





AN

+ ILLUSTRATED + WEEKLY + MAGAZINE +

FOR THE

ARCHITECT, ENGINEER, ARCHÆOLOGIST, CONSTRUCTOR,
SANITARY REFORMER, AND ART-LOVER.

CONDUCTED BY

H. H. STATHAM,

FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

"Every man's proper mansion-house, and home, being the theater of his hospitality, the seat of self-fruition, the comfortablest part of his own life, the noblest of his sonne's inheritance, a kinde of private principedome, nay, to the possessors thereof, an epitome of the whole world, may well deserve, by these attributes, according to the degree of the master, to be decently and delightfully adorned."

"Architecture can want no commendation, where there are noble men, or noble mindes."—SIR HENRY WOTTON.

"Our English word To BUILD is the Anglo-Saxon Bylðan, to confirm, to establish, to make firm and sure and fast, to consolidate, to strengthen; and is applicable to all other things as well as to dwelling-places."—DIVERSIONS OF PURLEY.

"Always be ready to speak your mind, and a base man will avoid you."—WILLIAM BLAKE.

VOLUME LI.—JULY TO DECEMBER, 1886.

OFFICE: No. 46, CATHERINE STREET, COVENT GARDEN, LONDON, W.C.

INDEX TO VOLUME IV

1886

ARTICLES AND REVIEWS

ILLUSTRATED WEEKLY MAGAZINE



INDEX TO VOLUME LI.

JULY TO DECEMBER, 1886.

CONTENTS.

Articles and Reviews	iii	Letters, Writers of	ix
Notes	v	Miscellaneous	ix
Reports of Meetings, Papers Read, Law Cases, &c.	vii	Architects, &c., of Buildings Illustrated	xi
Letters	ix	Illustrations	xv

ARTICLES AND REVIEWS.

- ABATE'S stove, 753
 Abbeys: Buckfast, 613; Mangan, 304;
 Tewkesbury, 374; Westminster, 177
 Aberdeenshire granites, 399, 434, 469, 504
 Academy, Royal: position of architecture
 at the, 473; prize drawings, 570; pro-
 posed rival exhibition, 410
 Aeropolis, recent excavations, 46
 Administration Report on Indian Railways,
 403
 Air process for purifying sewage, 824
 All Saints' Church, Peterborough, 749
 Almshouses, Fulham, 837
 Alpland, M., 801
 "Altaria," St. Marie's, Sheffield, 662
 American villa architecture, 907
 Amiens Cathedral, 907
 Amsterdam, new, 439, 603
 Amsterdam Gate, Haarlem, 478
 Ancester stone, 718
 Ancient buildings and restoration, 545
 Annual Report, Local Govt. Board, 691
 Anion stone, 734
 Antiquities of Paris, 7, 477
 Apparatus for sun-copying or heliography,
 750; for timber-drying, 618
 Arc and glow lamps, 575
Archæologia Cantiana, 755, 873
 Archæology, Greek, 548, 583
 Arches, Roman triumphal, 333, 371, 406,
 442
 Architect, the consulting, 759
 Architect's notes and sketches, an, 411
 Architectural: history of Cambridge, 115,
 153; notes in Kent, 187, 226, 263, 304,
 588; restorations, 545; sketching, 81
 Architecture: American villa, 907; in
 Amsterdam, 439; castellated, in Scot-
 land, 890; domestic, in Sussex, 192;
 early Christian, 617; position of, at the
 Royal Academy, 473; the romance of,
 687; Saracenic, 1
 Argyleshire granites, 574
 Arlington-street, 723
 Arms, shields of, 551
 Art: Early Scandinavian, 557; of Cyprus,
 the, 110; ecclesiastical, at Wakenfield,
 513, 550; of the Saracens in Egypt, 1
 Art, the ministry of, 932
 Athens, British School at, 583, 679, 727
 Art Gallery, Sheffield, 412
 Art schools in Paris, 191
 Art-workmen, Indian, 86
 Artillery Ground, Westminster, 119
 Artisans' dwellings, 189
 Aske's School for Girls, Hincham, 376
 Assembly Hall, Mile End, 628
 Athens, British School at, 583, 679, 727
 Atkins's water-softening process, 181
 Audlem, St. James's Church, 432
 Australian woods, 548
 Awards: at the Salon, 9; at the York Sanitary
 Exhibition, 495
 Aylesford, 228
- BALLU, the late M., 335
 Banks: London and County, Kensington,
 376, 429; Staffordshire, Birmingham, 857
 Bath, Roman remains at, 510
 Bath stone, 683
 Baths: Hampstead, 538; Poplar, 230
 Bath-street, artists' dwellings, 183
 Bench ends, Cornish, 296
 Berlin Museum, the, 546
 "Bethlehem," 296
 Bhora Shabpur, window from, 38
 Bickereth Hall, Hampstead, 149, 213
 Birmingham: Law Courts competition,
 151, 155, 169, 232, 301, 643, 679; shops
 and offices, Corporation street, 713;
 Wesleyan Chapel at, 874
 Blackpool, Church of the Holy Trinity, 268
 Boat-house, Christ's Coll., Cambridge, 574
 Bolsover stone, 754
 Bolton sewage works, 611
 Bombay terminus, G.I.P. Railway, 608,
 660
- Books, pamphlets, &c.: notices, reviews,
 and articles as to:—
Almanachs and diaries, 932
American Journal of Archaeology, 726
 André, J. L., Sussex Domestic Architecture,
 192
Archæologia Cantiana, 755, 873
 Architect and Contractor's Compendium,
 829
Art Annual, the, 619
Art-Journal, the, 168, 504
 Ballard, Dr., Results of a Sanitary
 Survey, 605
 Birkmyre, W., Revival of Trade by the
 Development of India, 303
 Boetticher, A., Olympia, 110
 Boiti, L., Il Palazzo Vitelleschi in Cor-
 neto Tarquinia, 3
 Brade, D., Picturesque Sketches in
 Italy, 692
 Bright, T. J., The Agricultural and Tenant
 Right, 763
 Britten, F. J., Watch and Clock Maker's
 Handbook, 932
 Brown, J., Brick Ornament, 408
 Brown, Prof. Baldwin, From School to
 Cathedral, 617
 Burlingame, H., and Simpson, W. H., Iron
 Plate Weight-Tables, 577
 Butterfield, W., Church Seats and Kneel-
 ing Boards, 226
 Calvert's Mechanic's Reference Book, 111
 Catalogues of the Berlin Museum, 546
 Church, A. C., Food Grains of India, 758
 Collignon, Maxime, Les Artistes Céle-
 bres.—Phœdrias, 49
 Comder, F. R., The Iron Process of
 Dealing with Sewage, 110, 145
 Diaries and Almanachs, 932
 Dictionary of the Building Trade, 578
*Dictionnaire Epigraphique di Antichità
 Romane*, 726
 Dunn, A. M., Notes and Sketches of an
 Architect, 411
 Edwards, J. C., Catalogue of Raabon
Terra-Cotta, 269
English Illustrated Magazine, 166
 Fürwagner, A., Beschreibung des
 Vasenmuseums in Antiquarium, 549
 Goodere, T. M., Manual of Mechanics,
 110
 Gray, G. G., Right to Lateral Support
 from Land and Buildings, 869
 Griffiths's Guide to the Iron Trade, 798
 Hastings, C. W., Gas and Water Com-
 panies' Directory, 441; Gasworks
 Statistics, 441; Waterworks Statistics,
 441
 Hermann's *Lehrbuch der Griechischen
 Antiquitäten*, 763
 Holwadia, A. E. J., Die alten Kyprien
 in Kunst und Kultur, 110
 Honeyman, J., The Incidence of Taxa-
 tion as affecting the Housing of the
 Poor, 903
*Jahrbuch des Kaiserlichen Deutschen
 Archæologischen Instituts*, 6
 Kelly, G. G., Electric Transmission of
 Energy, 755
 Kelly's Directory of the Building Trades,
 578
 Kerr, R., The Consulting Architect, 759
 Klein, Wilhelm, *Euphronios: Eine
 Studie zur Geschichte der griechischen
 Malerei*, 291
 Keech's Sketches of Life and Character, 7
 MacGibbon, D., and Ross, A., Castel-
 lated and Domestic Architecture of
 Scotland, 699
 Maier, J., Arc and Glow Lamps, 575
 Map of London, Vischer's, 1618, 86
 Merriman, M., Mechanics of Materials, 110
 Morgan, Thos., Roman-British Mosaic
 Pavements, 681
 Murray, R., Treatise on Marine Engines,
 290
- Books, Pamphlets, &c. (continued):—
 Museum of Athens, 46
 Perry, T. Gambier, The Ministry of
 Fine Art, 831
 Pausanias's Description of Greece, Trans-
 lated by A. R. Shilleto, 799
 Pilling, W., Order from Chase: a
 Treatise on Land Tenure, 895
 Poole, S. L., Art of the Saracens in
 Egypt, 1
 Porphyrio, the, 904
 Potter, T., Construction of Silos, 503
 Pottier, E., Reinach, S., and Veyries, A.,
La Vierge de Myrina, 894
 Prestwich, J., Geology: Chemical,
 Physical, and Stratigraphical, 367
 Price, J. E., Descriptive Account of the
 Guildhall of London, 795
*Professional Papers on Indian Engineer-
 ing*, 798
 Reichensperger, A., *Zur Profan Archi-
 tektur*, 40
 Report on Irrigation in Egypt, 901
 Russell, J. B., Vital Statistics of Glas-
 gow, 239, 869
 Sander, F., Reichenbachiana, 40
 Smith, C. Roach, Retrospections, Social
 and Archaeological, 505
 Smith, T. W., The Law of Bills, Cheques,
 Notes, and I O U's, 755
Statistical Abstract, the, 441
 Stevenson, D., Canal and River Engineer-
 ing, 865
 Technical Chemical Receipt Book, 578
 Templeton, W., and Hutton, W. S.,
 Practical Mechanic's Workshop Com-
 panion, 110
 Thurston, R. H., Treatise on Friction,
 110
 "Timber Trades' Directory," 576
 Variorum, 578, 933
 Vischer's View of London, 1616, 86
 Wanklyn, J. A., Gas Engineers' Chemical
 Manual, 576, 646
 Westlake, N. H. J., History of Design
 in Painted Glass, 259
 Willis, R., and Clark, J. W., Architect-
 ural History of Cambridge, 115, 163
 Wolters, P., *Die Gipsplastiken Antiker
 Bildwerke in Historischen Folge
 erklärt*, 546
 Worthwick Castle, 901
 Boughton Monchelsea, 264
 Boulogne harbor works, 763
 Bourne, new, Paris, 477
 Boyle's ship ventilator, 107
 Braid U.P. Church, Edinburgh, 907
 Bramley Fall stone, 791
 Brant memorial, the, Ontario, 89
 Bridge, the Tower, 10
 Bridge, proposed new, at Southwark, 511
 Bristol Church of St. Francis, 907
 British School at Athens, the, 583, 679, 727
 Brighton Orphanage for Fatherless Girls, 72
 Buckfast Abbey, 643
 Buenos Ayres improvements, 362
 Building materials, tests for, 727, 871
 Building records in Domesday Book, 653,
 717
 Building society disputes, 92
 Buildings, concrete, 123
 Buildings for Oxford University, 635
 "Buretticited," 296
 Burnley the Victoria Hospital, 644
 Bust of Plato, a, 534, 662
 Buxheim choir stalls, the, 269, 361
- CA' D'ORO, Venice, 902
 Cabinet, Edinburgh Exhibition, 857
 Cairo, architecture in, 2
 Cambridge: architectural history of, 115,
 153; boat-house at, 574
 Canadian: monument, a, 88; woods, 548
 Canal and river engineering, 865
 Canal: North Sea, 698; Panama, 46
 Canterbury, St. Augustine's Gateway, 749
 Carlyle mansions, Chelsea, 626, 685
 Carmelite monastery, Kensington, 54
- Carving, Northumberland-avenue Hotel,
 679
 Castellated architecture of Scotland, 899
 Castle for the Emperor of Russia at Spala,
 609
 Castles: Glenbuck, 376; Kent, 227, 264;
 Löwenstein, Wertheim, 767; Newark,
 Renfrewshire, 802; Oystermouth, 304;
 Scotch, 899
 Casts: in the Berlin Museum, 547; at
 South Kensington, 587
 Catalogues of the Berlin Museum, 546
 Cathedrals: Amiens, north aisle of choir,
 907; Chichester, sculptured aisle, 53,
 835; Gloucester, 177; Liverpool, Mr.
 Christian's report, 650; Liverpool, de-
 signs for, 618, 807; Mechlun, 10; Old St.
 Paul's, the "new work," 662
 Cement: new applications, 832; tests, 727
 Ceremonial trowel, a, 80
 Chandler, Stanley's secret-balance, 559
 Changes: in St. George's, Southwark, 621;
 at Seotland-yard, 519; at the Tower, 157
 Chapels: Countess of Huntingdon's, Spa
 Fields, 727; Marlborough College, 554;
 Wesleyan, Birmingham, 374
 Charter, Royal Institute of Architects, 329
 Chelvey Church, new in, 432
 Chester, the Grosvenor Museum, 231, 285
 Chevreuil, centenary of M., 336
 Children's Hospital, Shadwell, 224, 291, 324
 Choir aisle, Westminster Abbey, 177
 Choir stalls from Buxim, 269, 361
 Christian, Mr. E., on the Liverpool Cath-
 edral designs, 867
 Christian architecture, early, 617
 Churches: St. James's, Audlem, 432; Holy
 Trinity, Blackpool, 268; U.P., Braid,
 Edinburgh, 907; St. Francis, Ashton-
 gate, Bristol, 907; Ellingham, 823;
 Farchm, 614; Great Barton, tower and
 porch, 163; St. Mary's R.C., Hamp-
 stead, 124; St. Saviour's, Holloway, 626;
 St. Nicholas, Ipswich, 71, 478, 573, 682;
 in Kent, 227, 264; Kingsbury, 51; St.
 Mary Magdalen and St. Gregory by St.
 Paul's, London, 839; Lullington, 873;
 Macleodfield, 766; Maidstone, 223; Sacred
 Heart, Montmartre, 181, 477; Mos-
 borough, 374; All Saints', Peterborough,
 749; Plympton St. Mary, reared at,
 338; St. Ignatius R.C., Preston, 432;
 Rossett, Denbighshire, 482; St. Bartholo-
 mew, Smithfield, 657; St. Mary Overie,
 Southwark, 444; St. Peter's, Streatham,
 90; Taddington, proposed, 198; village,
 designs for, 713; Waverley R.C., 54; Wel-
 lingtonborough R.C., 682; Prebysterian,
 Wimbledon, 141
 Circular wards for hospitals, 644
 Classification of rocks, 59, 77
 Club, the Constitutional, 535, 575
 Clony Museum, Paris, 477
 Coats of thread-mills, Paisley, 767
 Colham, 187, 228
 Coffee-tavern for a village, 196
 College, Marlborough, Chancel, 514
 College, Royal Holloway, Egham, 36, 54
 College, Cambridge, the, 115, 153
 Colonial Exhibition (see "Exhibitions")
 Colonial Institute, Northumberland-avenue,
 679, 719
 Colonial Institute, proposed, 510
 Colonial woods, 548
 Colonnade, Temple of Vesta, Rome, 124
 Concrete: building, 122; telegraph poles,
 832
 Conder's iron process for sewage, 110
 Congregational Church, Woodford, 874
 Constitutional Club, the, 535, 575
 Construction of silos, 503
 Consulting architect, the, 759
 Corneto Tarquinia, Palazzo Vitelleschi, 3
 Cornish: bench-ends, 296; granite, 218, 254
 Cottages, Kenish, 588
 Couplings, automatic, 85, 573
 Craftsmen, Indian, 86
 Cross, the, in heraldry, 765

ARTICLES AND REVIEWS (continued).

Scotland, episcopal heraldry of, 336
 Scotland, changes at, 549
 Screens: Lullingstone Church, 873; at the Indian Exhibition, 90
 Sculpture: in the Berlin Museum, 547;
 "Cloopatra," 588; for Paris, 533; Royal Museum, Leipzig, 801; Scandinavia, 587
 Sculptured stones: Chichester Cathedral, 53, 535; Ipswich, 475, 673, 682
 Seals, the Great, in Heraldry, 410
 Secret-balance chandelier, 539
 Seventeenth-century houses round London, 764
 Sewage: in the Thames, 609; treatment, 110, 145; purification, 824; works at Bolton, 611
 Sewers, ventilation of, 583
 Shadow Hospital, 224, 291, 324
 Sheffield, the Mappin Art Gallery, 412
 Shields of arms, 551
 Ship ventilators, 107
 Shops, Corporation-st., Birmingham, 713
 Shrires at St. Marie's R.C. Church, Sheffield, 662
 Sign-board, Edinburgh Exhibition, 537
 Siles, construction of, 505
 Simla, concrete building at, 122
 "Siphonella" pipe-faceting, the, 182
 Sketches: by an architect, 411; in Italy, 428; in Holland, 875, 788, 785; in St. Mary Overie's, 444; in Tewkesbury Abbey, 874; by the Welland, 404
 Skating for students, 81, 145
 Snodland, Holbrooke Court, 413
 Somerhill, 263
 Sorbonne, the new, 9, 336
 South Kensington Museum, prize drawings at, 179
 Southwark: changes in, 621; St. Mary Overie's, 444
 St. Peter's Chapel, 727
 Spala, new castle for the Czar, 609
 Spanner, a new, 145
 Stadium at the Hague, 785
 Staffordshire Bank, Birmingham, 867
 Stained-glass, history of, 239

Stained-glass window, City of London School, 304
 Staircase, the Mairie, Neuilly, 857
 Stallwork from Buxheim, 299, 361
 Stairs: the aerial-balance chandelier, 539
 Staple Inn, 685
 Statues: to Gambetta, 9; to Lamartine, 9; of the late G. E. Street, 9, 191
 Steppes, old houses at, 764
 Stevenson, the late David, F.R.S., 144
 Stirling Castle, 900
 Stockholm: house near, 554; notes, 572
 Stone Age graves at Falkoping, 225
 Stone carving at the Indian Exhibition, 119
 Stonehenge, present state of, 760
 Stone quarries (see "Students' Column")
 Stones, sculptured: Chichester Cathedral, 53, 535; Ipswich, 475, 673, 682
 Story of a wall, the, 443
 Stove, Abate's, 753
 Streatham, St. Peter's Church, 90
 Street, G. E., monument to, 9, 191
 Stroll by the Welland, a, 404
 Students' Column: Stone Quarries—Aberdeenshire granites, 399, 434, 480, 504; classification of rocks, 39, 77; Devon and Cornwall granites, 218, 264; Gernsey granites, 363, 399; Hornblende granites, 290, 324; Irish granites, 612; Kincardine granites, 510; Kirkcaldy bright granites, 574; limestones, 647, 683, 717, 754, 790; metamorphic and igneous, 109, 146, 181; sandstones, 790, 826, 861, 894; slates, 91
 Studios, South Kensington, 518
 Sun-copying or heliography, 789
 Sunderland municipal buildings, 90, 141
 Surrey, a sanitary, 905
 Sussex domestic architecture, 192
 Sweden: forests in, 337, 506; notes from, 572; Stone Age graves in, 225
 Sycietes, 324, 363
 TADEMA, Mr., ironwork designed by, 412
 Tahapan, Pharaoh's house, 337, 372
 Tavern, Edgware-road, 708
 Teddington, proposed new church, 198
 Telegraph-poses, concrete, 832
 Temple of Vesta, Rome, 124

T. minims G.I.P. Railway, Bombay, 808, 650
 Terra-cotta facade in Oxford-street, 445
 Tests for building materials, 727, 871
 Tewkesbury Abbey, 874
 Textiles at the Indian Exhibition, 119
 Thames: bridge, proposed new, 511; pollution, 609
 Thread-mills, Paisley, 787
 Thurston's treatise on Friction, 110
 Thwaites, B. H., on new applications of concrete, 833
 Timber-drying apparatus, 608
 Timber, preservation of, 260, 298, 655, 872
 Timbers, Colonial, 548
 Tombs: Lullingstone Church, 873; St. Mary Overie's, Southwark, 444
 Tombstone, Scandinavian, 567
 Topographical Society of London, 86
 Tower of London, the, 167, 196
 Tower Bridge, the, 10
 Toweds: All Saints' Church, Great Bourn-ton, 183; Eiffel, Paris, 9, 447, 729; Gloucester Cathedral, 177; Mechlin Cathedral, 10; St. Nicholas's Church, Ipswich, 71
 Town-halls: Eastbourne, 685; Motherwell, 571
 Trade, the revival of, 303
 Traffic, railway, 440
 Treasury house, Tower of London, 167, 196
 Trinity Presbyterian Church, Wimbledon, 141
 Triumphal arches of the ancient Romans, 333, 371, 408, 442
 Trowel, a ceremonial, 90
 Tunbridge Wells, house at, 874
 Turner, G. R., on the preservation of wood, 280, 298
 Twickenham, houses at, 196
 Tynte Pew, Chelvey Church, 482
 UNIVERSITY buildings, Oxford, 535
 VASE-PAINING, Greek, 291, 546
 Venice: the Ca' d'Oro, 502; St. Mark's, 545, 572, 588, 796
 Ventilation of sewers, 582
 Ventilator: Honeyman's "Diaphragm," 486; ship, 107

Versailles, building at, 478
 Victoria Hospital, Borneo, 644
 Victoria Hospital for Children, Chelsea, 38
 Victoria-street, Prince's Mansions, 232
 Villa architecture in America, 907
 Village churches, designs for, 713
 Village coffee-tavern, a, 196
 Vischer's view of London, 1616, 86
 Vital statistics of Glasgow, 228, 569
 Vulliamy, the late George, 724, 728, 753
 WAKEFIELD, ecclesiastical art at, 513, 550
 Wall, the story of, a, 404
 Warehouse facade, a, 333
 Warehouses: Rochester-row, Westminster, 196; St. Paul's Churchyard, 518, 573
 Warley, All Saints' R.C. Church, 54
 Water-gate, the Palace, 10
 Water-softening at Henley, 181
 Welland, a stroll by the, 404
 Wellington R.C. Church, 682
 Wesleyan Chapel, Birmingham, 874
 Westminster: Abbey, choir aisle, 177; Artillery Ground, 119; Parliament and Great George-streets, 904; St. James's Dwellings, 180; warehouses in Rochester-row, 196
 Whitechapel, industrial dwellings, 713
 Wimbledon, Presbyterian Church, 141
 Windmill-pump for irrigation, 85
 Window from Shera Shahpur, India, 36
 Windsor, City of London School, 304
 Women's Fawcett Memorial, 788
 Wood, Colonial, 548
 Wood, preservation of, 260, 298, 655
 Working-machine machinery at the "Colonies," 84
 Woodford: Congregational Church, 874
 Woodlands Park, Stoke D'Acre, 749
 Workhouse for the Holborn Union, Mitcham, 688, 646, 682, 717
 Workshops at public and private schools, 369, 405, 476, 726
 Wren, a church, burned down, 839
 Wrotham-place, 264
 YORK, sanitary exhibition at, 465, 480, 542
 ZUYDER ZEE, the, 608

NOTES.

Academy, Royal: architects in the, 332; opposition to, 228, 299, 332, 399
 Action, excavations on the, 548, 585, 689
 Acton drainage, 118, 578, 585
 Adams's automatic sewer flushers, 690
 Adelphi Theatre enlargement, 763
 Adams, Messrs., exhibition of pictures, 895
 Agricultural machinery in India, 903
 Aldwinckle, Mr., and relief works, 6
 American Architect, the, and Mr. George Godwin, 725
 American iron and steel, 332
 "Ancient lights," Shaftesbury-avenue, 585
 Appointments at the Office of Works, 189
 Approaches to Southwark Bridge, 619
 Archaeological Institute of America, 118
 Archaeological Society of Athens, 160, 548
 Archaeological survey in India, 194
 Archaeology, Greek, 6, 47, 54, 156, 547, 548, 584, 655, 689, 728, 762, 799, 834, 904
 Architects: Belgian, 333; and the Royal Academy, 332, 589; and street names, 411
 Architects' commission, 393
 Architectship, M.B.W., 117, 189, 215, 226, 511, 720, 798
 Architectural Association excursion, 156
 Architectural casts, South Kensington, 6
 Architectural federation, 655, 618, 645, 763
 Architecture: Dublin, 441; Palagio, 118
 Areas in rear of buildings, 762
 Art Annual, the, 619
 Art Journal, the, 156, 904
 Art-criticism and the Times, 191, 263
 Art-workers' Guild, Liverpool, 226
 "Arts of Peace," the, 239, 338
 Assos, discoveries at, 118, 726
 Athens: discoveries in, 47, 156, 548, 689, 762, 799; French School at, 548
 Awards at the Liverpool Exhibition, 620
 Balata gum-tree, the, 870
 Barony Church competition, Glasgow, 584, 619
 Basson, Doric, found at Assos, 726
 Basson, Fortification of, 51
 Bath City Architect's competition, 263
 Baths, Roman, at Bath, 370, 469, 503, 510, 527, 670
 Bathmen of the Ca' d'Oro, Venice, 283
 Beaufield, Backs, 6
 Bedrooms and w.c.'s in Bloomsbury, 369
 Belg an architect, 83
 Belin, Parliament Hall, seats in, 690
 Berlin Museums, 6, 408
 Birkenhead Docks Canal, 283
 Birmingham Law Courts, designs, 155
 Birmingham: Church, Forest; houses, 369
 Board of Trade: labour statistics, 684; railway returns, 332

Bog, reclamation of, 569
 Boiler explosions, 761
 Bolzano, Sic, and monuments at Venice, 190
 Bradford, waste of water at, 809
 Bradford-on-Avon Church, 411
 Bribes offered to architects, 84
 Brick ornament, 408
 Bridge, Southwark, 619
 Brighton, new projects at, 833
 British iron, 547, 655
 British Museum, the Hera of Gigenti, 619
 Bronze strid, Greek, in the Louvre, 726
 Brussels Canal, proposed, 903
 Bueclough estate, Richmond, 83, 370, 476, 511, 578, 619
 Building-trade, drink in the, 190, 220
 Bulwer, Sir H., and excavations in Cyprus, 762
 Bureau for labour statistics, 584
 Burnham, railways in, 476
 Bury St. Edmunds, discoveries near, 441
 Bust of Plato, a, 584, 662
 Burmah, oak stalls from, 299, 361
 Ca' d'Oro, Venice, 263
 Cambrian Archaeological Association, 225
 Canadian railways, 117, 644, 761
 Canals: proposed, Birkenhead Docks, 262; between Brussels and the sea, proposed, 903; Manchester ship, 117, 155, 181, 998; neglect of, 619, 833; Panama, 183, 225, 651, 904; between Rouen and Paris, proposed, 548; the Thames and Severn, 538
 Cardiff, scavenging at, 262
 Carlisle markets competition, 477
 Carnegie, Mr., his gift to Edinburgh, 407
 Carving of Highlanders from Blickling Hall, 834
 Castle, Balthard, d, 83
 Casts at South Kensington, 6
 Cathedrals: Chester, 903; Cork, 763; Hereford, 903; Liverpool, 763, 834; Winchester, 903
 Catermole, Mr., etchings by, 476
 Cement: strength of, 762; Louisville, 690; and magnesia in, 156
 Cement and mortar, 725
 Chain pier, Brighton, 833
 Chambers Memorial, Edinburgh, 236
 Chancellor of the Exchequer and the Coal Dues, 761
 Changes in Rome, 190
 Chantilly and the Duc d'Aumale, 511
 Chapel, Saxo, at Deerpark, 332, 689
 Chapel or house? 118
 Charges, railway, 441
 Charnwood Forest Railway, 725
 Chastillon, French national monument at, 299, 336

Chester, 158; Cathedral mosaics, 903
 Cheshire: home inspection, 407, 469;
 sewage, 126
 Choir stalls from Buxheim, 299, 361
 "Church House," proposed, and the Chatterhouse, 690
 Church organs, 611
 Church-seats and kneeling-boards, 226
 Churches: Bloomsbury, 408; Bradford-on-Avon, 441; Hereford, 903; Llantwit Major, 263; St. Bartholomew's Smithfield, 762, 798; St. Paul's, Kensington, 118; Stratford-on-Avon, 191
 City Architect, the, 190
 Classical buildings in Dublin, 441
 Clement's Inn, 476
 Club-house, National Liberal, 904
 Coal and Wine Dues, the, 761
 Coasts, erosion of, 726
 Cockburn Association, Edinburgh, 118
 College, University, Wales, 226
 Colonial: forest-laws, 83; railways, 189, 195
 Column and lion, Piazzetta, Venice, 190
 Commercial museums, 863
 Condition of Stonehenge, 225
 Congress, the Trades' Union, 370, 407
 Contractors and contracts, 84
 Commissions, illicit, 84, 585, 799
 Compensation by railway companies, 6
 Competition conditions at Sunderland, 333
 Competition, Barony Church, Glasgow, 584, 619
 Cork Cathedral organ, 753
 Cost of London drainage, 689; railway traffic, 725; scavenging, 262
 Couplings, railway, 833
 Cremation, 611, 797
 Cyprus, excavations in, 762
 Dance of Death, the, 269
 Dances and small box hospitals, 370, 797
 Death-rate and "disconnection," 407
 Debaraters in payment of contractors, 725
 Deerpark, Saxo chapel at, 332, 689
 Demolition of Portsmouth, the, 584
 Deprez's experiments on electrical motive power, 225
 Designs, Birmingham Law Courts, 155
 Diocletian, Woburn, and Southampton Railway, 680
 Dionysus theatre at Athens, 762
 Directors, liabilities of, 725
 "Disconnection," 407
 Discoveries: at Assos, 118, 726; in Athens, 47, 156, 548, 689, 762, 799; in Egypt, 6; at Olympia, 834; at the Pelreus, 84; at Winchester Cathedral, 903
 Distraint, the law of, 654, 689
 District Surveyors and their duties, 665

Dividends of gas companies, 190
Donario Epigrafico di Antichità Romane, 226
 Done for Edinburgh University, 225
 Donaghadee and Portpatrick tunnel, proposed, 190
 Doric shaft found at Assos, 726
 Dorpfield, Dr., and Tyrre, 47, 117, 142
 Drainage: Acton, 118, 678, 685; house, 639; in Ireland, 618; London, cost of, 689; Richmond, 48, 370, 614, 694; West End of London, 655
 Draughtmen, hints to, 690
 Drawings for publication, 990
 Drink in the building trade, 190, 223
 Dry-rot, alleged cure for, 655
 Dublin, Classical buildings in, 441
 Durability of water-colours, 5, 47, 408
 Duties of District Surveyors, 655
 Earthquakes and building, 369
 Easement of light, the, 408
 Economy of cremation, 511
 Edinburgh: Cookburn Association, 118; free library for, 407; Harrison memorial, 226; Municipal Buildings, 262, 298, 332, 370, 646; University, done for, 225
 Education, technical, 338
 Egypt, discoveries in, 6
 Elections, inconveniences of, 5, 83
 Electric lamps, portable, 370
 Electrical motive power, 225
 Elmes and St. George's Hall, 611
 Empire of rivers, our, 868
 Employers' Liability Act, 48
 English Illustrated Magazine, 156
 Epidaurus, discoveries at, 547, 619, 799
 Erosion of our coasts, 726
 Etchings by Mr. Catermole, 476
 Excavations: on the Acropolis, 548, 685, 689; in Cyprus, 762; at Epidaurus, 647, 619, 799; at Pompeii, 762; at Rome, 7
 Excursion, Architectural Association, 166
 Exhibition of art, proposed: national, 226
 Exhibition awards, Liverpool, 620
 Exhibition at the Polytechnic, 333
 Exhibitions and the Press, 47
 Exhibitions of pictures, 5, 47, 407, 408, 763, 799, 835
 Expenses in tendering, 47
 Experiments with electrical motive power, 225
 Explorations: at Assos, 118; at Athens, 156
 Explosions of boilers, 761
 Fall of an arch at the new baths, Bath, 570
 Failures in railway shunting, 833
 Fawcett monument, Thames Embankment, 156

NOTES (continued):—

- Federation, architectural, 655, 615, 645, 739
Fawson's sewer-gas destructor, 370, 477
Financial position of Panama Canal, 189, 225, 654
Fine Art Society's exhibitions, 620, 835
Fire at Hampton Court, 763
Fireproof cement, 762
First Commissioner of Works, 189
Flushing sewers, 690
Fogs, the, and street lamps, 798
Forest laws in the Colonies, 63
Forging steel, 156
Fortifications of Bassano, 511
Forts at Portsmouth, 584
France, railway construction in, 655
Free library for Edinburgh, 407
French school at Athens, 548
Fresco: in Brittany, 209; by Sir F. Leigh-ton, 389, 393
Fuel, petroleum as a, 6
Fulham Ventry Hall competition, 157
Fuller's sketches from "Petrarch's Country," 620
Furtwängler, Dr., and the Hera of Giriti, 619
Gas-lamps and fog, 798
Gas-meters, hire of, 699
Gasworks statistics, 441
Gasworks and municipalities, 190
General elections, inconveniences of, 5, 83
Germany, cremation in, 797
Glasgow, Barony church competition, 684, 619
Godwin, George, and the American Architect, 725
Goupil Gallery, the, 119
Government work, 584
Government of London, the, 83
Grand Trunk Railway of Canada, 654
Grave-relief, curious, 934
Gray's Inn-road, widening, 869
Greene, new railways in, 788
Greek architecture, 6, 84, 16, 54, 167, 548, 634, 685, 689, 726, 762, 799, 834, 904
Grintheop, Lord, and Precentor Venables, 408, 476
Growth of London, 656
Guide to the iron trade, 7, 798
Gutters and roofs, 685
Hammer-smith: Ravenscourt Park, 511; sanitary energy at, 699
Hampton Court, pictures at, 726
Harrison memorial, Edinburgh, 293
Harbours, Irish, 619
Heads, the Tega, 7
Hebb, Mr., and the Metropolitan Board of Works, 189
Henrick Heaton, Mr., and intercolonial postage, 476
Hera of Giriti, the, 619
Hereford Cathedral, 903
Hermes of Praxiteles, the, 655
Herne Church, 834
Highlanders, carved, from Blickling Hall, 834
Hint to secretaries, a, 904
Hire of gas-meters, 699
Hofburg Theatre, Vienna, 690
Holborn: Leather-lane, 441; Staple Inn, 190, 689
Holloway College key, 7
Holyrood Chapel, Edinburgh, 119
Honeyman, Mr., and the Barony Church competition, Glasgow, 584, 619
Hume, open air, 384
Hospitals, small-pox, Darent, 370, 797
Houghton, 83
House or chapel? 718
House: drainage, 656; inspection at, Chiswick, 407, 469; rates, 903
Houses, insensate, in Central London, 369
I'Anson, Mr. E., 655
Illicit commissions, 84, 585, 799
Illustrations, the preparation of, 690
Imperial Institute, the proposed, 725
Imperial Museum, Berlin, 408
Improvement in St. Paul's Churchyard, 83
Incorporation of West Ham, 656
India: agricultural machinery in, 903; archaeological surveying in, 190
India-rubber and gutta-percha, 370
Indian railways, 408
Injury to property by railways, 6
Industries, Irish, 618
Insanitary houses in Central London, 369
Insurrection, the, London, 834, 870
Institute of Architects: and architects' commission, 263; federation, 118, 645; Light and Air Committee, 47; President's address, 655; travelling pass, 225
Institute of Painters in Water-colours, 789
Institution of Civil Engineers, 698
Intercolonial postage, 476
Ireland, light railways in, 165, 252
Irish ports and harbours, 618
Iron trade: American, 334, 547; British, 547, 655, 798
Jahrbuch des Kaiserlichen Deutschen Archäologischen Instituts, 6
Jeans, J. S., on railway traffic, 725
Jones, Sir Horace, 190
"Jubilee": celebration schemes, 903; medals, 904
Kensington, Church of St. Paul, 118
Kensington exhibitions and the Press, 47
Kermartin, France, at, 299
Key of Holloway College, 7
Kline, Roman, near Bury St. Edmunds, 441
Knowing in church, 298
Knightbridge for the City Architect, 190
Labour: representation, 407; Statistical Bureau, 684
Ladies' monument to Prof. Fawcett, 156
Lamps, electric, 370
Land question, the, 379
Landlord's liabilities, 726
Larigue railway, the, 370, 542
Lateral support, right to, 569
Law of distraint, the, 654
Law Courts designs, Birmingham, 155
Leather-lane, Holborn, 441
Lectures by Miss Harrison, 585, 870
Leech's Sketches of Life and Character, 7
Leighton, Sir F., fresco by, 209, 338
Levensham inscription, the, 834, 870
Lettering on plans, 580
Liabilities: landlords', 726; employers', 48
Light, the easement of, 408
Light and Air Committee, R.I.B.A., 47
Light railways in Ireland, 155, 252
Lights, ancient, 585
Lincoln's Inn, Thurlow's chambers, 904
Linton, Sir J., and the durability of water-colours, 5
Lion of St. Mark's, the, 656
Liverpool: Art Workers' Guild, 226; Autumn Picture Exhibition, 407; Cathedral competition, 763, 834; Exhibition awards, 620; sculpture for St. George's hall, 190, 252, 548, 611
Llanthwyt Major Church, 263
Locomotives and bridges, 726
London: drainage, coal, 689; gas supply, the, 190; government, 83; growth of, 656; water companies and the Thames Conservancy, 680
London and North-Western Railway, 298
Louisville cement, 690
Lyons' snow-melter, 833
Machinery, agricultural, in India, 903
Magnesia in cement, 156
Malpractice, trade, 298
Manchester: picture exhibition, 408; sanitation at, 689; ship canal, 117, 155, 181, 519
Manufacture of steel, 156
Markets, proposed, Carlisle, 477
Marble collection of works by Rubens, 118
Masonry, waterproofing, 333
Medals: Jubilee, 904; Liverpool Exhibition, 620
Medullus Lackrymans, alleged cure for, 665
Metopes of the Parthenon, 655
Metropolis Management Amendment Act, 225
Metropolitan Asylums Board and the smallpox local question, 797
Metropolitan Board: the Architect, 117, 159, 215, 226, 511, 727, 798; the Coal Mines, 761; overhead wires, 654; Westminster drainage, 555
Metropolitan Railways: London, 333; Paris, 298
Middle London Railway, 298
Mithreum, the, at Ostia, 619
Monuments: French national, at Châtillon, 299, 338; Isaac Walton, 548; Prof. Fawcett, 156
Moreau, Gustave, water-colours by, 726
Mortar: made with "sewer sand," 655; flag cement in, 725; gans in, 834
Mortlake drainage scheme, 470
Mosaics: at Chester Cathedral, 903; St. Mark's, Venice, 191, 263
Municipal pumping engines, 870
Municipal buildings: Edinburgh, 282, 298, 332, 370, 643; Sunderland, 48, 103
Munich's picture of "The Last Moments of Moses," 834
Murray, Mr., and the Hera of Giriti, 619
Museums: Berlin, 6, 408; commercial, 83; South Kensington, 6
Mycene sword-blades, the, 655
"National" Exhibition of Art, proposed, 226
National Liberal Clubhouse, 904
New York: obelisk in Central Park, 476; "Old London" in, 889; telegraph wires in, 263
Non-removal at Manchester, 669
Non-acceptance of lowest tender, 869
Notice to demolish, 225
Oak stalls from Buxheim, 299, 361
Obelisk, the New York, 476
Offer, a tempting, 585
Office of Works, the, 189
Offices, new, for Metropolitan Police, 190
"Old London" in New York, 889
Old Paris, 298
Olympic discoveries at, 834
Open areas in rear of buildings, 762
Open spaces for London, 658, 834
Ordinance Committee's Report, 685
Organ, Cork Cathedral, 793
Organ-chambers, 511
Ornamental brickwork, 408
Ostra, Temple of Minerva, 619
Overhead wires, 263, 654
Palmer, Sutton, water-colours by, 799
Panama Canal, the, 189, 215, 654, 94
Paris a sejour, 548; the Metropolitan railway at, 298
Parks: Kilmartin, 511; London, 656
Parthenon monuments, 655
Passenger receipts, 298
Pausanias' "Description of Greece," 798
Pelagos, discoveries at, 84
Pelagic architecture, 118
Peorose, Mr., and the Roman baths at Bath, 370
Percy, Dr., iron trade statistics, 547
"Petrarch's Country," sketches from, 620
Petrol as fuel, 6
Petrol's house in Tabernas, 6
Philadelphia Towall, 727
Pictures: exhibitions of water-colours, 726, 798; at Hampton Court, 763; at Liverpool, 407; at Manchester, 468; from the Salons, 119; at Tooth & Son's gallery, 620; at Mr. Wallis's gallery, 763
Pisto, authentic bust of, 584, 682
Plumbers, registration of, 333
Ploaier, the late M., 333
Police Office, Central London, 190
Pollution of the Thames, 441, 509
Pompeii, excavations at, 762
Portable electric lamps, 370
Port of St. Petronio at Bologna, 6
Portfolio, the, 904
Portpatrick and Donaghadee Tunnel, proposed, 189
Ports, proposed tunnel for connecting the defences, 684
Post-office extensions, 299
Postage, intercolonial, 476
Pottery, Roman, at Bury St. Edmunds, 441
Praxiteles's Hermes, 655
Preservation of stone, 333; of timber, 855
President's address at the Institute, 655
Press, the, and Kensington exhibitions, 47
Properties, historic, in the market, 83
Protection of Egyptian obelisks, 476
Proxy question, the, 156
Pumping engines at Mulhausen, 870
Rails (disused), utilisation of, 798
Railway: accounts, 298; Bill, the, 262; companies, compensation by, 6; construction in France, 655; couplings, 833; neglect of canals, 619, 833; passenger receipts, 298; rates, 441, 511, 547; returns, 83, 333; station, Willesden Junction, 690; traffic, cost of, 725
Railways: Canadian, 117, 761; Colonial, 190, 156; Didcot, Newbury, and Southampton, 690; Grand Trunk, 654; Indian, 408; Larigue, 370, 542; Metropolitan, Central London, 333, 155, 252; proposed Metropolitan, Paris, 298; in the Peloponnese, 798; York-shire, 189
Rater, railway, 441, 511, 547
Ravenscourt Park, Hammer-smith, 511
Receipts, railway, 53, 332
Reclamation of the Salton, 669
Registration of buildings, 763; of plumbers, 333
Relief of Clement's Inn, a, 476
Relief of works at Wandsworth, 476
Repair, "tenantable," 190
Report of the Ordnance Committee, 685
"Restoration": at St. Alban's, 476; of Westminster Hall, 390, 332, 370, 407, 440; of Holyrood Chapel, 118; at St. Bartholomew's, 762, 798
Retail of coal, 332, 655
Richmond: Buccleuch Estate, 83, 370, 476, 611, 678, 619; drainage at, 48, 370, 614
Richman's extension, Metropolitan Railway, 333
Right to lateral support, 869
Rivers, our empire of, 889
Robinson, J. C., and the durability of water-colours, 5, 47
Robson's balanced ashes, 477
Roman baths at Bath, 370, 469, 503, 510, 762, 870
Roman remains near Bury St. Edmunds, 441
Rome: discovery of stones, 555; excavations, 190; the Colosseum, 190; Victor Emmanuel monument, 7
Roof of the Berlin Museum, 6
Roofs and gutters, 465, 655
Rosen and Paris Canal, proposed, 548
Royal Academy, opposition to, 226, 299, 332, 399
Rushmore-cotta, 299
Rubens, works by, 118
Russia, reclamation of bog, 869
Saint Alban's Abbey, 405, 476
St. Bartholomew's, 762, 798
St. George's Hall, Liverpool, 190, 252, 545, 611
St. Mark, the lion of, 658
St. Mark's, Venice, 191, 263
St. Paul's Churchyard, 83, 673
Site of Staple Inn, Holborn, 190, 689, 695
Sales under the Settled Land Act, 156, 403
Salon, pictures from the, 119
Salwood Castle, 83
Sanatorium wanted at Windsor, 84
Sanitary inspectorship, Twickenham, 869
Sanitary Registration of Buildings Bill, 763
Sanitation: 7; at Hammer-smith, 689; at Manchester, 689
Sashes, balanced, 477
Saxon Chapel at Dehurst, 332, 689
Saxon Church, Bradford-on-Avon, 441
Scarborough, Bridlington, and West Riding Railway, 189
Scaffolding, cost of, 262
Schemes, Jubilee, 903
Schliemann, Dr., and Tiryns, 47, 117, 142
School workshops, 476, 728
Shelf, Doris, found at Aves, 728
Shafter's-avenue, "ancient lights," 565
Shareholders and proxies, 156
Shelf, trade malpractice at, 298
Ship canal, Manchester, 117, 155, 181, 868
Shrewsbury water supply, 119
Simplex tunnel, the, 834
Site for police extension, 299
Sketches: by Mr. Fullerylove, 620; by John Leech, 7
Slag cement in mortar, 725
Smallpox: at Windsor, 84; hospitals, Darent, 370, 797
Society of Artists, 763
Society of British Artists, 799
Society of Metallurgists, 804
Society of Painters in Water Colours, 799
South Kensington Museum, 6
Southwark Bridge, approaches to, 619
Stairs in Westminster Hall, 332, 440
Stalls from Buxheim, 299, 361
Staple Inn, Holborn, 189, 689, 695, 762, 799
Statistical Abstract, the, 441
Statistics of: colonial railways, 189, 195; gas and water works, 441; the iron trade, 547; labour, 584; railway, 332
Statues: Isaac Walton, proposed, 548; lead, in Clement's Inn, 476; found at Epidauron, 347; found at Rome, 685; Victor Emmanuel monuments, Rome, 7; Wellington, 798
Steel manufacture, 156, 547
Stela, curious, 904
Stone, preservation of, 333
Stonehenge, condition of, 225
Stones of Temple Bar, 256, 476
Strains due to rolling roads, 726
Stratford-on-Avon Church, 191
Street nomenclature, 673
Streets named after architects, 441
Strigell, Currier, in the Louvre, 728
Sugar in mortar, 834
Surrey: new Municipal Buildings, 48, 108; schools competition, 333
Superintending Architectship, M.B.W., 117, 189, 215, 226, 611, 720, 798
Swiss meeting of the Ambrian Archaeological Association, 225
Sword-blades, Mycene, 655
Taxation and the housing of the poor, 603
Technical education: the Polytechnic, 333
Tega heads, the, 7
Telegraph wires, overhead, 263, 654
Telegraphs, 370
Temple Bar, 256, 476
Temple of Minerva, Ostia, 619
"Tenantable repair," 190
Tender, non-acceptance of lowest, 869
Tenders and commission, 263
Tenders, law as to, 47
Terra-cotta, Euston, 299
Thames: Severn canal, 833
Thames and sewage pollution, 441, 609
Thames-supplied London water, 680
Thames: Adelphi, 763; Hofburg, Vienna, 690
Thurloe and Lincoln's Inn, 904
Timber, preservation of, 655
Tiryns, the, and art criticism, 191, 263
Tiryns, 47, 117, 142
Tomb of Waller at Beaconsfield, 6
Tomb of Sir John Lubbock, 689
Tower, "Victoria Jubilee," 666
Townhall, Philadelphia, 727
Trade: malpractices, 298; revival of, 332, 685
Trades' Union congress, 370, 407
Traffic, railway, 725
Traffic, the, in Rome, 190
Travelling-pass, Institute of Architects, 225
Tunnels: proposed, at Portsmouth, 584; between Scotland and Ireland, 190; of the Great Eastern, 190
Ventilation of sewers, 370, 477
Vegetables of Old Paris, 298
Vestiges Hall, Fulham, 157
Victor Emmanuel monuments: Rome, 7; Venice, 84
"Victoria Jubilee Tower," proposed, 656
Vienna, the Hofburg Theatre, 690
Wales, University College of, 226
Waller's tomb, Beaconsfield, 6
Wandsworth, relief works at, 6
Water-carriage, 619
Water-colour exhibitions, 726, 799
Water-colours, durability of, 5, 47, 408
Water-meter, a new, 870
Water rates at Dewsbury, 235
Water supply: Shrewsbury, 119; Thames, to London, 690
Water-waste at Bradford, 869
Waterworks at Chiswick, 156
Wellington statue, the, 798
West Ham, incorporation of, 666
Westminster, drainage of, 655
Westminster Hall "restoration," 300, 332, 370, 407, 440
What is a chapel? 118
Wharfedale, 190
White, W. H., and the Royal Academy, 332, 399
Widening of St. Paul's Churchyard, 83
Wilkes, the, 476
Wilkesden Junction, 690
Winchester Cathedral, 903; proposed restoration, 190
Window-sashes, balanced, 377
Windsor, health of, 84
Wires, overhead: in London, 654; in New York, 263
Work, Government, 584
Works of Mr. T. Anson, 655
Workshops in schools, 476, 726
Yaldham estate, near Sevenoaks, 84
York water-gate, the, 299
Yorkshire railways, 159

Factories, and utilization of, 536
Fading and workshop inspection, 432
Fading of watercolours, 393
Father, Rev. R. C., 653
Fawcett, W. M., on iron piping, 645
"Federation," architectural, 615, 717
Fellows-Prynn, G. H., on metal-work, 929
Frankland, Dr.: on micro-organisms, 411;
on smokeless fires, 933
Frankland, P. F., on filtration of water, 537
Franklin, R. H., on water, 425
Freezing at an end to the sinking of foundry, 395
Friston, building land at, 400
Galton, Capt. Douglas, on sanitary matters, 107, 635
Gascoy, the Landies of, 537
Gas-lighting by incandescence, 438
Gay, J. B., on Architectural sanitation, 536
Geo-logy and sanitation, 499
Girdler bridges, 395
Gleagor: Architectural Assoc., 255, 752, 892; Institute of Architects, 635
Gowdin, G., on registration of plumbers, 680
Granger, J. A.: on church planning, 788;
on decorative metal work, 929; on pupillage, 716
Grammar-school, Taunton, 215
Grand Junction Waterworks, Hampton, 229
Grantham, Rev. H., on St. Mary's Church, Chester, 363
Greek architecture, 583
Gresford Church, 303
Ground-water, influence of on health, 466
Guildford, meeting of the Surrey Archaeological Society, 231
Hanley meeting of Municipal Engineers' Association, 50
Hawyard, O.: on architectural polychromy, 730; on stone, 923
Harbour construction, 731; Whitehaven, 730
Hardness of metals, the, 436
Harold Wood, building land at, 143, 326, 578, 574
Harrison, Miss, on the myths of Attica, 583
Harriss, T. Harnett, on the Public Health Act, 500
Harrower election, Architectural Assoc., 71
Hartford, Prof., on the fading of water-colours, 393
Harvey, L.: on the Masonry Class, 625; on pupillage, 716
Hawthorn, Leslie and Church, 3-3
Hay, J. M., on Liverpool Cathedral, 988
Hayling Island, building land, 292
Heald, Mr. J., on registration at, 395, 43
Heath, public and municipal, government, 501
Health influenced by ground-water, 466
Health questions at the British Association meeting, 393
Hearne, W., on house drainage in London, 591
Heslop, J.: on architectural polychromy, 730; on the Ca' d'Oro, Venice, 838; on the late Mr. Vulliamy, 728
Hellenic Society, 18, 683
Helyar, J. W., on registration at, 395, 43
Hope, Mr. Beretford, on arc mology and architecture, 266
Hoskins, G. G., on federation, 717
House of the Blessed David, Swansea, 358
Hospitals for infections & disease, 195, 600
Hotel, the "Army and Navy," 184
Houghton, the late G. S. Street, 681
House property in South London, 613
Hudson, C. M., on church planning, 788
Hall: Operative Bricklayers' Society, 434
Huddersfield, the late G. S. Street, 681
Hygiene and pre-ventive medicine, 467
Hypocaust found in Chester, 267
L'Asson, E.: on architectural polychromy, 730; on the building trade, 714; on marble, 923; on plumbers' work, 75; on professional topics, 659, 681
The lace trade, 397
Importance of the fine arts, 41
Incandescent gas-burners, 436
India: concrete building in, 122; river systems, 395
Induction, electric, 393
Infectious disease, controlling, 500
Influence of ground-water on health, 466
Influence of the Pre-Raphaelite drawing, 892
Ingredient, a new, in mortar, 655
Institute, R.-yal, of British Architects: Architectural Polychromy in France, 730; on the Pre-Raphaelite drawing, 892; Ca' d'Oro, Venice, 837; Marble: its uses as suggested by the past, 905, 927; Ordinary, 660, 681, 718; President's Address, 681
Institute of Architects and Surveyors, 636
Institution of Civil Engineers: Birmingham student, 41, 465; concrete buildings, 122; on the late G. S. Street, 681; construction, 731; President's address, 732

REPORTS, &c. (continued):—

- Inspection of factories, 432
Inspectors, sanitary, 432
Inventors' Institute, the, 649
Iron-trade, the father of the, 552
- Jones, J. S., on colonial railways, 195, 725
Jerram, G. B., on sanitary matters, 710, 863
Jones, I. M., on a Roman hyacinth, Chester, 267
Jones, J., on the Architect's Department, M.B.W., 839
Jubilee Exhibition, Manchester, 255, 328
Junior Carlton Club, 87
- Kohlarow, 402
Kennard, Mr., on the Carpenters' Company, 714
Kenington, land at, 79
Kent Archaeological Society, 113, 179
Kent Hatch, Westham, 399
Kentish Architectural Association, 187, 226, 265, 304
Kerr, Prof., on architectural polychromy, 730; on the late Mr. Dovey, 728; on the prospects of architects, 641
Knapfield, Mr., on concrete work under water, 731
Kirkham Priory, 214
Knill, Alderman, on the registration of plumbers, 690
Krali, Mr., on decorative metal work, 929
Kyle, Mr., on Colombo harbour works, 731
- Lambert, Rev. J. M., on sanitary associations, 61
Land question, the, 713
Land Sales: Aldershot, 42; Aldershot, 767; Barking, 607; 609; Barchingham, 435; Bognor, 107; Clacton, 542; Epping, 679; Frinton, 470; Harold Wood, Romford, 118, 320, 578, 871; Haying Island, 322; Ilford, 897; Kensington, 79; Kent, 472; Lee-on-the-Solent, 435; Leytonstone, 792; Loughton, 185, 578; Lowestoft, 542; Southsea, 284; Woking, 614
Landes of Gascony, the, 537
Langley, Mr., on Lowestoft harbour, 732
Lartigue railway, the, 642
Latham, Baldwin, on ground-water, 498
Law of patents, the, 639
Law Courts, Birmingham, and terra-cotta, 619
Lead, drinking water and, 393
Learning to design buildings, 514
Lectures in architecture, University College, 514
Lectures by Miss Harrison, 732, 859
Lee-on-the-Solent, land at, 435
Leeds Castle, Kent, 264
Leeds and Yorkshire Architectural Soc., 220, 609, 618
Leeds, proposed art galleries, 610
Legislation, sanitary, 441
Lesseppe, M. F. de, on Panama Canal, 399
Leybourne Castle, 227
Leytonstone, land sale at, 792
Light and air cases, 107, 408, 798, 892, 902
Lightfoot, Bishop, on the archaeology of Durham, 158
Lincoln, old, 177
Lincoln Diocesan Architectural Society, 177
Lincoln and Nottingham Archaeological Society, 84
Liverpool: Architectural Society, 763, 789, 892; Cathedral, proposed, 892; Engineering Society, 256, 610, 629, 719, 757, 882; Master Builders' Association, 793
Liverpool and Chester in their ancient commercial relations, 301
Llewellyn, J. T. D., on Cambrian archaeology, 322
Lloyd, S., on canal communications, 429
Lock Black, 303
Lobley, J., on sanitary topics, 89
Local government, 835
London: house drainage, 891; reconstruction of, 394
London and County Banking Co., 221
Loughlen, H., on decorative metal work, 926, 930
Loughlen, land at, 185, 578
Low, R. B., on medical officers of health, 500
Lowestoft: harbour, 732; land at, 642
- McGovern, J. H., on Manx antiquities, 759
Machines, at re-cutting, 392
Maclean, J. M., on metal work, 929
Maddison, F., on trade union matters, 398
Magne, Sir P., on manual training, 397; on plumbers' work, 76
Maguire, T. H., on the arts, 43
Madstone, the churches of, 224
Maintenance of country roads, 72
Malpas Church, 302
Manchester: Architectural Association, 36, 75, 183, 624, 793, 902, 927; Association of Engineers, 552; Jubilee Exhibition, 255, 328; Society of Architects, 827
Mansergh, J., on water supply, 538
Manual training, 397
Manufacture, value of art in, 397
Manufacture of metal tubes, 396
Manx antiquities, 759
Marble: its uses as suggested by the past, 805, 927
Mergam Abbey, 322
Masonry, Practical Class of, 625
Master Builders' Association, 193, 792
Mathews, C. K., on the water supply of Birmingham, 431
Mathews, J. D., on architectural matters, 645
Mandley, Mr., on trade union matters, 398
Medical climatology, 537
Medical officers of health, 500
Metal tubes, manufacture of, 396
Metal work, decorative, 925, 929
- Metals: colours of, 397; the hardness of, 436
Metropolitan Asylum Board, 195
Metropolitan Board of Works: canvassing for appointments, 112; drainage of Westminster, 655; mortar-making in Bermondsey, 855; office of Superintendent Architect, 823, 829, 571, 850, 855, 720, 728, 739, 758, 787, 859, 901; park for Hammersmith, 112; Thames tunnel at Blackwall, 225
Metropolitan Building Act, cases under (see "Building Act")
Micklethwaite, J. T., on Kirkham Priory, 214
Micro-organisms in water and air, 391, 411
Middletown, Prof., on Schliemann's discoveries at Tiryns, 61
Milk and disease, 503
Mill, Dr. R. H., on river entrapment, 396
Moller, F. T. W., on pupillage, 716
Mold Church, 303
Moncreff, Lord, on Holyrood Chapel, 118
Monk's Park stone, 145, 182
Monuments, ancient, 649
Mortars-making in Bermondsey, 855
Moule, Mr. H. J., on Abbotbury Abbey, 430
Mowbray, J. F. Q. C., on Mr. F. A. Son's analysis, 631
Municipal Engineer's Association, 37, 72, 89, 558, 829
Municipal government and public health, 501
Mauro, Prof., on regulation of wages, 395
Myths of Attica, the, 732, 859
- Nantwich church, 302
National Assoc. of Master Builders, 193
National Smoke Abatement Inst., 933
Naukratis, 73
Newcastle Abbey, 194
Nevill, R., on the use of marble, 928
Newhaven harbour, 732
Newcastle at Durham, 158
North, Dr., on sanitary matters, 107
Northern Architectural Association, 717
Notes in Kent with the A.A., 226, 243, 304
Notification of infectious diseases, 600
- Odling, Dr., on drinking-water, 394
Old's Dyke, 300
Open spaces, 537
Organic and sanitary, 447
Ornamental design, 827
Overtime, 433
Oxford Architectural Society, 717
Oxford, visit of Architectural Association, 286, 323
- Pain, C. S., on depression in engineering, 582
Palace of Darius at Susa, 681
Palace of Wexham Church, 301
Panama Canal, 396
Parliamentary Committees' report, Trades' Union Congress, 393
Patent law, 619
Penrose, F. C., on Schliemann's discoveries at Tiryns, 45, 61
Penshurst, 141, 263
Percy, Earl, on archaeology at Chester, 240
Peto, Basil E., on builders' losses, 714
Peto, Sir Morton, on building trade competition, 714
Picton, Sir J., on Chester and Liverpool in their ancient commercial relations, 301
Pillar of B'arg, the, 300
Pink, R. C., on antiquities of Winchester, 650; on architectural topics, 644
Pinner Churches, 785, 788
Plockner, E., on the building trade, 714
Plumbers, registration of, 75, 184, 433, 642, 680, 785, 927
Plumbers' Company, 75, 642, 680, 785, 827
Pollution of rivers, 501
Polychromy, architectural, in France, 728
Poore, Dr. G. V., on the Landes of Gascony, 537
Prest, H. W., on metal work, 929
Prees, W. H., on electric induction, 432
Presentations: to Mr. Carbutt, M.P., 41; to Mr. A. Ritchie, 833; to Mr. G. Shaw, 680
Preservation of: ancient monuments, 649; old records, 265
President's addresses: Architectural Association, 633; Institute of Architects, 658, 859, 681; Institution of Civil Engineers, 731; Surveyors' Institution, 713
Preston, A., on technical education, 397
Preventive medicine and hygiene, 437
Prices current of materials (weekly)
Principles of ornamental design, 827
Pringle, Surgeon-Major, on rain-water storage, 336
Priory, Kirkham, 214
Prize, J. R., on the churches of Darlington, 159
Prizes: Architectural Association, 564, 845; University College, London, 74
Property, sales of (weekly)
Public Health Act, the, 600, 538, 829
Pullan, R. P., on Cheshire and Flintshire churches, 302; on Valle Crucis Abbey, 690; on Wrexham Church, 301
Pupillage, 632, 716
- Quality, pattern, and price, 927
- Raby Castle, 169
Railway: the Lartigue, 643
Railways, Colonial, 195
Rain-water storage, 336
Reclamation of the wastes of Gascony, 537
Reconstruction of London, 394
Records, preservation of, 236
Redemption of tithes, 874
- Registration of plumbers, 75, 181, 433, 642, 680, 785, 827
Regulation of wages, 395
Reichenbach, O., on freezing as an aid to the sinking of foundations, 395
Report of the Royal Commission on Trade, 221
Respect, a sanitary, 752
Richardson, G. C., on Valle Crucis Abbey, 300
Richmond Castle (York), 194
Richardson, J., on drainage, 691
Rider, T. F., on architects and surveyors, 714
Ripper, W., on technical education, 397
Ritchie, A., presentation to, 833
River: entrances, 396; pollution, 501, 863
River systems of South India, 396
Roke, an art of the masonry, 72
Roberts, C., on medical climatology, 537
Roberts-Austen, Prof., on colours of metals and alloys, 397
Robertson, J., on the manufacture of metal tubes, 396
Robus, E. C., on the artistic side of sanitary science, 501; on church planning, 785; on sanitary matters, 107
Robinson, Prof., on river pollution, 397
Rochester Cathedral and Castle, 179; on the history of Kent Archaeological Society, 143, 179
Roman remains: Chester, 249, 265, 287; Laurence Forest, 302; Durham, 158
Rowntree, Ald., on municipal government and health, 501
Royal Academy students, 107
Royal Archaeological Institute, 144; meeting at Chester, 249, 265, 300, 358, 360
Royal Commission on Trade, 221
Royal Institute of British Architects (see "Institute")
Royal Institution of Great Britain, 835
Runcall, Genl., on rivers of India, 396
Rural hygiene, 393
Ryde, E., on the tithes question, 874
- Saint James's Dwellings, Beak-street, 152
Sales of Property (weekly)
Sanitary associations, 601
Sanitary Assurance Association, 610
Sanitary inspectors, 433; Association of, 538, 718, 891
Sanitary Institute of Great Britain: Congress at York, 447, 465, 469, 477, 480, 489, 535; dinner, 107; examinations, 763
Sanitary registration of buildings, 610
Sanitary retrospect, 752
Sanitary science and preventive medicine, 467
Sanitation: American, 836; s; archaeology, 296; in its artistic aspect, 501; and the water channels of the country, 537
Saxon Churches: Deunhaat, 216; Ecombe, 83
Sevon remains in Durham, 158
Schliemann, Dr., on Tiryns, 49, 61
School workshops, 397
School of Engineering, Crystal Palace, 231, 300
Schools of Art: Andover, 927; West London, 573
Scotch fishing-boat harbours, 732
Scotch ecclesiastical architecture, 749
Sculptured walls, Chichester Cathedral, 63
Sedding, J. D., on church planning, 785, 789; on the churches of Midwinton, 229; on decorative metal work, 929
Sedley, J., on the arts, 43
Sedley, Paul, on architectural polychromy, 728
Sellers, J., on quality, pattern, and price, 927
Selous, W. R., on the Architect's Department, M.B.W., 787
Selwyn, Admiral, on patent law, 649
Shaw disposal, 683
Shaw, G., on mortar-making, 655
Shaw, G., on plumbers' work, 76; presentation to, 689
Sheffield School of Art, 721
Shelford, W., on girder bridges, 395
Shipton, G., on labour questions, 398
Shropshire Archaeological Society, 649
Shrubsole, G. W., on the walls of Chester, 265, 267, 302
Simla, concrete building in, 122
Slater, J., on the Ca' d'Oro, Venice, 838; on pupillage, 715
Smallpox hospital, proposed, 195
Smith, Holroyd, on electric tramways, 410
Smith, Prof. T. Roger, on learning to design buildings, 514; on the late Mr. Villiam, 724
Smith, W., on concrete building in India, 122
Smoke abatement, 937
Society of Arts: Address of Chairman of Council, 753; annual meeting, 79; Cantor Lecture, 827
Society for the Encouragement of the Fine Arts, 43
Society of Engineers, 229, 542, 863, 891
Society for Promoting Hellenic Studies, 48
Solley, H., on technical education, 397
Somerset Archaeological Society, 144, 216
Southend building, land at, 292
Space at the rear of buildings, 789
Spicer, R. P., on architectural polychromy, 730; on the late Mr. Dery, 728; on pupillage, 715; on washing buildings, 625
Stability calculations, 719
Stallwood, S., on Wantage Church, 213
Statham, E. H., on colour in architecture and sculpture, 729
Statistics, vital, 535
Stullman, Mr., on Schliemann's discoveries at Tiryns, 60, 117, 142
Stokes, L., on cast-iron work, 929; on pupillage, 716
Stone, Monk's Park, 145, 182
- Stone-cutting machines, dispute as to, 892
Stones, sculptured, Chichester, 63
Storage of rain-water, 538
Stratford, Workmen's Institute for, 609
Street bust, the, 681
Strype, M., on Wicklow harbour, 732
Stubbs, Bishop, on archaeology, 285
Students of the Royal Academy, 117
Submarine cables, or coal-mining, 388
Superintending Architect, M.B.W., 36, 232, 571, 650, 685, 720, 728, 749, 786, 787, 839, 930
Surrey Archaeological Society, 144, 189, 251
Surveyors' Institution, 713, 874
Sussex Archaeological Society, 195
Swansea meeting, Cambrian Archaeological Association, 322, 397
Sykes, J. F., on infectious diseases, 500
- Tarver, E. J., on the A.A. prizes, 845
Tarnin Church, 303
Tattersall, W., on factory ventilation, 539
Tay Bridge, 360
Taylor, E. R., on art in manufacture, 397
Teale, T. P., on fireplaces, 660
Telford School of Art, 721
Tenure of medical officers of health, 500
Terra-cotta at Birmmham Law Courts, 649
Thames tunnel, proposed new, 232
Thorp, J., on the ancient boat found at Briggs, 88
Thrupp, G. A., on art training, 873
Thurston, J., on house drainage, 391
Till, Dr., on lead poisoning, 393
Till, W. S., on Birmingham drainage, 394
Tithes question, the, 874
Tombsmen, removal of, 253
Toway, W., on recent earthquakes in America, 320
Towel water supply, 637, 638
Trade mark case, 146, 182
Trades' Union Congress at Hull, 398, 432
Trades' union, 397
Tramways, electric, 110
"Treasure trove," 302
Trevail, S., on local government, 633
Tunnel, proposed at Blackwall, 222
Turner, Sir Llewellyn, on Carnarvon Castle, 358
Tutty, J., on testing the hardness of metals, 436
Tyiers and Bricklayers' Company, 716
- Underground water, circulation of, 435
University College, London: architecture at, 514; prizes, 74
Uses of marble, 905, 927
- Vacher, F., on hospitals for infectious diseases, 500
Vacher, S.: on architectural polychromy, 730; on church planning, 788; on pupillage, 715
Valle Crucis Abbey, 300
Venables, Precentor, on Beeston Castle, 302; on Caergwille Castle, 303; on Chester Cathedral, 301; on Valle Crucis Abbey, 300
Venice, the Ca' d'Oro, 837
Ventilation of factories, 638
Venetian, Honeyman's Diaphragm, 49
Viets, Architectural Association, 87, 141, 255, 286, 323, 399, 469, 539
Vital statistics, 535
Villiam, the late G., 728
- Wages, the regulation of, 395
Walls of Chester, 265, 267, 302, 376, 434
Waller, George, 213
Water action, on lead, 393; filtration of, 537; micro-organisms in, 394, 411
Water channels of the country, 537
Water colour, the fading of, 393
Water-supply of Birmingham, 431
Waterhouse, A., on the use of marble, 927
Watering-place, a new, 400
Waters, underground, 436
Watershed areas, 537
Waterworks, Grand Junction, 629
Weaver navigation works, 512
Webb, Aston, on pupillage, 632, 716
Wells, Sir T. Spencer, on sanitary organization, 447
West London School of Art, 873
Westham Church, 399
Westgarth, W., on London reconstruction, 394
Westminster, drainage of, 655
Westminster, Duke of, on archaeology, 249
Whitaker, W., on geology and sanitation, 499
White, W., on church planning, 788
Whitehaven Harbour, 750
Whitby Church, 213
Wilkinson, John, and the iron trade, 552
Willet, Mr., on Scotch fishing boat Harbours, 732
Wilkinson, J. B., on the Hospital of the Blessed David, Swansea, 338
Wiltshire Archaeological Society, 225
Winchester, antiquities of, 650
Woking, land at, 514
Woods, R., on engineering topics, 731
Woodhouse, B., on the late Mr. Villiam, 728
Woodward, W., on St. Mark's pavement, Venice, 928
Wrexham Diocesan Architectural Soc., 90
Workmen's Institute at Stratford, 609
Workshop and factory inspection, 432
Workshops in schools, 397
Workshops, ventilation of, 536
Wrexham Church, 301, 393
Wrotham-place, 264
- York Architectural Assoc., 107, 471, 753
York Sanitary Congress, 447, 465, 469, 467, 480, 489, 535
Yorkshire Archæol. Assoc., 214

LETTERS.

Academy Royal, 399
Ancient lights, 521
Apnea, 363
Architricship, M.B.W., 215
Architectural Association: *Conversations*, 573; *reaction visits*, 76
Architectural federation, 573, 612, 615, 646
Area of a Saxon cathedral, 717
Asize Court plans, 365
Automatic couplings, 573
Bath stone, 182
Baths of Bath, the, 469, 503, 540, 612
Block system of workhouse plans, 646, 693, 717
Building by-laws at Chiswick, 612, 682
Canal, Manchester ship, 181
Care-takers of houses, 503
Cathedral (rescue), Liverpool, 830
Cement, running of, 573, 612
Chester, the walls of, 375, 434
Chimney-shaft for "destructor," 593, 691
Chiswick building by-laws, 612, 682
Churches: All Saints', Peterborough, 790; St. Bartholomew's, 891; (R.C.) of St. Ignatius, Preston, 573; Wrexham, 363
Clerks' overtime, 324
Coal-liming process of gas-making, 646
Concrete floors, 730
Conferences, Architectural Assoc., 573
Cooper's coal-liming process, 646
Cork Cathedral organ, 783, 825
Corsehill stone, 790, 825, 861
Couplings, automatic, 573
Damp on water-colour drawings, 790
Dangers of new buildings, 753
Designs for Liverpool Cathedral, 930
"Destructor" chimney-shaft, 593, 691
Domesday churches, 717
Drain-pipe joints, 647
Drain ventilators, 145, 182
East Bergholt Church, inscription on panels, 289
"Ecclesiastical," the, in Domesday, 717
Edinburgh Municipal Buildings, 646
Edin Union workhouse, 825
Emballated gables, 825, 891
Episcopal heraldry, 324, 180, 503, 549
Examinations: Sanitary Institute, 790; Science and Art Department, 730
Federation of Architects, 573, 612, 645, 646
Finance and sanitation, 459
Fire, 753
Floor of St. Mark's, Venice, 572, 586, 616
Floors, concrete, 730
Gables, embattled, 825, 893
Gates and tricycles, 359
Granites, 280
Gunnsallake granite, 280
Hassall's drain-pipe, 647
Heraldry, episcopal, 324, 180, 503, 549
Hospital for Children, Shadwell, 324
House-owners and care-takers, 503
Inscription, East Bergholt Church, 289
Interpretation of building by-laws, 612, 682
Ipswich, sculptured stones, St. Nicholas' Church, 573, 682
Ireland, light railways in, 352, 289
Iron process for sewage, 145, 646
Joints for drain-pipes, 647
Kiln granite, 280
Lancers, Truro Cathedral, 146
Law court and police-court plans, 363
Light railways in Ireland, 253, 289
Lights, ancient, 824
Liverpool: Cathedral designs, 930; St. George's Hall, 252, 611
Manchester ship canal, 181

Methods of sketching, 145
Monk's Park stone, 182
Mosaic pavements, 682
Municipal Buildings: Edinburgh, 646; Sunderland, 108
Museum, Sir John Soane's, 252, 289
New buildings, dangers of, 753
Non-acceptance of lowest tender, 825
Organ, the, in Cork Cathedral, 783, 825
Overtime, clerks', 324
Paint for roofs, 682
Painting in tiles, 790, 825
Pavement, St. Mark's, Venice, 572, 586, 616
Pavements, mosaic, 682
Plans of law and police courts, 363
Pressure in water-pipe, 215
Preston, R.C. Church of St. Ignatius, 573
Prime cost, 790, 825
Quantity of lime mortar used in England, 763
Quarry tile floors, 324
Railway: rails and couplings, 573; rates, 573
Railways, light, in Ireland, 253, 289
Robberies from builders, 289
Roman baths of Bath, 469, 503, 540, 612
Royal Academy, 399
Saint Bartholomew's Church, 891
St. George's Hall, Liverpool, 252, 611
St. Mark's, Venice, pavement, 572, 586, 616
St. Paul's Churchyard, 573
Sanitary Institute Examinations, 790
Sanitation and drainage, 459
Saxon Cathedral, area of, 717
Schleimann's discoveries at Tiryns, 117, 142
School workshops, 363, 470
Science and Art Department Examinations, 790
Sculpture of St. George's Hall, 252

Sculptured Stones at St. Nicholas, Ipswich, 573, 682
Sewage treatment, 145, 646
Sewer Ventilation, 646
Shadwell Hospital Competition, 324
Ship canal, Manchester, 181
Sketching, methods of, 145
Soane's Museum, 252, 289
Stained glass at Windsor, 547, 682
Stone, Corsehill, 790, 825, 861
Stones at St. Nicholas' Church, Ipswich, 573, 682
Stones of Temple Bar, the, 363
Sumner v. Picot, 182
Sunderland Municipal Buildings, 108
Superintending Architectship, Metropolitan Board of Works, 215
Temple Bar, 363
Tender, non-acceptance of lowest, 825
Tile floors, 324
Tiryns, 117, 142
Tricycles and gates, 359
Truro Cathedral, 146
Venice, floor of St. Mark's, 572, 586, 616
Ventilation of sewers, 646
Ventilators, drain, 145, 182
Visits, Architectural Association, 76
Walls of Chester, the, 375, 434
Warehouses, St. Paul's Churchyard, 573
Warning, a, 239
Water-colour drawings, damp on, 790
Water-pipes, pressure in, 215
Windsor, stained glass at, 540, 682
Workhouse, Elham Union, 825
Workhouse plans on the block system, 646, 682, 717
Workshops at public schools, 468, 476
Wrexham parish church, 363

LETTERS, WRITERS OF.

Aitchison, G., the Royal Academy, 399
Aldwinkle, T. W., block system of work-house plans, 647
Anderson, J. Macvicar, federation of architects, 615
Appleton, H. D., & Pryce, T. E., federation of architects, 646
Ashton, J., dangers of new buildings, 753
Bacourt, R. M., chimney shaft for destructor, 593
Bedford, W. K. R., episcopal heraldry, 324
Binyon, B., Sunderland Municipal Buildings, 108
Bird, S. G., robberies from builders, 289
Blackall, T., architectural federation, 573
Broad, A., Edinburgh Municipal Buildings, 616
Campbell, R. F., drain ventilators, 145
Carpenter, R. H., area of a Saxon cathedral, 717
Caws, F., concrete floors, 730

Chalk, W. J., Kit Hill granite, 280
Christian, B., designs for Liverpool Cathedral, 930
Cohen, B. L., workhouses at public schools, 469, 476
Cooper, F. R., the iron process for sewage, 145, 646
Dean of Cork, Cork Cathedral, 825
Dixon, T. J., light railways, Ireland, 253
Downing, J., drain-pipe joints, 647
Du Cane, Sir E. F., law and police court plans, 363
Farman, E., "Federation" circulars, 612
Forest, A. L., & Loverton, W. J. H., Architectural Association, 76
Goldsmith, F. T. W., embattled gables, 893
Harston, A. C., ancient lights, 824
Harvey, Lord F., sculptured stones at Ipswich, 573
Joseph, Delissa, warehouses, St. Paul's Churchyard, 573

Leaning, J., prime cost, and painting in tiles, 320
Madden, S. O., Cork Cathedral, 825
Mann, K., Roman baths at Bath, 469
Morgan, J. E., Temple Bar, 363
Mortley, J. E., interpretation of building by-laws, 682
Moron, C. F., drain ventilators, 181
Nicholl, S. J., Church of St. Ignatius, Preston, 573
Phillips, E., episcopal heraldry, 469
Picot, Sir James, sculpture at St. George's Hall, Liverpool, 252
Smith, F. R. E., summer sketching, 145
Snell, H. S., block system of workhouse planning, 825
Snell, H. S., & Son, Shadwell Hospital Competition, 324
Spice, R. E., Cooper's coal-liming process, 646
Stillman, W. J., Schleimann's discoveries at Tiryns, 117, 142

Stopper, T., inscription at East Bergholt Church, 289
Story, E., Gunnsallake granite, 280
Sumner, S., Monk's Park stone, 182
Swain, H., Truro Cathedral, 146
Thomas, E. E., rails and couplings, 573
Trickett, S., & Sons, Corsehill stone, 790, 861
Vinn, F. A. H., Roman remains at Bath, 540, 612
Waller, J. G., sculptured stones at Ipswich, 573, 682
Wanklyn, J. A., Cooper's coal-liming process, 646
Warrington, W., stained glass at Windsor, 540
Watkin, W. T., the walls of Chester, 434
Wild, J. W., Soane's Museum, 289
Wyatt, W. G., & Co., Corsehill stone, 825
Young, J., non-acceptance of lowest tender, 825

MISCELLANEA.

Abatement of smoke, 148
Accidents, 578, 579, 720
Action of water on metal pipes, 596
Agricultural Hall, Kennington, 720
Agricultural show, Norwich, 112
Aideburgh, building and at, 42
Altar, St. Marie's R.C. Church, Halifax, 219
America, architectural education in, 862
American minerals, 685
Applications of electrical power, 79
Antiquities, protective resemblances of, 471
Appointments, 108, 112, 216, 255, 282, 303, 361, 646, 655, 766, 765, 863
Archaeological discoveries: in Bavaria, 719; in Russia, 640
Archæology at Athens, 539, 862
Architectural education in America, 862
Architecture at University College, 481
Art galleries: Leeds, 263; London, 43
Art Society, Southampton, 548
Art-Union of London, 812
Asphalt paving in Berlin, 614
Assoc. of Municipal Engineers, 435, 471, 785
Aston workhouse, 720
Asylums: Formby, 614; Montrose, 37
Asylums, 144, 265
Atkins' process of water-softening, 766
Atmosphere of Underground Railway, 650
Athens, the British School at, 639, 862
Australian building trades, 280
Banbury and Cheltenham Railway, 220
Bath, Roman remains at, 108, 186
Baths: Bath, 108, 186, 215; Bridgewater, 146; Buxton, 76; Grantham, 146; Kennington, 221
Battersea dispensary, 649, 790, 825
Bavaria, archaeological discoveries in, 719

Bedford memorial bridge, Glentilt, 292
Belfast Evening Telegraph Office, 220
Berlin: asphalt paving, 614; hygienic museum, 839; general steam supply, 713
Bickersteth Hall, Hampstead, 149, 213
Birmingham, new officers, 539
Bombay railway terminus, a, 823
Bradford, big chimney at, 614
Brass & Son, smoking concert, 933
Brickmaking under new conditions, 679
Bricks in Sweden, 839
Bridges: Glentilt, 292; Gunduck, 184; Harlem River, New York, 220
Brighton, military memorials at, 42
British Columbia, timber of, 614
British Hospital, Port Said, 665
British Museum lectures, 642
British School at Athens, 539, 862
British Assurance Office, Strand, 286
Browning, Mr., and Venice, 792
Brussels a seaport, 720
Buckingham Palace, Richmond, 578
Bude-Porth, hot-water springs, 673
Buildings, foreign and colonial postage, 446
Builders' Benevolent Institution, 577, 649
Building materials, Rhine provinces, 112
Building in Philadelphia, 829
Building trade, drink in the, 180, 220
Building trades: Australian, 220; Swedish, 471
Buildings on the Thames Embankment, 691
Buxton sewerage, 233
Cable Tramways, 195, 614
Caldwell & Webster system of underground electric communications, 933
Cambridge School of Art, 361
Canals: Brussels, 720; new, in France, 828
Cantor lectures, Society of Arts, 762

Cardiff Mission Hall, 181
Carlisle, a new, 539
Carlisle markets, 477, 891
Castle, Edinburgh, 229
Catalogue, 87
Cathedrals: Dublin, 895; Upsala and Lund, 720
Cement, manufacture, new process, 650
Cement, Swedish, 823
Cement-trade of the Tyne, 573
Cemetery, New Shroton, 38
Chelsea, erections at, 614
Chimney at Manningham Mills, 614
Chimneys, the loading of, 829
Christiania, Government offices at, 679
Church, ancient, at Throodjem, 361, 893
Church, marble, at Copenhagen, 506
Church-Building News: Accrington, 148; Andover, 486; Ashton, 764; Andam, 482; Aymestrey, 76; Baner Bridge, 182; Battersea, 754, 825; Blackburn, 283; Bradington Quay, 146; Bristol, 146, 217, 807; Church Broughton, 38; Dalby, 217; Dolwyddelan, 754; Droitwich, 503; East Leake, 792; Euston, 217; Eastrop, 503; Edale, 76; Elton, 108; Fairford, 217; Farnham, 54; Farnborough, 482; Filey, 289; Flixborough, 108; Givend-le, 108; Glasgow, 884; Glastonbury, 108; Good Easter, 217; Gorseinon, 189; Great Bourton, 193; Great Borestead, 146; Guernsey, 146, 263; Guildford, 266; Hibbourn, 289; Hemstead, 825; Kelloway, 37, 636; Kewell, 76; Kennington, 217; Kennington, 118; Kirkland, 807; Lewis Town, 108; Lillingstone Dayrell, 289; Llantwit Major, 683; London, 857, 826, 762, 798; Loughborough, 142; Macclesfield, 766, 890;

Middleton, 217; Monkton Wyld, 76; Monyash, 503; Mosborough, 874; Newby-in-Cleveland, 893; Newcastle-on-Tyne, 754; Peterborough, 749; Plympton St. Mary, 338; Pocklington, 108; Porth, 289; Rodmersham, 217; Rossett, 492; Ruxton, 538; Sandhurst, 503; Seamer, 503; Sheffield, 503; Shrewsbury, 289; Shustoke, 326; Stafford, 217; Stainland, 146; Stamford Brook, 326; Swansea, 30, 683; Tansor, 38; Taddington, 198; Tilstock, 321; Thimbury, 289; Walsend, 650; Wavertree, 324; Weston-super-Mare, 825; Weymouth, 217; Withnell, 883; Woodford, 146
Circus, proposed, in the Strand, 7
City Art Gallery, 43
Clapham tramway depot, 896
Clay, pitting, 420
Cleaning London buildings, 185
Clocks and bells, 112, 538, 906
Club, United Arts, 685, 690
Club-buildings: Kilburn, 932; Leicester, 289
Coal-mines, explosions in, 719
Coinage, the new, 193
Colliery, Shadwell Park, 165
Colonia, Roman remains at, 79
Colonial immigrants, 39, 79
Colonial and Indian Exhibition, fire protection, 42
Colonial postage of the Builder, 146
Colosseum, North London, 506
Competition: Art Gallery, Leeds, 610; Bank, Halifax, 861; Barclay Church, Glasgow, 681, 619; Bath, Hampstead, 858; Cathedral, Liverpool, 43, 650, 765, 834, 897; Church, All Saints', Peterborough, 790; Church of St. Paul, Ken-

MISCELLANEA (continued).—

United Arts Club, 535, 895
 United States Fair, 893
 Universal Finner Company, a 326
 University College lectures, 481
 Upsala Cathedral, 720
 Venice, Mr. Browning's palazzo, 782
 Ventilation at the Four Courts, Dublin, 324
 Victoria Hall, science classes at, 400
 Vienna: mansion for Madame Pauline
 Lucas, 825; apse of St. Stephen's, 471
 Villa of the Comte de Paris, 13

Wages in the Colonies, 39
 Wakes, the late Dr. J. G., 360
 Warm climates, the hygiene of, 828
 Warning to emigrants, 39
 Washing London buildings, 185
 Water, effects of, on metal pipes, 895
 Water-lifting, 766
 Water-supply.—Alvaston, 38; Birmingham, 431; Blackburn, 682; Bradford, 889; Buenos Ayres, 362; Cookstown (Ireland), 262; Cremona, 252; Exeter, 233; Grand Junction, Hampton, 228; Harrogate, 684; Henley-on-Thames, 181;

Highbury, 273; Kidderminster, 502; London, 680; Melbourne, 506; Peterborough, 184; Shrewsbury, 119; Southampton, 34, 253; Southwark and Vauxhall, Hampton, 229; Staines, 216; Sutton-in-Ashfield, 220
 Water-valve, a cheap high-pressure, 74
 Watering-places, 328, 572
 Wells, dangers of descending, 578
 Will of Sir John Kilk, 730
 Wimbledon camp, 112
 Winter fund, painters' and decorators', 618
 Winter palace at St. Petersburg, 42

Wood-carving, school of, 435
 Wood-carving in Norway, 720
 Wood paving in Berlin, 815
 Wood pulp & plaster of Paris, 326
 Wood wool, 292
 Workhouses:—Aston, Birmingham, 720; Fordingbridge, 898; St. Pancras, 825
 Workmen's club, Kingston, 749
 Yarmouth Townhall, 254
 York meeting, Sanitary Institute, 252, 431
 Yorkshire Penny Bank, 681

ARCHITECTS, ETC., OF BUILDINGS ILLUSTRATED.

Architects of buildings, and authors of designs and works illustrated:—

Alphand, M., Paris Exhibition of '89, 803, 804
 Armistead, H. H., Street Monument, Law Courts, 13
 Arnold, T. M., Congregational Church, Woodford, 889
 Banks & Townsend, Mission Church, Kirkland, 918
 Barry, J., Life, Tower Bridge, 34, 25
 Bateson, W. Hunt, Design for Birmingham Law Courts, 304, 310, 311
 Batterbury & Huxley, shop, Oxford-street, 458, 459
 Bell, C., house, Castle Carey, Somerset, 135
 Bentley, H. H., Holborn Union Workhouse, 589, 590, 604
 Bishop, E. F., Tower of St. Nicholas's Church, Ipswich, 71
 Blomfield, A. W., church, Fareham, 58, 57; Street Monument, Law Courts, 13
 Blomfield, R. T., Glenbuckley Castle, 376, 388
 Bodley & Garner, Chapel, Marlborough College, 594, 596, 597
 Bon, J., Ca' d'Oro, Venice, 813, 837
 Bonnard, M., Paris Exhibition of '89, 804, 809
 Boulton & Warner, Assembly Hall, Mile End, 637
 Broad, A., Design for Birmingham Law Courts, 170, 171
 Brown, J. M., Design for All Saints' Church, Peterborough, 738
 Browne, G. W., U.F. Church at Braid, N.B., 914
 Burnett, J., & Son, Design for Birmingham Law Courts, 231, 232, 233
 Champneys, B., Fawcett Memorial Fountain, 783
 Clarke, Sir A., Norwich Depot Barracks, 206, 207
 Corroyer, M., restoration of Mont St. Michel, 698
 Corson, G., Design for Birmingham Law Courts, 168
 Craos, L. P., house, Tunbridge Wells, 884
 Crasland, W. H., Holloway College, Egham, 28, 29, 35, 64, 65
 Cutts, J. P., St. Saviour's Church, Holloway, 628, 629
 De Fabris, Prof., facade of Duomo, Florence, 484, 485
 Doubleday, W., Staffordshire Bank, Birmingham, 846, 847, 847

Doubleday & Caws, Design for Sunderland Municipal Buildings, 100, 101, 141
 Douglas & Fordham, Rossett Church, Denbighshire, 492, 493
 Dutert, M., Paris Exhibition of '89, 804, 809
 Duvoce & Simonet, M.M., staircase of the Mairie, Neuilly, 812
 Eales, C., & Son, premises, Edgeware-road, 779
 Emerson, W. R., house, Bar Harbour, Massachusetts, 322
 Fletecher, B., house, Hampstead, 888
 Flockhart, W., studios, South Kensington, 518, 552
 Formigé, M., Paris Exhibition of '89, 804, 809
 Foulkes, W. T., Design, Birmingham Law Courts, 170, 171; Townhall, Eastbourne, 698, 702, 706
 Frampton, G., Fawcett Memorial Fountain, 783
 Freeman, R. K., Holy Trinity Church, Blackburn, 274, 275
 Goldie, Child, & Goldie, R. C. Church of St. Mary, Hampstead, 130, 131; monastery, Kensington, 68; residences, Farm-street, 49
 Grant, Miss, Fawcett Memorial Fountain, 783
 Griffiths, —, screens, Bombay Court, Indian Exhibition, 104, 105
 Habershon & Fawcett, Colonial Institute, 677, 678, 680
 Hadfield, C., shrines, St. Marie's R. C. Church, Sheffield, 664, 665
 Hadfield, M. E., & Son, R. C. church, St. Ignace, Preston, 452, 468, 469
 Hall, E. T., houses, Port-street, 778
 Hall, J. G., almshouses, Fulham, 855
 Hardcastle, W. J., Bickersteth Memorial Hall, Hampstead, 213
 Hay, Messrs., Design for Liverpool Cathedral, 620, 521
 Hayward, C. F., Natural Science Schools, Harrow, 830, 851
 Haywood, Butler, & Bayne, window, City of London School, 306, 307
 Hemmings, F., warehouses, St. Paul's Cathedral, 628, 629
 Herrant, A., Maison de Repression, Nanterre, 698, 807
 Holbein, decorative work, 620, 631, 658, 659
 Holmes, F. & G., Board Schools, Runcorn, 124, 138
 Hoozemay, J., diaphragm ventilator, 481
 Hoole, E., industrial dwellings, White-chapel, 707, 713

Ince, J. H., house near Stockholm, 580, 581
 Isaacs & Florence, Northumberland-avenue Hotel, 670; warehouses, Rochester-row, Westminster, 202, 203
 Jackson, T. G., Ellingham Church, Hants, 820; University buildings, Oxford, 533
 Jones, Sir Horace, the Tower Bridge, 24, 25
 Keeling, E. Bassett, Prince's Mansions, Westminster, 233, 234-239
 Lacey, E. W., lodge and gates, near Kingston, 774, 668
 Lawson, G. A., sculpture: "Cleopatra," 601
 Leyland, P., Mairie, St. Denis, 633
 Lea, Ernest C., proposed church, Teddington, 188, 189
 Leighton, Sir F., fresco at South Kensington, 340-343
 Lockwood, T. M., Grosvenor Museum, Chester, 270, 271, 286
 Lucas, C. S., house at Newport, Mass., 923
 Lyman & Rickman, Audien Church, 407
 Maxwell & Tate, Design for Birmingham Law Courts, 230, 240, 247; Jubilee Exhibition Building, Manchester, 624, 625
 Mead & White, the Casino, Elberon, U.S., 823
 Micklethwaite, J. T., diagram showing true nature of Westminster Hall "restoration," 271
 Moore, T. L., All Saints' Church, Peterborough, 734, 735
 Nicholl, B. J., R.C. church, Wellingborough, 673
 Osborn & Reading, Wesleyan chapel, Birmingham, 880, 881
 Penrose, F. C., British School at Athens, 727, 728
 Plumb, R., house, Stoke d'Abernon, 739, 742, 743
 Potts, Sulman, & Hennings, Presbyterian church, Wimbles, 139
 Prynce, G. H., Fellows, St. Peter's Church, Streatham, 92, 93, 96, 97
 Raffles, W. H., design for village church, 711
 Read, W., offices, Birmingham, 703
 Richards, T. R., houses, Twickenham, 211
 Repton, E. R., ceremonial tower, 80
 Roper, G. F., Design for Birmingham Law Courts, 167
 Sesser, J. H., offices, Wellington, N.Z., 74
 Sedding, J. D., residences, Plympton St. Mary, 346, 347
 Skipper, G. J., Coffee Tavern, Street, Somerset, 210

Smith, T. Roger, and Gale, A. J., house Oxford, 584, 585
 Snell, H. B., & Son, Holborn Union Workhouse, 589, 590, 604
 Statham, H. H., "the Palace Water-gate," 20, 21
 Stevens, F. W., Terminus, G.I.P. Railway, Bombay, 562, 593, 697, 698
 Stevens, J., Macclesfield Church, 767, 770, 771, 775
 Stirling, W., design for warehouse, 316
 Stock, H., Aske's Schools for Girls, Hatching, 380, 391
 Stone, P. G., Design for Birmingham Law Courts, 166, 167
 Sugden, W. H., and Fairbank & Wall, Design for Grammar School, Cheltenham, 719
 Tadema, Alma, wrought-iron work, 412
 Tarrar, E. J., Brixton Orphanage, 72
 Tasker, F. W., All Saints' (H.C.) Church, Warley, 60, 61
 Taylor & Gordon, house, Montreal, 672
 Thwaite, B. H., apparatus for sun-copying or heliography, 789
 Topham, E. S., boathouse, Cambridge, 574
 Ungerer, Herr, sculpture, Royal Museum, Munich, 801
 Walmley, A. T., design for a bridge to relieve London Bridge, 512
 Walters, F. A., Buckfast Abbey, Devon, 640, 641
 Waterhouse, A. R.A., sketch plan for Birmingham Law Courts, 162
 Webb, Aston, & Bell, E. Ingress, Law Courts, Birmingham, 160, 162, 163
 Webb, W. A., design for village church, 710
 Webster, J. D., church at Moshborough, 483; Design for Mapping Art Gallery, Sheffield, 414, 415, 418, 419
 White, E. T., house at Coombe, 831, 823
 White, W., tower and lych-gate, Great Bourton, 193
 Wilkinson, E. S., and Warren, E. G., design, Birmingham Law Courts, 636, 643
 Williams, A., London and County Bank, Kensington, 387, 329
 Wilson, D., new applications of concrete, 823
 Wilson, J. B., Town-hall, Motherwell, 571
 Witherington, W. S., Carlyle Mansions, Chelsea, 825, 834
 Wren, Sir C., Church of St. Mary Magdalen, London, 840
 Wyatt & Spiers, house in Hampshire, 569
 Young, E. D., and Hall, H., Great Northern Central Hospital, 908, 919

ILLUSTRATIONS.

Abbey, Buckfast, F. A. Walters, Architect, 640, 641
 Abbey, Naffling, 319
 Abbey, Margam, 314
 Abbey, Mont St. Michel, 694, 699
 Abbey, Tewkesbury, sketches by R. W. Paul, 876, 877
 Abbey, Westminster. North Choir Aisle: sketched by W. H. Bidlake, 175
 Almshouses, Fulham, J. G. Hall, Architect, 855
 Alphand, M., Portrait of, 870
 Alvarinos, St. Marie's (R.C.) Church, Sheffield, C. Hadfield, Architect, 664, 665
 Apparatus for Sun-Copying or Heliography, invented by E. H. Thwaite, 789
 Arches, Triumphal, of the Ancient Romans.—Arch of Drausus, 365; Arch at Orange, 378, 379; Arch at Pola, called the Porta Aurea, 470, 481; Arch at St. Martin, 422; Arch of Septimius Severus, 351, 351; Arch of Theodosius and Hadrian, Athens, 454, 455; Arch of Titus, 354; Arch of Trajan at Beneventum, 382, 383; Arches at Bridge of St. Charles, 426, 427
 Art Gallery, Sheffield, Design by J. D. Webster, 414-419
 Assembly Hall, Mile End-road, Boulton & Warner, Architects, 637

BANK, London and County, Kensington, A. Williams, Architect, 387, 429
 Bank, Staffordshire Joint Stock, Birmingham, W. Doubleday, Architect, 846, 847, 847
 Barracks, Norwich Regimental Depot, Sir A. Clarke, R.E., Architect, 2, 6, 20
 Bede-house, Lyddington, 405, 408
 Bench-ends, Cornish, sketched by A. G. Langdon, 738

Boat, ancient, found at Brigg, 88
 Boat-house, Cambridge, R. S. Topham, Architect, 574
 Bones of Roof, St. Mary Overie's, 445
 Brasses at Knebworth Church, 50
 Bridge, the Tower, Sir H. Jones, Architect; J. Wolfe Barry, Engineer, 24, 25
 Bridge, proposed, for the Relief of London Bridge, A. T. Walmisley, Engineer, 512

CA' D'ORO, Venice, from a Drawing by F. T. Baggallay, 812, 813; Details, 857
 Cabinet and Sideboard, Edinburgh Exhibition, 83
 Carving, Stone, in Indian Exhibition, 134
 Crayons, Northumberland Avenue Hotel, Isaacs & Florence, Architects, 678
 Casino, Elberon, U.S., Mead & White, Architects, 923
 Castle, Glenbuckley, proposed Restoration: R. T. Blomfield, Architect, 374, 388
 Castle, Inverlochy, 901
 Castle, Loches, drawn by A. B. Pite, 854
 Castle of Löwenstein, Wertheim, drawn by H. W. Brenner, 782
 Castle, Neidpath, 900
 Castle, Newark, Renfrewshire, drawn by A. M. Prentice, 818, 817
 Castle, Ortermouth, 314
 Castle, Roxburgh, (after wing), 403
 Castle, Strirling, 900
 Cathedral, Amiens: North Choir Aisle: drawn by E. Jefferson Jackson, 911

Cathedral, Gloucester, Central Tower: sketched by W. H. Bidlake, 174
 Cathedral, Liverpool: Design by Messrs. Hay, 520, 521
 Cathedral, Melton, Tower as originally intended, drawn by H. W. Brewer, 16, 17
 Cathedral, Old St. Paul's, the "New Work," drawn by H. W. Brewer, 608, 609
 Cathedral, Roder, Tower, sketched by A. M. Dunn, 411
 Chaises exhibited at Wakefield, 551
 Chandelier, Stanley's Secret Balance, 539
 Chapel, Marlborough College, Bodley & Garner, Architects, 594, 596, 597
 Chapel, Wesleyan, Birmingham, Osborn & Reading, Architects, 884, 881
 Church, All Saints': Great Bourton: Tower and Lych Gate, W. White, Architect, 193
 Church, All Saints', Peterborough, T. L. Moore, Architect, 734, 735; Design by Mr. J. Martin Brooks, 738
 Church, Audlem, Cheshire, as restored, Lyman & Rickman, Architects, 497
 Church, Birling, 319
 Church, Chelvey: the Tynte Pow, drawn by R. W. Paul, 496
 Church, Congregational, Woodford, T. Arnold, Architect, 889
 Church, Ellingham, Hants, as Restored, T. G. Jackson, Architect, 820
 Church, Fareham, A. W. Blomfield, Architect, 66, 67
 Church, Holy Trinity, Blackburn, R. K. Freeman, Architect, 274, 275
 Church, Kingsbury, Exterior and Interior, 62
 Church (Mission), Kirkland, T. L. Banks & Townsend, Architects, 918

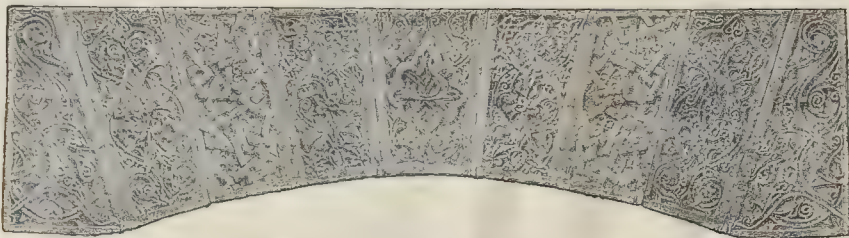
given) as a typical example, and the cruciform mosque, of which he takes that of Sultan Hasan as the finest example, which dates from 1356-9, and the legend goes that the Sultan "took the futile precaution of cutting off the architect's hand, in order to prevent any further efforts of his genius." The introduction of the adjective "futile" seems to suggest that the author has some theories as to the position of the architect in relation to his work, which it is disappointing to find thus only vaguely hinted at. The detailed description of the mosque, however, is of sufficient interest to quote:—

"The interior of the mosque consists of a cross,* of which the transept on the east side, which may be compared to a chancel, is larger than the three other arms, while the founder's chapel (over which is the dome) occupies the position of a lady-chapel

rays, and the facing of the arch itself is treated with the common zigzag ornament, which is seen so frequently around arches and over doors in Cairo. The effect of the whole is extremely rich, and the details are finished with infinite care and skill." The character of the external architecture, however, with its monstrous cornice tier over tier, and projecting 6 ft., does not belong to the higher order of architectural style or design; and from some subsequent remarks it seems that the author, with all his enthusiasm, has misgivings on this head himself.

The domestic architecture of Cairo is, like so much more Eastern domestic architecture, planned on the principle that the inmates should see and be seen as little as possible from outside. Nearly all the architectural

of our exhibition rooms; for painters who travel Eastward find them interesting objects of study. We give an illustration from the pages of the book, by the publishers' kind permission, of a door more simple than many others (No. 1), taken from a sketch by Mr. Wild, but which exhibits in a kind of outline form some of the characteristic methods of doorway decoration; the square *cadre* of ornament which frames it in, and the peculiar interlocking shape of the alternately light and dark voussoirs. It is in reference to this habit of extracting decorative effect from the treatment of the voussoirs of an arch that we give another illustration (No. 2), that of the arched ornament from the Khān built by the Sultan Kāit Bey (1468-96), whom Mr. Poole styles the prince of Cairo builders. In this arch it will be



No. 2.—Arched Ornament from the Wekala of Kāit Bey.

behind the chancel. The outline of the founder's chapel is visible on the outside, but the cross-shape is not; the spaces in the right angles, between the four transepts or arms, are so filled with offices and schools and other apartments (as is the case with most cruciform mosques), that the exterior has the form of an irregular oblong, the sloping outline of which is partly due to the line of the street which runs past the mosque to the citadel, which it confronts. The exterior walls from the base to the top of the cornice are about 113 ft. high, and are entirely built of finely-cut stone brought from the Pyramids. The broad expanse of wall is slightly relieved by windows, of which the most prominent, those of the founder's chapel, consist of two horse-shoe-headed lights, surmounted by a single round window, placed in a tall shallow recess, which is brought forward at the top to the face of the wall by stalactite corbelling supporting a trefoil arch. The other windows are plain rectangular grilles (sometimes as many as eight, one above another), similarly placed in tall shallow recesses with stalactite tops, or small circular windows set in square recesses. The eastern corners of the main building resemble polygonal towers, and the angles of the chapel are ornamented with graceful pilasters or engaged columns, carved in a spiral or twisted design, with stalactite cupolas, reaching to nearly half the height of the wall. The cornice, which is unusually prominent in this mosque, and forms one of its most beautiful features, consists of six tiers of stalactites, each overhanging the one below it, till the top projects some 6 ft.; the coping is plain, without the usual crenellated parapet.

The other main features externally are the dome, rebuilt in the last century, and not worthy of the building; three minarets, of which that on the south-east angle, the tallest, is 280 ft. in height, and the main portal, on the beauty of which Mr. Poole is eloquent; an engraving of a portion of the ornament, which is given (fig. 8), shows what rich and effective work it must be. Another piece of carved ornament from this mosque (fig. 9) is even finer. The interior of the mosque is mostly brick plastered over, but the facing of the arches is of stone. The decorative effect of the interior is mostly concentrated about the *mihrab* or prayer niche. "The interior of the niche is beautifully adorned with three tiers of arches (the first pointed, the second round, and the third trefoil), supported by dwarf columns, one above another, and divided by arabesque borders and bands of greenstone. The backgrounds of the arches behind the dwarf columns are alternately of red and green marble, the shell-like top of the niche is decorated with marbles arranged in

* This fact suggests, by the way, how little part symbolism had in Mohammedan architecture, otherwise the builders would never have adopted this antagonistic form as the basis of their temple. The cross form in the Medieval cathedral, of course, did not arise from symbolism originally, but it was certainly invested with a symbolic meaning.



No. 1.—Doorway of a Private House, Cairo. From a Sketch by Mr. J. W. Wild.

embellishment is towards the interior courtyard; the external aspect is blank and uninviting; one of the most striking instances of the reflection in architecture of social feeling. The social and intellectual position of woman in the East is at the bottom of this form of the dwelling-house; she is not the companion and friend, but the superior chattel or chattels (for it is "*elles et lui*") of the master of the house, to be guarded from other eyes. Mr. Poole mentions one common characteristic of the Cairo house-plan, arising out of this desire for seclusion, the passage leading from the front door being planned with one or two sharp turns, so that no passer-by can look down it when the outer door is open. The only external decorative treatment is generally concentrated on entrance doors, many of which have been rendered familiar to those who have not visited Cairo, by drawings on the walls

observed that each pair of voussoirs on either side of the keystone is carved with a different design, the keystone having also its own design. This multiplicity of decorative detail is, of course, a characteristic of Eastern architectural taste in many other localities and styles.

In the chapter on stone and plaster, Mr. Poole notes that plaster ornament is a sign of early date, though, as he says, it is difficult to account for this. "The art of carving marble had certainly been known in Egypt long before the Saracens set about building mosques, and the Copts have marble pulpits and other works of early date. Nevertheless, as a fact, the earlier mosques are generally ornamented with plaster designs." It is curious thus to see the reverse of the usual progress in architectural styles, in which in almost every other case the cheaper and more easily worked material is

brought into use in the decadence of the style. The most perfect example of plaster ornament in Cairo Mr. Poole considers to be the mausoleum of Kalaün (date, 1284). "Here the borders of the tall arches supporting what was once the dome, the borders of the clearstory windows above, and an infinity of other decorations, are wholly of plaster, and nothing more delicate and lace-like can be imagined. The bud surmounted by leaves again forms a central idea, but it is developed until it is scarcely recognisable, and the designs are chiefly characterised by a broad treatment of large foliage worked round into a scroll-like continuous pattern. Continuity is a leading quality of these designs; it would be difficult to break off at any given point in the borders." The last general employment of plaster in any considerable mosque Mr. Poole believes to have been in the two mosques built by the son of Kalaün, about 1318.

design, with the interspaces carved in small arabesques or more simple ornamental forms, constitute the prevalent form of wood decoration. A good many illustrations are given of the peculiar lattice work in small balusters, as they may be termed, with broader joining pieces, of which there are good examples at South Kensington. The variety of detail in the illustrations given, all based on the same constructive idea, is curious. In point of design they are not all equally satisfactory; the specimen given in fig. 54, for instance, is weak and unconstructive in appearance. Two fine examples are given (figs. 59, 60), in which both the balusters and the intercepting bosses are elaborately moulded, with very rich effect; and one (from the South Kensington Museum) in which the smaller crosspieces are introduced only partially, in such a way as to form a second design or outline on the ground of the more widely-spaced portions.



No. 3.—Lamp of Sultan Beybars II.

The mosaic work of the style in Egypt is apparently a mixture of true mosaic design carried out in small cubes, with marble inlay, a combination susceptible of great variety of effect though, perhaps, not so artistically complete and *sui generis* as the method of pure mosaic. In touching on woodwork Mr. Poole comments on the extensive use made of wood in Cairo, notwithstanding the scarcity of the material on the soil of Egypt and the difficulties by which the use of it is hampered, owing to the effect of the climate on pieces of any size. The leading characteristic of Cairo woodwork, accordingly, is its sub-division into numerous panels, small enough to permit of slight shrinkings without materially affecting the whole work. Some excellent examples of this class of work are to be seen in the South Kensington Museum, notably the pulpit of Küit Bey (fifteenth century), of which an engraving is given. Tracery bars, in the geometrical patterns peculiar to Saracenic decorative

The early Saracenic work in metal, in Egypt Mr. Poole traces to Mesopotamia, and distinguishes it as the Mosul style,—a style in which much Persian influence is to be observed, and in which the Mohammedan artist has often broken through or neglected the prohibition against the representation of human or animal figures; probably from the influence of the models which he imitated. The characteristic of this early Saracenic metal work is the lavish use of silver inlay. The silver itself, after inlaying, was chased on the surface; and it is mentioned that a noted Saracen metal-worker of Venice, when he made use of the stippling process to retain his silver plates in their places, carried the feeling of the artist so far that he executed all the stippling in graceful scroll patterns (perhaps to keep his hand in), though they would be immediately concealed by the silver plate they were intended to hold; this fine instance of the artist spirit being revealed by the accidental

wearing off of the silver in places. The later and more commonly-known Manlik class of metal work is more on the usual lines of Saracenic design. One example, an inlaid table, in the Museum at Cairo (fig. 74), was illustrated a year or two ago in our pages, along with one or two other specimens of Saracenic art from the same Museum, from photographs forwarded to us for the purpose by Franz Pasha. The beautiful lamp, decorated with filagree silver inlay, of which we are enabled to give an illustration (No. 3), is an admirable example of metal work of early fourteenth-century date.

There is a great deal of very interesting information in this chapter on processes of metal work and inlay as practised by the Saracenic artists, to which we have not space to refer; and in the chapter on glass we may commend to the reader's attention the remarks on the method of preparing the plaster tracery and stained-glass windows peculiar to the style, of which some examples are illustrated, in engravings which convey admirably the rich jewelled effect of this work.

We have been able to give only an imperfect outline of the contents of this interesting book, which will no doubt become a standard work on the subject of which it treats. The author in his preface pays a well-deserved compliment to the engraver, Mr. J. D. Cooper, for the manner in which the numerous woodcuts have been executed; indeed, it would be impossible to have a book on this mod *rato* scale and size more beautifully illustrated.

THE PALAZZO VITELLESCHI AT CORNETO TARQUINIA.

BY THE BARON DE GERMÜLLER.

Two respects the above-named monument is fully worthy of the monograph recently consecrated to its complete illustration by Signor Boffi, a Milanese architect*; firstly, because there are so few examples of similar private residences of Gothic style in Italy; secondly, on account of the interesting process of transformation which took place in the details during its erection from 1435 to 1440.

The number of Gothic private palaces of some importance, which, after resisting the assaults of time and men, have come down to our days in Italy, is not considerable. A certain exception can be made, it is true, for Venice; but the local circumstances of this enchanting, half Oriental city, have produced there a type different in almost every respect from that which existed in the country seats and in the towns of the remaining part of Italy. It may, therefore, be of some interest, particularly to architects in England, if their attention be called to a monument which, judging from my own case, may be unknown to many of those even who have spent some time in the south of the Alps.

If the transformation of parts and details which takes place at every period of transition from one style of architecture to another is rightly considered by architects as very instructive, there exist some peculiar circumstances connected with the revival of architecture in Italy which render this last great transformation in art particularly attractive. In fact, if the sudden rise at Florence of Brunelleschi's style may be compared to the birth of Minerva coming out from Jupiter's head, grown up and in full armour, and if this sudden origin seems to contradict the two opinions generally admitted, that no style can be the invention of a single man, and that no style can form itself without a style of transition, we are, on the other hand, far from possessing yet all the knowledge that might be wished as to the way in which the style of the Renaissance, from its cradle in Tuscany, spread over the rest of Italy.

We know, it is true, that very soon after

* Il Palazzo Vitelleschi in Corneto Tarquinia rilevato e descritto da Lucio Boffi, architetto. Milano: Ulrico Hoepli editore Librai della Real Casa, 1884. Gr. in folio, 29 plates in photo-eproduction from the original drawings. One edition of 100 numbered copies only.

the beginning of the revival several of the greatest Florentine masters, Brunelleschi himself, and Michelozzo, for instance, were repeatedly called to Milan, Ferrara, Venice, as also Donatello to Padua. We know, too, that architects of the second generation went to Rome and Naples,—that Leon Baptiste Alberti resided perhaps more at Rome than at Florence, and stayed for a longer time at Rimini, Urbino, and Mantua. In like manner it is comparatively easy to follow the development of certain styles, such as that originated by Luciano da Lovrana in the palaces of Urbino and Gubbio, brought by Bramante, first to Milan, developed there and, thus modified, transported by the Lombardi to Venice,* yet we are not able to establish clearly the connexion between Urbino and Florence. Whence does it come that in the whole country east of the Apennines, from Ancona to Venice and Milan, there appears, from the very beginning, a certain character of ornament distinctly different from what we see in Tuscany? It is impossible that terra cotta alone should have produced this. Is it due merely to a difference of the artistic sentiment and aptitude between the races inhabiting these countries, or to the original influence of some pre-eminent master hitherto insufficiently observed or totally unknown? Did Donatello at Padua, or Squarcione, exercise some particular influence,—did it come from Tuscany or direct from Rome? We cannot say. After all, just as Brunelleschi brought his details from Rome, interpreting them in Tuscany in his own particular way, so some other architect, bringing with him another interpretation of the same forms, might early have taken from Rome the direction of the Adriatic. Even without thinking of the great master of the second generation, Leon Baptiste Alberti, who introduced elements of a different character from those of the Brunelleschi and Michelozzo school, the mere absence of important Roman buildings of the fifteenth century is not sufficient to exclude the possibility of an influence exercised by Rome, different from and independent of the Florentine interpretation. If we are not mistaken, the Gothic forms we still see in the Vitelleschi Palace, as well as those of the Renaissance,—at least, in the principal doorway, are not quite clearly Florentine, as far as we can now ascertain.

It must not be forgotten that soon after its erection between 1445-50, the projected reconstruction of St. Peter's and the Vatican, the celebrated designs made for Nicolas V. by Alberti and B. Rossellino, though their execution was soon interrupted, were the great architectural events of Italy in the middle of the fifteenth century, and certainly exercised a far greater influence than now is generally suspected or easily traced; though these important events had their reflex in the very heart of Tuscany, in the Rucellai Palace at Florence, and in that of the Piccolomini at Pienza, which, as we have acquired pretty clear proof recently, reflect parts of the designs which these two masters together had presented for the new Vatican.

The palace at Corneto was built for Giovanni Vitelleschi, one of those strange figures we meet with in the Italian fifteenth century, first apostolic protonotary, and bishop of Reianati, and Governor of the Marches. He became Archbishop of Florence in the very year he began his palace of Corneto, and soon after Patriarch of Alexandria, and Cardinal.

Before 1434 and 1440 he fought personally for the temporal power of the Pope, winning the fame of a brave captain and a merciless enemy, keeping down Rome under his iron hand. He displayed these qualities to such an extent that he was blamed for it at the Council of Bâle. However, in 1440, five years after the beginning of his palace, having fallen under suspicion of standing in secret alliance with the Duke of Milan against the Florentines, the Pope had him suddenly imprisoned in the castle of St. Angelo, where he died on the 2nd of April from a wound received in a fight undertaken to regain his liberty.

* Signor Michele Caffi has recently proved in the *Storia di Siena* of Florence that the Lombardi belonged to the *Setari* family.

These dates, given by Signor Boffi, and confirmed by numerous coats-of-arms, with the cardinal's hat, are important; for they show that the palace as it now stands was really built in the space of five years, fixing thus the exact limits to the modification of architectural forms we are to examine.

At a later period the palace was inhabited nine different times by Pope Leo X. Owing to its situation, as well as the imposing height of the building, the upper loggia enjoys a view of surprising beauty. The panorama comprises the Mediterranean, with Corsica and Sardinia in the distance, the Roman Campagna, as well as that of Tuscany. For a long time it has been the property of the Soderini family, and though complete in almost every part, Signor Boffi writes that it is so much out of repair that the family would willingly part with it for a trifle if it were to come into the hands of those who would have it carefully restored.

Considering the interest of this building, I venture to ask if it would not deserve to attract the attention of the Italian Government and to be classed among the historical monuments? In any case it is saved from oblivion by the careful monograph of Signor Boffi, who, as well as his publisher, deserves praise for this undertaking. Signor Boffi's text is clear and simple, his drawings so numerous and evidently faithful that, without having visited the monument he describes, I have been able to feel myself acquainted with all its parts and the nature of its details so as to judge of its real character and importance. The only point I regret is that, in the execution of his drawings, M. Boffi should have worked too much with his pen in the secondary parts, such as the surface of walls and stones, and, on the contrary, not always given sufficient accent and shadow to the openings of doors and windows; he would thus have spared some time and produced a still more satisfactory effect. However, as it is, his book ought to find access to the principal architectural libraries.*

The scale of the drawings, and particularly of the details, is such as to enable one to make a minute examination of every interesting point.

I now proceed to the description of this monument from the plates of M. Boffi's work.

It is built entirely of *tufo travertino*. In the arches of the courtyards the stones are alternately of this stone and of another kind called *nenfo*, more resembling marble, whilst the columns forming the mullions of the various windows, their bases, and capitals, are of white marble. The columns in the courtyard have granite shafts.

The principal front of the Palazzo Vitelleschi is towards the Piazza Cavour, forming the corner of Via di Castello, which borders it on the left. The narrowest side, *i.e.*, the back, is limited by other buildings extending to the not-distant corner of the Piazza del Duomo. On the right side a neighbouring building borders it for one-third of its length from the Piazza, whilst the remainder faces to the north-east Piazza Soderini. In consequence of these dispositions, the palace, which is about 30 metres wide and 60 deep, has three façades, and is isolated on the greater part of its contour. The front of the building to the right falling back above the ground-floor, and forming over this a broad terrace, permits the Vitelleschi palace to have a fine window in each of its upper stories, looking towards the entrance close by of the street now called Corso Vittorio Emanuele.

Some parts of the plan show irregularities which, at the first glance, prove them to have belonged to some older buildings. This is particularly evident in regard to the part behind the right half of the front, and also of the furthest portion to the left, where a certain number of smaller rooms belonging to older houses, connected with one of those square towers so frequent in the Mediæval dwellings of the nobles which have been preserved.

* The rather as it was published only in 100 numbered copies.

The three principal features of the palace are the courtyard, opening on the Via di Castello, the pavilion (Padiglione) separating it from the Piazza Cavour and forming the left half of the façade, and under which leads the principal entrance into the court; and, finally, the part of the building occupying the whole right half of the ground.

The courtyard, separated from the street only to the height of the ground-floor by a thick wall crowned by a gallery projecting internally on consoles, is surrounded on the two remaining sides by two stories of galleries of four pointed arches each on the short side, six on the long one. Over this latter rises a third story with a loggia, of which more hereafter. The gallery on the short side has the double object of giving a more regular shape to the court, by covering the oblique direction of the older houses, and of establishing a communication between some of the rooms in them with the remainder of the palace.

The whole length of the ground, forming an irregular quadrangle, is divided into two halves by a central line of communication, beginning at the front with the staircase, continued by the portico of six arches along the court, and ended by the gallery, or corridor. By this means all the rooms are easily accessible, and the very few rooms without separate entrances were not provided with any evidently only because it was thought more convenient they should have none.

The last arch of the courtyard is wider than the others, because in the ground-floor it corresponds to a *rampa a cordoni* (or succession of inclined planes, connected each by low marble steps, similar to the mule paths on the mountains of the Riviera), leading up to a second entrance situated in the angle of the Piazza Soderini, which is on a higher level than the court. The principal entrance, as was said before, passes under the pavilion through a square vestibule with a vaulted ceiling, open in its whole width under an arch supported by two columns, and situated rather to the right of the longitudinal axis of the courtyard, so that by making three or four steps to the right you are at the entrance of the portico and of the stairs, which ascend by the first flight to a landing-place adjoining the front wall, and by the second flight back to a landing-place which separates the stairs from the upper loggia. The disposition of the stairs is the same in every story. Abundant light comes from two windows situated on the front landing-places.

These stairs are remarkably easy, and evidently made for riding up with mules. They have no steps, but a succession of sloping planes paved with bricks, and separated by what the Italians call *cordoni*, of white marble.

On the ground-floor all the rooms are either approaching the square form or about one half of that size. On the first floor, or *piano nobile*, the foremost half of the part to the right, which below was divided by four walls, has but two, and in the second floor one single division. Thus the size of the rooms increases considerably in each story, the largest room being always at the right corner of the palace. On the upper floor the extremity to the right is occupied by a small chapel, preceded by an *anticappella*.

After the description of the general disposition of the palace I will now give that of the more interesting parts in detail, beginning by the principal front on the Piazza Cavour.

The principal front is, perhaps, the most interesting part of the building, and a first glance would induce one, as Signor Boffi rightly says, to attribute it to two different epochs,—we might even say three. However, a close and conscientious examination has shown M. Boffi that this is not the case, for neither in the horizontal direction nor in the vertical can you detect the slightest evidence of an interruption in the course of execution. The only circumstance that M. Boffi would consent to admit would be a change during the five years in the person of the leading architect.

The surface of the travertine wall in the ground-floor is quite even; its height and its few openings protected by iron railings give it

a fortress-like appearance, whilst the two upper stories are rusticated in that flat manner which is exhibited in the somewhat later palaces of the Rucellai at Florence, and the Piccolomini at Pienza, and by Bramante's two palaces at Rome. The appearance of belonging to two periods arises from the following points in the disposition and design. On both extremities the windows rest on a cornice lying in the same level, but in the centre the stories seem lower and on a quite different level, and both cornices on reaching this part have a vertical drop, and pass under these lower windows. This interruption of the level is produced by the staircase being lighted at each landing-place by two windows, each separated by a column. To the right of this central architecture only three very large and beautiful Gothic windows exist, two on the first floor, one on the second. These two parts of the façade are crowned by the same cornice, very effectively composed of small Gothic arches resting on corbels, projecting three times, one beyond another, and very much resembling that of Or San Michele at Florence. The left part of the façade, the so-called pavilion, shows only Renaissance forms in all its parts, in the beautiful entrance-door; above it, in the first floor, a large round-headed window, and in the second floor two broad windows separated by two columns, each bearing architraves. These are the characteristic forms of the second story, and run around the three sides of the pavilion, and along the courtyard, where they are still broader, so as to have three columns in each; and as the piers of masonry separating these windows have the breadth of an inter-columnium, we obtain thus a real upper loggia with stronger supports at equal distances, and the effect resulting from the straight line of architraves is not only peculiar to this palace, but a very rare feature at that time, when we may in cloisters meet with wooden beams supported by columns with or without wooden corbels, but hardly with stone beams bearing the not inconsiderable height of the remaining wall under the cornice, which in the pavilion and around the court is more than three metres lower than the one first described.

The architecture of the court consists of two galleries of pointed arches, the voussours being alternately of two different contours; the shafts of the columns are granite; the capitals of white marble. The capitals are everywhere of a simple Gothic type, with thick leaves, different from the Corinthian type, and in the upper loggia they are much broader than their height, in order to give better bearing to the architraves. The mouldings of the archivolts, bases, and cornices are throughout Gothic. The cornice above the ground-floor consists of elegant pointed small arches resting on a double tier of corbels, and forming the parapet of the upper loggia.

The front of the right side, consisting of two distinct parts separated by the neighbouring building, is less remarkable. The part looking on the terrace before the latter building has, in the upper story, a fourth beautiful Gothic window like those on the principal façade, and a round-headed one below. The part looking on the Piazza Soderini shows the side entrance to the court,—in the first story large windows of the seventeenth century; and in the second story, besides three Gothic windows, part of the curve of the apse of the little chapel is seen, projected on corbels connected by small arches. Above the roof, a stone pointed arch under a gable received a bell, and a single round stone chimney with a cornice on arches and corbels is to be seen on this side.

The details of the interior consist in the visible roof of the pavilion, decorated in form as well as in colour, on the principle we see in St. Miniato, near Florence, or in the Cathedral of Messina. In horizontal projection the principal beams form two intersecting crosses, rectangular and oblique. Then there is a wooden vault in the ante-chapel, in the form of a flat coffering, with some paintings, among which the Vitelleschi coat of arms is reproduced in colour; these arms, with the cardinal's hat, and containing two calves (*vitelli*), are very important as dates for the different parts

of the palace, and confirm, in fact, the conclusion that it really was built between 1435 and 1440.

The single large chimney-piece preserved, as well as the fountain, are shown on plate 16.

Having thus sufficiently described the general disposition of the palace, and the principal forms which compose it, we are now better able to point out briefly the process of transformation which took place also in the details during the building of this monument, and which gives it the transitional character so instructive as illustrating one of the ways by which the new forms gradually superseded those of the expiring style.

Whether we admit the existence of a single guiding architect who, during the course of five years, gradually transformed his style, according to this increasing knowledge of the new forms, or whether we admit the succession of two masters, of whom the second was nearly as well acquainted with the forms of the Revival as was then possible, one thing is certain, the two galleries of the court, and the four beautiful Gothic windows of the right part of the façade, are entirely Gothic in their forms and details. The two cornices are built on the machicolated principle, but only for the sake of lightness; the arches are not only not projecting enough to give room for throwing down any projectile, but the openings for that purpose were covered by a course of stone from the very beginning. The general design of these four windows is the same, consisting of two mullions in the shape of twisted marble columns supporting the tracery, delicately-sculptured in *neofo*, formed by three circular or wheel openings of different arrangement, but very pleasing in effect, recalling somewhat those by Michelozzo in the corridor leading to the chapel he built for Cosimo Medici, in Santa Croce at Florence. However, in two of these windows (pl. 19, 20, upper story looking towards the terrace, and pl. 25 in the first story), the columns of the mullions have Ionic capitals, two others are intended to be composite, and as the desire to give antique proportions to these columns made them shorter than the Gothic ones of the jambs of the window, an abacus (meant perhaps to be an entablature) is put on their capitals to attain the height of the springing of the arches. The ornaments round the archivolts show a progress in the direction of the revival forms.

If we now pass to the windows lighting the staircase in the middle of the front we see the movement of transition is far more advanced. Of the seven windows which in five stories light the landing-places, each story shows a different design. The lowest window and the two next divided by columns have square dressings, the latter being rusticated. Those in the third story (we reckon there the landing-places as stories) are likewise rusticated, but the windows are finished in the shape of two pointed arches resting on the column in the middle. In the two windows above the arches are round-headed, and have received a common rectangular frame with medallions and half medallions in the spandrels, being thus quite in the Renaissance style. The uppermost has a square architrave without any column.

The shafts of the dividing columns are smooth or twisted and once fluted, but the capitals are still Gothic, and in one case with a rectangular abacus like those described in the upper loggia, proving them to be made under the guidance of the same architect.

Passing finally to the details of the pavilion, I mentioned already the large round-headed window. It has on the outside of the archivolts, at each springing, one rose ornament, and on the summit an acroterion between two others, completing thus a system of decoration extremely frequent over arched doorways and frames of the fifteenth century in Tuscany. But the most striking detail of the whole palace is certainly the beautiful entrance-door; this is of a form so perfectly antique in every part that the popular opinion at Corneto believes it to have been brought here from some ancient building at Palestrina,—an opinion however, as M. Boffi rightly observes and proves by his drawings, entirely unfounded.

The rectangular opening is 2·70 mètres wide and 4·20 mètres high. The cornice over the frieze is supported at each extremity by two consoles of beautiful design, and its projection between these by much smaller consoles, producing thus a very pleasing as well as original effect. These smaller consoles and the shells which ornament the panels between them, are repeated under the sloping cornice of the pediment, which, in its centre, shows the Vitelleschi coat of arms, with the cardinal's hat and other emblems of his arms.

The front of the corona in the horizontal cornice is ornamented with a line of shell forms, inscribed in circles, and the cyma of the raking cornice shows an enrichment of laurel leaves, flowers, and fruits, twisted and bound by a ribbon. Some very slight Gothic recollections in a few of the leaves, and the diamond-pointed shape given to the dentils, are the only remains of Mediaeval feeling, not sufficient to disturb the beauty of the design, but sufficient to prove its execution for Cardinal Vitelleschi. I may say that at Florence there exists no specimen of a door of this type and of equal interest, nor, perhaps, at Rome either.

Thus, in conclusion, the Palazzo Vitelleschi is one of the most striking specimens of the passage from forms entirely Gothic to those of Classic art. It illustrates one of the modes by which such transitions of style are effected, and proves clearly in how short a time (only five years), under certain circumstances, such a considerable change can take place. We are in presence of what must be admitted to be an entirely Gothic plan and a Gothic conception of the whole, executed first in Gothic details nearly pure, which all at once begin to be influenced, it would seem, by stone-cutters desirous to exhibit the few notions of new forms they happened to have picked up. Soon we see entire parts, such as doors and windows, struggling both to get rid of the old forms and to acquire the new. It seems as if the master-mason or guiding architect were anxious to produce as many of these new forms as he could obtain.

Finally, we see the principal doorway, antique in every part, retaining only such traces of Mediaeval detail as are sufficient to prove that it really was executed at that date, and not taken from some antique monument. It is finally interesting to observe that the general plan, though entirely Gothic, contains all the features and characteristic elements of the palaces and villas of the Renaissance during the fifteenth and first thirty years of the sixteenth century.

HENRI DE GEYMÜLLER.

NOTES.

THIS journal has nothing to do with the political aspects of the General Election, but certainly it is much to be desired that it should result in the establishment of a strong Government, and put an end, for some time to come, to uncertainty as to the government of Ireland. Such uncertainty as now exists is fatal to the proper employment of capital and to the prosperity of industrial undertakings. Again, in this country, if a new Government results from the Election, there will be a new First Commissioner of Works, making the fourth within a year. Such change of the head of this department leaves it entirely in the hands of the permanent officials, and likewise puts a stop to the carrying out of important works, such as the erection of a new National Portrait Gallery. It is the same all along the line; the disputes and strivings of politicians for place are entirely adverse to the general interests of the whole community.

WE have to thank the quarrel lately got up in the columns of the *Times* ("quarrel" it must be called,—the chief disputants losing their tempers all round) about the durability of water-colours, for the getting up also of a most interesting exhibition at the rooms of the Water-colour Institute, whereby Sir James Linton desires to practically

refute the audacious blasphemies of Mr. J. C. Robinson in regard to water-colour painting. As far as the collection goes, it thoroughly supports Sir James Linton's contention that water-colour drawings are by no means necessarily faded and gone in twenty or thirty years, as Mr. Robinson rashly averred. Here are drawings of a considerable number of which have been in existence a great deal longer than that, and which are obviously unimpaired in their main qualities; drawings by Varley, De Wint, David Cox, W. Hunt, and others, which bear satisfactory evidence in Sir James's favour, and those of Barrett, perhaps, as much as any, since Barrett aimed at rich and bright sunlight effects, and there is certainly no reason to think that the drawings by him that are exhibited here,—a very fine set by the way,—were ever brighter in effect than they are now. There are some very fine small Turners, which do not look as if they had faded; but we do not feel quite so positive about all of them. W. Hunt's fruit-pieces are as brilliant as if painted yesterday. But one of the most notable instances of the stability of water-colour is shown in the church interior by De Witte, 217 years old, and painted (naturally at that period) with a very limited palette. This drawing is as sharp and clean in its lights and shadows as possible. At the same time we may conclude, like Sir Roger, that "much may be said on both sides." Mr. Robinson was much too sweeping in his statements; but, on the other hand, the collection of a roomful of water-colours that have not faded does not prove that water-colours are never liable to fade; and the tone of Sir James Linton's remarks on the subject savours a little too much of a feeling "that this our craft is in danger."

THE value of petroleum as fuel for marine purposes has been, not for the first time, pointed out in a paper recently read by Colonel Stevens at the United Service Institution. The advantages are so obvious in the case of navies and mercantile marines that it is a wonder that no practical efforts to utilise it on a large scale have not been made long before this, particularly as the area of the oil-beds has so enormously increased of late years. American petroleum and its extraordinary abundance is now a matter of history, but the American monopoly has been quite disposed of by the Russian discoveries on the Black Sea, and those in Germany, Hungary, Egypt, and other countries. Apart from the facility and cheapness of generating steam, petroleum particularly recommends itself by its portability and adaptation for storage, which in itself effects a tremendous saving in the sea-room of large steamers, besides a great saving of time and labour in coaling operations, which are frequently inconvenient, entailing a considerable diversion of route to reach a coaling station, and which are always dirty and unpleasant. On all occasions these economies would be worth attention, while in case of war they would be accentuated a hundredfold. Petroleum, as used for this kind of fuel, with its benzoline and gasoline distilled and its volatile constituents taken away, is a safe material even under tolerably high temperatures, and is very different to the petroleum and petrolene which now and again alarm the British householder by an explosion of the family lamp.

WE have received an interesting report from Mr. Aldwinckle in regard to an experiment which has been made, under his direction, in finding relief work for men out of work, in preparing the ground for the new buildings to be erected in connexion with the Wandsworth and Clapham Union Workhouse. This was not work invented for the purpose of giving relief (which is a most undesirable expedient), but work which had to be done, and on which it was possible, under proper supervision, to employ unskilled labour. Each applicant for work had to produce an order from the Relieving Officer of his district, vouching that he was a deserving man; and on the work being opened on February 22, 200 men presented themselves with the requisite orders,—the full number sanctioned by the Guardians,

though it was afterwards extended to 250. About 150*l.* worth of contractors' plant was first purchased, which will be available for future use in other cases. The work done included such matters as surface digging to form yards, excavating, filling in concrete and building footings, &c. 3*d.* per hour was paid, and the loss, over an expenditure of about 1,400*l.*, only amounted to 29*l.* Mr. Aldwinckle adds:—

"The establishment of these relief works enabled the Guardians to ascertain, in the most practical manner possible, the extent to which exceptional distress actually existed in the Union, and although in various parts of the metropolis there were varying opinions as to the existence of such distress, it became evident that in this Union there was a great pressure among a large number of the unemployed. The fact that, as reported from time to time by the relieving officers, twice as many men could have been put upon these works, had it been possible to find them work to do, is the best evidence that considerable distress existed. I have also ascertained from the relieving officers that the large majority of the men employed had not in previous years received any assistance from the Guardians. This shows, I think, that the Guardians were able, through the means of these relief works, to assist many who were, so to speak, somewhat out of the ordinary scope of the Poor Law, and to do so in a way that would not in any manner pauperise them, or destroy their sense of independence."

EGYPT has been the scene of some remarkable antiquarian discoveries, but few of more interest than that recently made in one of the Deltas of the Nile by Mr. Flinders Petrie of a royal palm, known in Biblical language as Pharaoh's house in Tahpanes, and locally as the "Castle of the Jew's daughter," which is mentioned in Jeremiah as the resting-place of the fugitive daughters of Zedekiah. The building, in general appearance, somewhat resembles the Norman keep of Rochester, and it contained sixteen chambers on each floor, of which there had evidently been several; while, attached to the tower, was an area of brickwork resting upon sand, which was actually the scene of one of Jeremiah's prophecies. It could scarcely have been expected that a building 2,550 years old should reveal many remains within its precincts; but from the mound at the base a very fair number of domestic relics were obtained, principally belonging to the kitchen, such as jars, dishes, pokers, corn-rubbers, together with a vast number of amphore lids and covers, in a chamber that was presumably the butler's pantry. Other chambers yielded remains that were not altogether so utilitarian, and these included early Greek vases of the date 600 B.C., with paintings of sphinxes, processions, chariot races, &c.; while from underneath the four corners of the tower were exhumed sacrificial bones, tablets, rings, and other small matters, evidently constituting the foundation deposits of its builder, Psammetichus I. The other antiquarian event, equally interesting in its way, was the unveiling at Boulak of mummies by M. Maspero, Director-General of Egyptian Antiquities,—and, in particular, those of Ramesis II., Sesostris, and his successor, Ramesis III. A third mummy, which was in a very bad state of putrefaction, proved to be that of Queen Nofretari, whose worship was very popular at Thebes. She was always represented in pictures by Egyptologists as a negress, but from her remains it was evident that she was of white race.

THE judgment of the Court of Appeal in the case of *Ford v. The Metropolitan and Metropolitan District Railway Companies* clears up a doubt in regard to the law of compensation for injury to property by railways and other undertakings. That doubt was raised by the well-known case of *Rickett v. The Metropolitan Railway Company*, in which some expressions of Lord Chelmsford gave rise to the impression that compensation could not be granted for injury done in the course of construction of the works, but only for injury by the works when finished. Messrs. Woolf & Middleton, in their work on the law of compensation, lay it down that "the injury must be of a permanent nature and not a mere temporary inconvenience." This, it is clear, is not the law. "The right to compensation,"

says Lord Justice Cotton, in the case to which we are alluding, "ought to include also injury caused to the house not only by the works when finished, but by the exercise of the powers of the Act in the course of putting up those works." It is unnecessary to refer to the facts of the particular case. The important part of it is the rule which we find is clearly laid down, that what the Master of the Rolls calls the "exceedingly strange proposition" that compensation cannot be granted for injury only existing during the continuance of the work, is not good law, but that, on the contrary, an arbitrator must take such injury into account and award compensation in respect of it.

AN important addition is to be made to the already most valuable collection of architectural casts at the South Kensington Museum in the form of a colossal one of the centre portal of the western façade of S. Petronio at Bologna. It may be remembered by our readers that it was accepting the commission for this doorway that ruined the peace and quietness of Jacopo dalla Quercia's life, for he was at the time already under a contract with the Opera del Duomo at Siena to finish the baptismal font now in S. Giovanni in that town. His whole heart, however, was in the sculptures of this doorway, and he was continually slipping away from Siena to work at them, and having to be recalled from Bologna under penalty of a heavy fine. It will not be long before our rising young sculptors will be able to study these *bassi-relievi* in London, just as the great master himself, in his youth, studied from the originals at Bologna. Permission to take this cast was obtained through the Accademia delle Belle Arti at Florence, who have confided the task to Signor Oronzio Lelli, also of Florence, and a scaffold just erected before the portal testifies to the undertaking having already been commenced.

AN operation as extensive as it is novel has just been completed at Berlin, where the old roof of the New Museum has been removed and a new one erected in its place. In order to remove the former covering of the several rooms of the great building, the work of Schinkel, without exposing the treasures it contains to the influences of the atmosphere, and consequent destruction, it was necessary to construct a temporary roofing, which was a work of constructive art by itself. Thus protected, the contents of the museum were safe against injury, and the work of erecting the new roof has proceeded uninterrupted for more than nine months. The new roof consists of iron girders with vaults between. The vaults are made of wood cement, covered by a simple layer of paper. Outside the roof has received a cover of macadam, which is considered by German architects as the best protection against fire from without. The old roof has stood since 1823, but it was no longer in accordance with present views as to safety against fire.

AMONG the picturesque pilgrimages in the neighbourhood of London, that to Beaconsfield, in Bucks, is not an unusual one, for here is seen the burial-place of Edmund Burke, and the grave of Edmund Waller, the poet and politician of the Commonwealth and the Restoration. A correspondent informs us that the lettering on Waller's tomb is in many places almost illegible. This is not as it should be. One may doubt whether it is desirable to cover a tombstone with panegyrics and a biography, but when they are there they should be kept legible and in good condition. Waller's tomb is a historical memorial, and Magdalen College, the patrons of the living of Beaconsfield, should take care that it is not allowed to be neglected.

THE first number of the *Jahrbuch des Kaiserlichen Deutschen Archäologischen Instituts* (1886) has just appeared. It is the successor to the time-honoured *Archäologische Zeitung*, whose final number we noticed a week ago. The new periodical gives a large

amount of its space to antiquities in our own museum. Dr. Paul Wolters publishes in a fine prototype plate two marble heads of the British Museum, which he holds to be Praxitelean in style, and which he thinks have not received the attention they deserve. One is from the collection of the Earl of Aberdeen, the other from the Townley collection. Both are catalogued in the "Guide to Græco-Roman Sculptures," but Dr. Wolters thinks they are genuine Greek work, of the time of Praxiteles. It remains to be seen if in a new edition the authorities of the Museum will adopt his suggestion. The most important paper is one by Professor Michaelis on the so-called "Ephesian" Amazon statues; he publishes the Petworth Amazon in two beautiful plates, and the Museum head side by side with the Berlin Amazon, to which he believes it to be near akin. His paper should be read in detail. We can only note that he brings together no less than thirty-five instances of these allied Amazon types, all of which he groups under three heads, according to the pose and the disposition of the drapery. We may call attention also to an interesting paper by Dr. Conze on the famous bronze "praying boy" of Berlin. He shows that both arms are modern, but believes them to be rightly restored. In the same number is published the curious bronze votive frog to which we drew attention last week. The *Jahrbuch* follows, we are glad to see, the example of the American *Journal of Archaeology* in devoting part of its space to a résumé of current archaeological bibliography.

WE are glad to find that the most important of the Tegea heads (whose transportation from the local museum at Piali to Athens we noticed some weeks ago, is carefully published in the latest number of the *Εφημερίς αρχαιολογική* (1886, i, plate 2). The head had appeared before in the *Miththeilungen* of the German Institute, but since it has received its missing half, which had been built into a local wall, it now well deserves the prototype plate devoted to it. Mr. Murray, long ago, in his "History of Greek Sculpture" (ii, 291), conjectured that the head, though wearing a helmet, had belonged to a woman. Only one woman was present at the hunt of the Calydonian boar, and certainly Scopas would not omit her from his composition,—the maiden huntress, Atalanta. Of course, it is not quite certain that the head comes from the front pediment, nor is it usual for Atalanta to be characterised by a helmet, as she is huntress rather than warrior. Though sadly mutilated, especially about the mouth and right eye, enough remains to give clear evidence of the pathetic character of the expression, and it harmonises generally with what we should expect from literary traditions of the style of Scopas. The plate is accompanied by a short notice by Dr. Kabbadias.

ON Thursday, the 17th ult., there was a meeting, in Rome, of the Commission for judging the premium in the competition for the equestrian statue to be placed on the grand national monument to Victor Emmanuel; but after an animated discussion the meeting was adjourned. It appears that the difficulty arose from the fact that none of the sketch-models submitted exactly fulfil the conditions of the competition, one part of the Commission maintaining that no premium should be awarded, while the other held that there were among the competing sketches some that well merit being carried into execution.

DURING the excavations that have been going on for some time among the ruins of the Villa Casali on the Celian Hill the workmen have discovered a portion of a Marble group representing the punishment of Marsyas. The group is of special interest, as it is quite differently conceived from the ordinary type of the subject, as it appears, e.g., in the statue in the Conservatori Museum. Marsyas is bound to the tree, his right hand fastened above his head, his left hanging down. He is leaning his head on his right shoulder in an attitude of quiet suffering,—his hair and beard are long, but there is nothing of the usual rough, Satyr character about the face.

The whole weight of the body is inclined to the right, not, as in the usual type, evenly balanced. The group is in bad preservation, almost the whole of the two arms are missing, the right leg and the left as far as the thigh. On this left thigh there still remains the hand of another figure.

THE excavations proceeding on the Janiculum have led to the discovery of a number of Roman lamps, which are of more than average interest on account of the mythological subjects which decorate them. On one Ulysses appears escaping beneath a ram from the cave of Polyphemus; on another, Hercules fighting with Geryon; on a third, the same hero contending with the Hydra; on a fourth, the figure of Fortuna seated holding the helm of a ship in her right hand, and a cornucopia in her left.

A FINE marble group, representing the three Graces, has just been unearthed during the re-building of a house in the Via Torre dei Conti. The group is about three-quarter life-size, and represents the goddesses in their typical attitude embracing each other, two of them facing, the middle one with her back to the spectator, like the well-known Graces of Siena. At either side of the group stands a vase, over which some drapery is hanging. All three heads are wanting, but there is hope they may yet be discovered, as the marks of fracture are evidently recent. The *Bullettino della Commissione Archeologica* (1886, Fasc. 4) reports that the style of the execution is fine, and that, save for the heads, the group is marvellously well preserved.

WE have received the second part of the re-publication of Leech's *Punch* sketches which Messrs. Bradbury, Agnew, & Co. are bringing out. It contains many old favourites, and illustrates Leech's humour (in the literary descriptions as well as in the drawings), and his ease and lightness of touch, and power of conveying character in a few lines. At the same time, one cannot help feeling that the style borders occasionally too much on caricature; in this respect, Mr. Keene and Mr. Du Maurier (the former especially) can claim a certain advance on their clever and genial predecessor.

THE key presented to her Majesty on the occasion of the opening of Holloway College, an engraving and description of which have been forwarded to us by the makers ("Chatwood's Patent Safe and Lock Company"), together with their own opinion on their own work, is an unhappy example of the kind of thing which passes current with the British public for artistic design. The key is of gold, it is true, and about 300 diamonds have been inserted in it; but gold and diamonds do not make art. The design is a piece of the most ordinary commonplace, and the connexion between the shaft and the handle so entirely without connexion (so to speak) as to suggest the idea that no one could turn the key without breaking the handle off from the stem. Yet this precious affair, the makers of it have the assurance to tell us, "is a masterpiece both in design and workmanship." The workmanship we do not contest; but before next puffing their own wares in this way, Messrs. Chatwood & Co., or whoever is responsible for their circular, had better study a little real artistic metal work,—Indian or Medieval, for instance,—and get some competent person to explain to them something about the elements of artistic design. They may then learn to understand that gold and diamonds do not make art, and that many a wrought-iron key is worth infinitely more, to the eye of an artist, than this costly piece of gimcrack.

Proposed Circus at the Junction of the Strand and Wellington-street.—Mr. Runtz has given notice that at the meeting of the Metropolitan Board of Works this Friday, July 2nd, he will move:—"That it be referred to the Works and General Purposes Committee to consider and report upon the desirability of the Board applying to Parliament in the next Session for power to form a circus at the intersection of Wellington-street and the Strand."

LETTER FROM PARIS.

WHEN these lines appear, after two laborious weeks spent in discussing the route and the mode of execution, the Municipal Council of Paris will have finally settled the Metropolitan Railway question. The operation will then only await the Parliamentary vote to enter on the stage of execution, and we can now indicate in detail the scheme which will so greatly modify the aspect of Paris and metamorphose its habits and local transactions. It is to be hoped that after all this delay the work will be so actively pushed on as not to leave Paris, at the time of the 1889 Exhibition, in the position of a great "chantier de démolitions," which is rather to be feared.

The scheme which is to be approved comprises first a circular line starting from the Place de l'Étoile and returning there after passing near the Place de Clugny, the Gare du Nord, the Places de Strasbourg, de la République, and de la Bastille, the Place Mazas, the Boulevard de l'Hôpital, the Place and the Boulevard d'Italie, the Boulevard St. Jacques, the Places Denfert-Rochereau and de Rennes, the Boulevard de Grenelle, and the Trocadéro, crossing the Seine twice in its route. This first line, which will follow that of the old outer boulevards, will be an open cutting between the Trocadéro and the Boulevard Barbès; the remainder will be on a viaduct.

A line starting from the above-mentioned one at the Place de Strasbourg, will pass by the boulevards de Strasbourg, de Sébastopol, near the Hôtel de Ville, and by the boulevard St. Michel to join the Place Denfert-Rochereau. All this portion will be in a tunnel, excepting for the ventilating spaces, which will form small squares like those in the Boulevard Richard Lenoir, above the canal St. Martin.

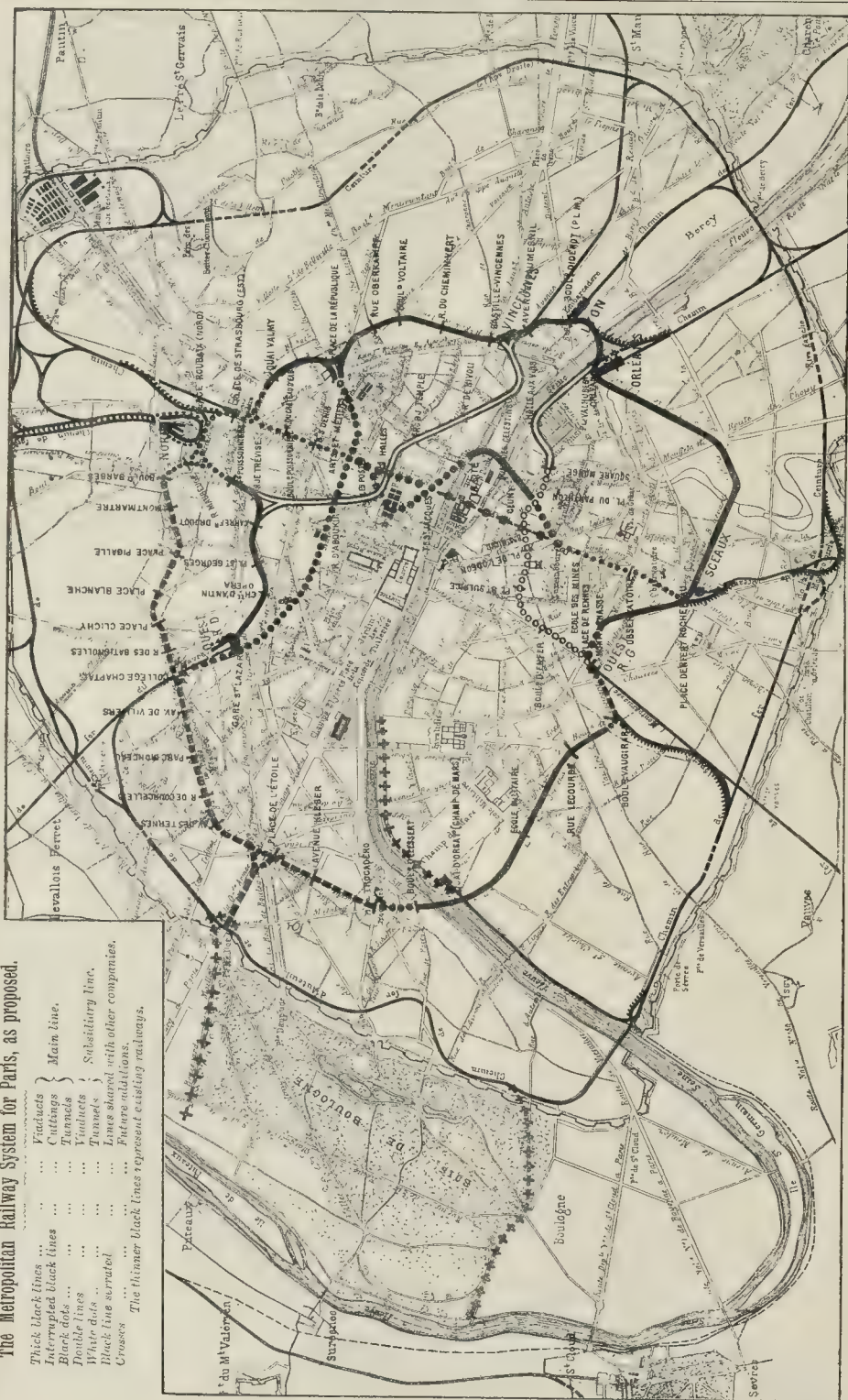
Then comes a third line, leading from Batignolles to the Place de la République. This will pass by or near the Place de l'Opéra and the Place de la Bourse, by the Rue Septembre 4, the Rue Réaumur, and the Rue Turbigo, with junctions at its two extremities, with the aforesaid circle line. This portion of the route will necessitate the prolongation of the Rue Réaumur, between the Boulevard Sébastopol and the Place de la Bourse,—the busiest and most crowded centre of Paris. This is an important piece of new road work, opening a considerable breach in the Montmartre quarter; less important, however, than the eventual establishment of a line from the Gare St. Lazare to the Gare du Nord, by way of the Square Drouot, in the midst of the most aristocratic portion of the Boulevard Haussmann, and the Chaussée d'Antin. Whether this will be subterranean (as the Municipal Council demand) or aerial, is the question, and there are so many different interests concerned in it that one cannot predict what the decision of the Chambers will be.

The project includes two other lines of future extension, the one branching off at the Square Drouot, and joining the Gare Mont Parnasse by the Halle aux Vins, the Square Monge, the Place St. Sulpice, and the Place de Rennes. Lastly, one other short branch is to start from the Porte Maillot, to join the outer circle at the Place de l'Étoile.

Such is the general project that has been adopted, of which we give a plan in the present number. Unfortunately, in a city like Paris, such an immense scheme cannot be carried out without here and there destroying some of the old associations dear to artists; and, as we have already said, the archaeological world is greatly disturbed at the danger with which the route threatens certain edifices, especially the old palace of the archbishops of Sens, already much disfigured through the inroads of business. Premises, and shorn of its ancient splendour since it was invaded by confectionery manufactories. M. Charles Garnier has, with his usual energy, constituted himself the defender of these vestiges of a former age, without much hope, however, of converting the engineers, who, as a rule, do not pique themselves much on archaeology. In view of the demolition of the hideous barracks occupied by the Administration des Postes, in the Cour du Carrousel, M. Garnier has also been commissioned by the Government to prepare a plan for the transformation of this large space into a square in which will be arranged the best works in sculpture purchased by the State during the last few years. This open-air museum of art will suitably surround the

Thick black lines	..	Vaducts	} Main line.
Interrupted black lines	...	Cuttings	}
Black dots	...	Tunnels	}
Double lines	---	Vaducts	Subsidiary line.
Wavy lines	~~~~~	Tunnels	
Blue line surruted	- - - - -	Lines shared with other companies.	
Crosses	x x x	Future additions.	

The thinner black lines represent existing railroads.



pretty little Arc du Triomphe of the Carrousel, at present out of its element amid a mass of all kinds of debris. One can have nothing but praise for this project, which will produce a fine and effectively-laid-out open space backed by the imposing mass of the Louvre and what remains of the Tuileries. But in that case, Government must take serious measures to put a stop to such injuries as the stupid "public" inflicts constantly on the numerous and really fine statues which occupy the gardens of the Tuileries. These acts of Vandalism have become so serious and frequent that the Government, after having granted to the Municipality for some years past the site on which the road from the Rue de Rivoli to the Pont Royal has been formed, has recently threatened to remove all the works of art which are its property, if these mischievous acts are continued. As the Municipality on their side refuse to put up railings along the road, there seems to be a conflict likely to arise out of the unwillingness of the Parisian public to respect the national property.

Not far from here, and behind the future square of which M. Garnier is studying the plans, is already rising the monument to Gambetta, which it is hoped will be inaugurated next year. While the architect, M. Boileau, is pushing forward the work for the pedestal, the sculptor, M. Aubé, is not less actively occupied with his portion of the work. The figure, in stone, of Gambetta, is in an advanced stage; and the model of one of the two side figures, symbolising "La Vérité," will soon be completed. The other figure, personifying "La Force," is also nearly completed. Both will be cast in bronze, as also the group of children, and the lion which crowns the pyramid. As an official inauguration must always coincide with the national fête, the statue of Diderot, by M. Gautherin, on the Boulevard St. Germain, at the corner of the Rue de Rennes, will be inaugurated this year. It is a mediocre work, and we much prefer another Diderot statue, by M. Lecomte, which in a few days will be placed, unostentatiously and with no official ceremonies, in the new Square d'Anvers, along with another statue by the same artist. Between them will stand an allegorical statue of Peace, which the Administration has commissioned from M. Jules Contant. We are also expecting soon the inauguration of the statue of Lamartine, long delayed, by M. Marquet de Vasselot. It will be erected at Passy, not far from the residence of the poet, in the place which bears his name. We may announce also, as fixed for the 17th of October, the inauguration of the statue of Berlioz, of which we recently gave a photograph. During the ceremony an orchestra and chorus is to perform a hymn by Berlioz, composed for the inauguration of the Colonne de Juillet, and which has never been performed since 1840.

We are approaching the season which is the dread of Parisians who love quiet, and who are in the habit of flying from the city before the crowd of provincial visitors who are attracted by the national fête, which takes place in a few days. The preparations, already made, come so little into our scope that we should hardly mention them except that the firework display in the Champ de Mars (the last, probably, that will be held there for some time) has a sort of special interest, as it has been arranged by M. Lavastre that the principal "pieces" should give the outline of the projected exhibition palace, with the great basement for the colossal tower of M. Eiffel. For the tower itself M. Lavastre has substituted a figure of France distributing palms and crowns. We only wish the Government would adopt this economical and much more decorative variation, in place of the monster tower which threatens us.

We may observe here that public opinion is showing itself generally refractory in the matter of that same tower. We need not repeat our criticisms on the æsthetic view of the project. Practically, its execution will be very difficult, and people are even asking how the public are to get up to the top of it. As it is impossible to work a single lift for an elevation of 300 metres, M. Eiffel's plan comprises a series of lifts of about 30 metres each journey, so that the visitors will have to pass from one cabin to another ten times in the course of the ascent. This in itself should be enough to condemn this project of an iron merchant to turn his materials to account.

Since our last letter, the jury of the Salon have distributed their final awards. It is a painter, M. Marec, who has obtained the "Prix

du Salon" for a realistic and violent work representing a scene in an artisan's dwelling the day after "pay-day." In the architectural section the much-envied prize has been carried off by MM. Marcel and Lafon for the interesting study for the restoration of the Hôtel de Bourgtherolde, of which we have already spoken.

The Académie des Beaux-Arts, on its part, has awarded the Deprez prize. It has selected for this honour a young and conscientious artist, M. Escaula, from whom the Municipality purchased, two years ago, a pretty group in marble, entitled "Bâton de Vieillesse." Lastly, to finish with public competitions and official rewards, MM. Emile Beber, Henri Saladin, and Jacques Galland, all young artists, have been premiated by the Government in the competition for the execution of the Beauvais tapestries intended for the Musée du Louvre.

The Government has now settled the complete list of painters commissioned to execute the interior decoration of the new Sorbonne. For the grand amphitheatre, M. Puvion de Chavannes is to execute a composition with groups symbolising Poetry, Eloquence, History, Philosophy, and the principles and application of Science. In the centre will be an allegorical group, which is left to the taste and imagination of the artist. M. Galland, the well-known decorative artist, is to treat the medallions of the cupola in the same apartment. On the grand staircases, MM. Flameng and Chartran are to illustrate the annals of the Faculties of Literature and Science. M. Benjamin Constant, to whom is entrusted the Salle du Conseil Académique, is to paint, in a centre panel, five figures personifying the five Faculties; two side panels will symbolise Literature and Science, two others will have for subjects "Prometheus bound" and "Prometheus delivered."

The other decorative schemes are thus commissioned by M. Nenot, acting in concert with the rector of the Académie de Paris:—Salon St. Jacques, M. Lerolle; Salon Sorbonne, M. Wencker; principal Salle-à-manger, M. Cazin; Salle des Commissions, MM. Lhermitte and Roll; Rector's dining-room, M. Raphael Collin; Salle des Facultés de Literature and Science, MM. Duez and Olivier Merson; Salon du Rector, M. Clairin. In all probability the Sorbonne, only just rising above the ground, will be finished and decorated before the Hôtel de Ville, which was commenced in 1872, and opened in 1882, unless the Municipal Council hasten their decision, which the artists are anxiously awaiting.

If we add that among the artists favoured by the largest commissions for the Sorbonne are M. Benjamin Constant, son-in-law of M. Emmanuel Arago, minister-plenipotentiary and senator; and M. Flameng, son-in-law of M. Turquet, Under-Secretary of State for the Beaux Arts Department, it will be seen that, even in a republic, nepotism is a power in art.

The sculptor Dumont, to whom we owe the "Genius of Liberty" of the Colonne de Juillet, and the statue of Napoleon which surmounts the Vendôme Column, has, during the last few days, possessed a monument in the Cemetery Mont-Farnasse, erected by the pious care of his former pupils. Among his surviving pupils are MM. Marigley, Mathurin-Moreau, Auzelin, and Jules Thomas. The latter has executed the bust of the master, which crowns a white marble stele surmounting a tomb of the same material. The monument, which is very simple in character, bears inscriptions recalling the principal works of the eminent sculptor.

We ought not to conclude without a word of regret for the landscape painter, M. Moulion, who has died at the age of 54 after a long and painful illness. He was an artist of merit, who was unjustly neglected by the jury of the Salon. He obtained, in 1880, the only medal ever accorded to his works, which deserved a better recompense.

Rebuilding of the Old Bailey.—The City Press states that the Corporation have at last determined to commence the rebuilding of the Central Criminal Court, and to make the additions which pressure of business has for some years demanded. The "City Fathers," or "Corporators," as some of them love to call themselves, have long talked of this much-needed work, and it is to be hoped that they really mean business this time.

Illustrations.

MONUMENT TO THE LATE G. E. STREET.

WE give an illustration of this work, engraved by Mr. J. D. Cooper from a photograph. A portion of the canopy and pedestal is, however, necessarily omitted in this view, the main object of which is to show the figure and the subject in relief under it. The architectural portion was designed by Mr. Blomfield, and the sculpture is by Mr. Armistead.

We have before expressed our own opinion that the head was not a very good likeness of the eminent architect, but we understand that his surviving relatives, who certainly have the best right to an opinion on the matter, consider the likeness a very good one. In other respects, the figure is at once life-like and sculptural in its pose and treatment. The relief represents the arts and crafts required for the due enrichment of a great public building, and does so, not by abstract representations of sculpture, painting, &c., but by showing the practitioners at work. The architect is shown considering his plan, the mason laying the foundation-stone truly, the sculptor modelling his figure of Justice, the carpenter sawing his plank, the bricklayer building his wall, the painter instructor, the tapestry-worker, the smiths at their hammering, with silversmith, on to the final testing of the bell by the musical doctor. One or two of the figures thus described are hidden from view in the illustration, being at the further end of the pedestal.

Every figure has been carefully studied from the nude, and then as carefully from the draped model.

THE GWALIOR GATEWAY.

THIS gateway, now in the Colonial and Indian Exhibition, and originally made for the Calcutta Exhibition two or three years ago, was the outcome of the munificence of the Maharajah Scindia of Gwalior, and the desire on the part of the Government of India to encourage industrial enterprise while fostering indigenous art. Great credit is due to Sir Lepel Griffin, the able administrator in Central India, for having warmly encouraged Major J. B. Keith in his undertaking, and to Mr. Buck, of the Government of India, for seeing it carried out. Engaged in conserving the ancient monuments of Central India, Major Keith desired to give the work a practical signification, and to dissipate the idea that the descendants of those who erected and carved the famous temples, were unable to work like their forefathers. He consequently proposed a representative piece of carving to be prepared for the Calcutta Exhibition, and this soon assumed larger proportions than originally intended. Some allowance will have to be made, seeing that the work of two years was crowded into six months, and that the arch itself is one solid piece of stone weighing 8 tons.

The gateway is not the facsimile of an ancient gate, but embodies the characteristics of Gwalior ornament, culled from various monuments. The arch is dissimilar to any ancient one now standing, and the bands of ornamentation are taken from no gateway, but adapted by Major Keith from what he found in nooks and corners of old buildings. Next, the pillars are quite unique in their treatment, a plain shaft being used with a view of keeping capital and base in prominent relief. The borders outside the pillars are, both in number and variety, different to those found in any other gateway. One was selected from an arabesque border that surrounds the exquisite sanctum of the Sas Bahn Temple, perched the tenth century; another from a Mahomedan tomb of the fifteenth century. Instead of bosses, elephants have been carved in the spandril. The native is not clever in delineating the human form. It is otherwise, however, when he depicts the elephant,—a task he performs with rare fidelity.

The work was executed in six months, the men working night and day. It may easily, therefore, be inferred that the gateway was erected under exceptional difficulties. These were added to owing to the risk of transporting the arch, which is one solid piece, weighing eight tons. Under ordinary circumstances, it would have been divided into pieces; but the workmen were anxious to show

the large stones their forefathers delighted to employ. Anyone conversant with Gwalior must have remarked the enormous lintels and architraves, measuring in some instances 45 ft.

The engraving is by Mr. J. D. Cooper, from a photograph taken by the Woodbury Company.

MECHLIN CATHEDRAL.

THE last quarter of a century has witnessed the completion of a remarkable number of spires and towers which were left unfinished by their Medieval builders. In France the Cathedrals of Quimper and St. Malo have had their spires added; in Germany the immense twins of Cologne are now visible with all their monstrous defects; the less enormous, but far more pleasing, spires of Ratisbon Cathedral have also been completed, and certainly are an addition to the beauties of that remarkably interesting building. The very similar pair of spires of the Weiskirche at Zoest are far less happy in their effect, as they serve to make the church, which was already too short, still more defective in proportion. The single spire at Ulm is also being carried up, with what effect remains to be seen.

In our own country Redcliffe Church, Bristol, has had its fine spire completed.

This rage for completing towers and spires calls our attention to those which are still left incomplete. It must not be understood that we are suggesting that they should be carried up and completed. The question is one which we neither intend nor care to argue about. We must, however, say that as a rule the completion of these vast Medieval towers cannot be regarded as an unmixed success. We are willing to allow that the completion of the spires of St. Mary's Redcliffe, Ratisbon Cathedral, and the Cathedral of Quimper have added to the dignity of those buildings, but can any one regard the spires of Cologne as anything but a gigantic failure? Those who recollect the grand effect produced by the solitary unfinished tower of the cathedral, with its weird-looking old crane on the top, pictured to their minds a magnificent result from the completion of this stupendous stump, but so little has that result been achieved that even the impression produced by vast size no longer exists. We do not say, nor do we know, whether this was owing to some defect in the design, or whether it is that an unfinished building is sometimes more attractive than one which is completed. There can be no doubt that men who have no architectural knowledge whatever can picture to their minds edifices which are far more splendid than anything which architects can devise or builder achieve, and, therefore, when one looks at an unfinished tower the terminations which our fancy would suggest are more lovely than any reality could make them.

The greatest spire over projected during the Middle Ages is that of the Cathedral at Mechlin. The tower portion of this mighty steeple has also been erected, and is 318 ft. high; had the work been completed according to the design which still exists, and which we reproduce in our illustration, it would have reached the stupendous height of 640 ft.

There is unfortunately a great deal of confusion with regard to the dates of the various parts of the Cathedral of Mechlin. Van Ghelst gives the following dates:—"Completion of the chancel and aisles, 1227; consecration of the church, 1312." Schayes says that the choir was erected in 1366, and the nave a century later, and that the tower was commenced in 1452. According to Kügler, the church was rebuilt in 1341, after a fire, but was not vaulted until 1457. He says the choir dates from the first half of the fifteenth century, and that the western tower was commenced in 1452, but there appears to be some doubt about this, because in a work compiled by a former Keeper of the Archives at Malines the date, 1465, was to be seen carved on a lion at the base of the tower. Murray, in his Handbook, gives the following dates:—nave 1437, choir 1451, and the tower 1452. We should not have quoted Murray as an authority upon architectural matters were it not that the architecture of the building would agree better with the dates which he ascribes to them than with those given by any other authorities; for instance, the nave is certainly earlier than the choir. At what time the carrying up the spire was abandoned we are unable to discover, nor does there seem ever to have been any positive intention of abandoning it, as

the bases of the flying-buttresses supporting the upper lantern had been fixed, and the buttresses themselves carried up several feet. In point of design Mechlin is more elegant than Antwerp, and has less inclination to wildness about it. We do not wish it to be understood that we advocate the completion of this spire. We have very considerable doubts whether, even if it were possible, such a work would be advisable. The architectural elevation is reproduced from an etching by Wenceslaus Hollar, dated 1619, entitled as follows:—"EKTUION. Turris Elegantissimas S. Romoldi Mechlinas. Sit ut Exhibetur in typo, tandem aliquando periciatur." Published in a work called "Brabantia Sacra et Profana." Amsterdam, 1796.

Hollar copied his etching from the original architect's drawing, which we believe is still in existence. It will be noticed that although drawn in elevation the projections are shown in a kind of perspective. This was probably intelligible enough to Medieval workmen, but in these days of taking out quantities, contracts, &c., it might lead to some unpleasant disputes. The niches shown in the elevation do not exactly agree with those in the perspective, and are often at different "ranges" upon the buttresses, but it is probable that the Medieval architect who drew out the elevation did not trouble himself much about the portion of the work already executed. Then, again, the original drawing may not have been copied by Wenceslaus Hollar with that amount of exactitude which a modern draughtsman would have given us in such a reproduction; but, of course, Hollar lived in days when people could not draw Gothic architecture correctly if they would, and would not if they could. He was, however, far away better than any other draughtsman of his time, as will be seen by comparing his illustrations in the Monasticon with those by other contemporary hands.

H. W. B.

THE PALACE WATERGATE.

WE have only tradition, and the architectural evidence, to throw light on the history of this rather bizarre combination of architecture. The palace, it is said, was originally but a fort and towers, with no attempt at architectural effect, till an ambitious mason, who had picked up a trick of carving, obtained leave to try his hand on the lower part of the tower, over the circular-headed doorway. He hacked through joints and all like a Trojan, playing the mischief with the arrises, but producing a sort of decorative effect, and obtaining a local reputation as "him who cut the crinkles on the old tower." Subsequently another King, a man of culture, employed an architect, who was supposed to have a smattering of "the Orders," to modify the upper portion of the tower by clumsily inserting pilasters, and cutting wide windows in place of the old slits, forming a room which was known as "the King's Sulkery." A succeeding Queen, who transformed the sulkery into a "boudoir," not appreciating the old, dark corkscrew staircase, contrived the separate entrance and the new, half-open newel staircase on the right. Being much under priestly influence, she also founded the big circular temple seen in the background, from a design furnished by one of the priests. Unfortunately, the master mason, with a reminiscence of the *kudos* gained by his ancestor of the "crinkles," must needs cut a band of similar work round the dome, "to break up the monotony of the surface," as he said; to the infinite disgust of the classically-minded priests, who said such things "might please the critics of the building trade," but were quite out of place on a sacred edifice.

After this temple (which cost money) architectural enterprise slumbered for a generation or two, till the reign of a monarch of much self-appreciation, who thought his palace put out of countenance by the distant temple. Accordingly he determined to clear away all the old buildings round the margin of the basin, and build a grand classic colonnade there, at once a screen to the inferior buildings of the palace behind, and a promenade for state receptions. This monarch had the good or bad fortune to have about his court one of that sort of people called "self-taught geniuses," one Ali Masha (the only architect's name that has come down to us), who began life as a butler's assistant at the court, and evinced his original genius by saving all the corks to cut egg-and-arrow and other ornaments upon them. His talent being noticed he was taken up, put through a course

of architectural pattern-books, and eventually became architectural adviser to the king, who, on going away for some time, entrusted him with the design and execution of the proposed "classic" colonnade. But here Ali Masha's defects of education came out. He threw his pattern-books to the winds. He treated the details with a licentiousness which shocked the very mortar-mixers. Forgetting the lesson of his pattern-books, that no decent ornament should ever be seen in public except under cover of a panel or moulding, he cut ornaments wherever he pleased. He put readings where he should have put flutings. He rusticated the lower part of his columns by carving a kind of seaweed decoration over them. He jumbled up scrolls and capitals together to make nondescript pedestals, evolved out of his inner consciousness. Finally, he took down the upper part of the old bridge gate-tower, and carried the cornice of the colonnade round it, thus, as he complacently said, "tying it into the composition"; and, having finished it off with a conical joss-house, put his hands in his pockets and surveyed his work with satisfaction.

In due time the king returned. He looked complacently on the new colonnade as his galley approached the stairs; but what was his horror on a close inspection! Each detail drove him more wild than the last; and, on seeing Ali Masha just then coming along the corridor with a roll of accounts under his arm, the king, reflecting that the payment of the architect's short account would be a poor compensation for the shocks his own taste had received, promptly though illogically ordered him to be sent to his long account, and Ali Masha was tied hand and foot and thrown over the bridge, to study further corruptions of classic detail at the bottom of the water.

Such is the tradition. It is said that the king, having happily got rid both of the architect and his bill at one stroke, relented somewhat in his mind, and even became reconciled to his colonnade: at least in the perspective, when he was pacing along it, he was observed to look towards the bridge and murmur, "poor fellow! *Requiescat in pace!*" And indeed, as they had taken the precaution to sling two or three thumping lumps of pig-iron to the architect before throwing him into the water, there seemed every probability that this pious wish would be realised.

THE TOWER BRIDGE.

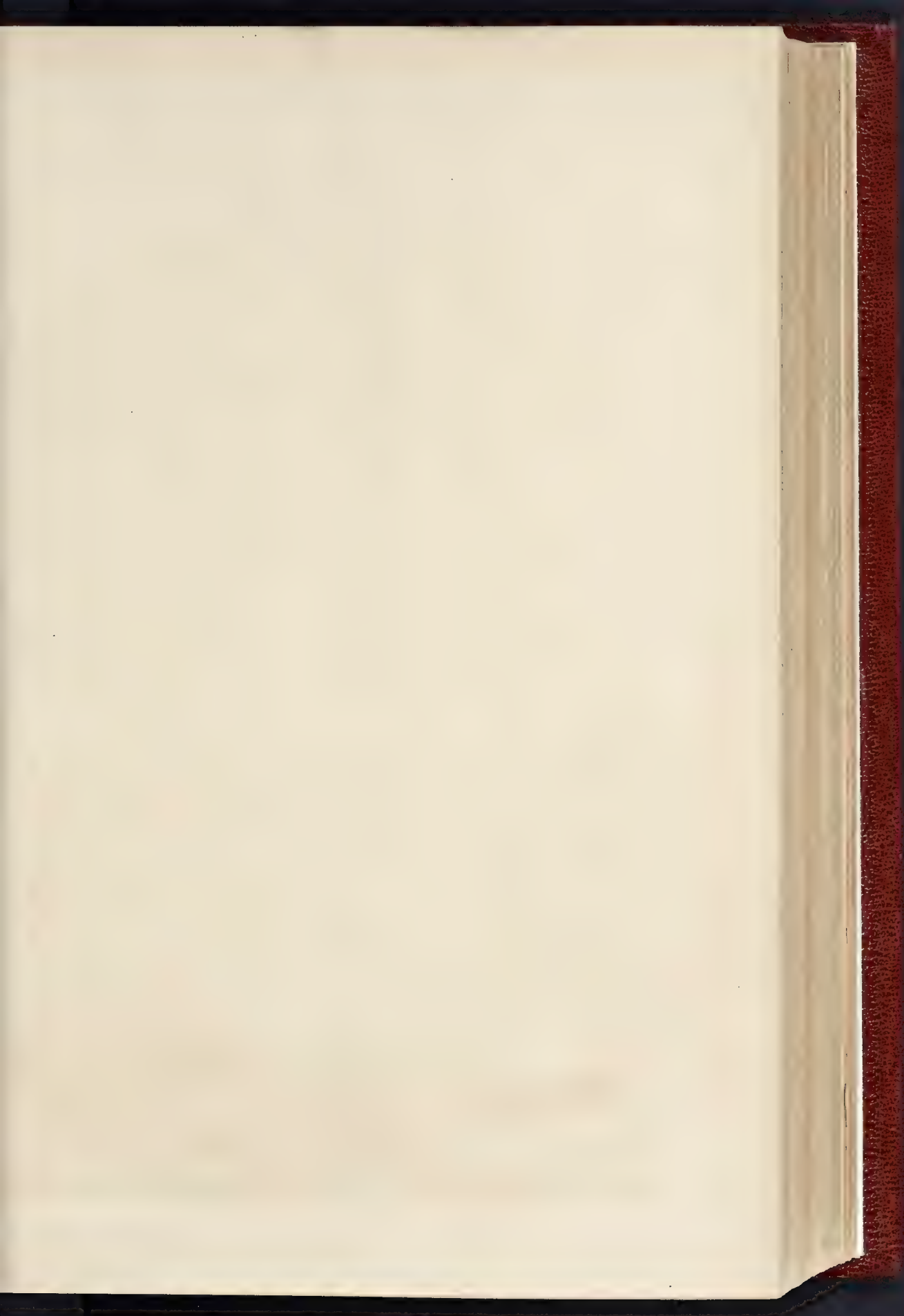
THE design for this bridge, of which we give a view, is from a drawing just completed, and is in effect the design approved by Parliament, and which received the Royal Assent on the 14th of August, 1885.

The illustration shows the bridge open, as will be seen. The bridge portion is carried by two massive Gothic towers, in which provision is made for the necessary machinery for opening and closing the centre span to allow the largest shipping to pass through. Lifts on either side, as well as an internal staircase, are provided for the use of foot-passengers. The lifts communicate immediately with the upper footway, so that the foot-traffic is never interrupted. The centre leaves of the bridge, when open, will be flush with the piers, thus leaving a clear opening or freeway for the shipping to pass of 200 ft. When the bridge is closed there will still be sufficient height at high water for the ordinary traffic of the river to pass under. The approach roads and footway will be 60 ft. in width. The land spans of the bridge will be 60 ft., and the centre span nearly 50 ft. wide. The two land spans will be suspended, as shown. The materials proposed to be used are, for the lower portion of the piers up to the parapet lines of the bridge, grey granite, the upper portion of the towers in a hard red brick, with Portland or other hard stone dressings.

The opening, passage of a vessel, and closing of the bridge could be accomplished in four or five minutes, but if even double that time, once or twice in the course of a day, is absorbed, it would, it is urged, be no material interference with the road traffic.

The Act of Parliament having been obtained, the Court of Common Council again referred it to the Bridge House Estates Committee to carry out, and with the approval of the Court, Mr. Horace Jones, the City Architect, was appointed architect, and Mr. John Wolfe Barry engineer, and under their joint superintendence the work is being carried out.

The foundations below the bed of the river





THE PALACE WATER-GATE.—F

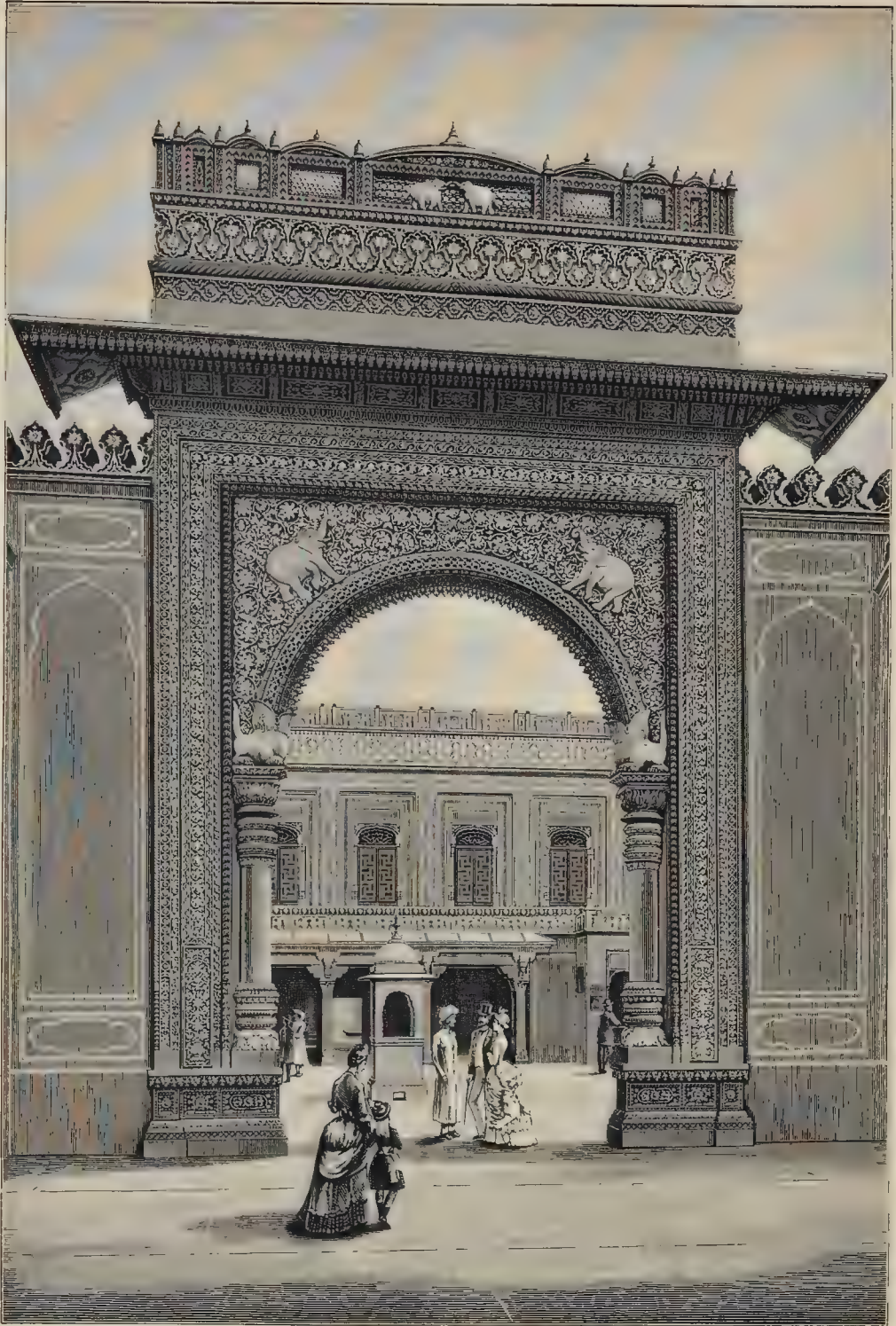
— "old"
Quivering within the w



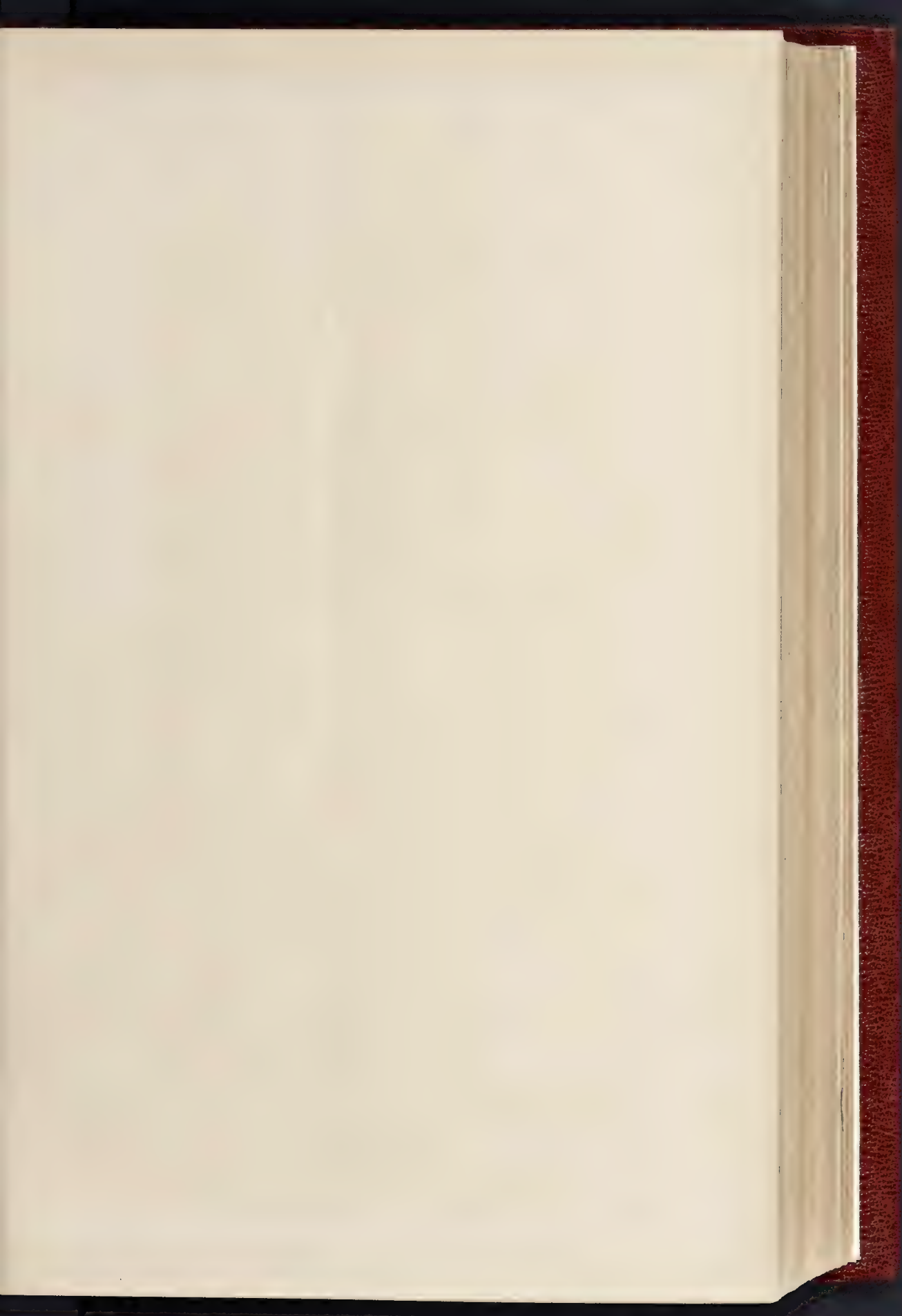
SKETCH BY MR. H. H. STATHAM.

and towers
insur dāv."—Shelley.

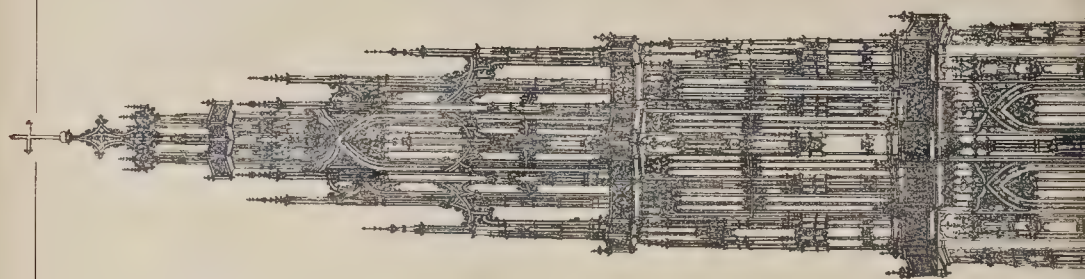


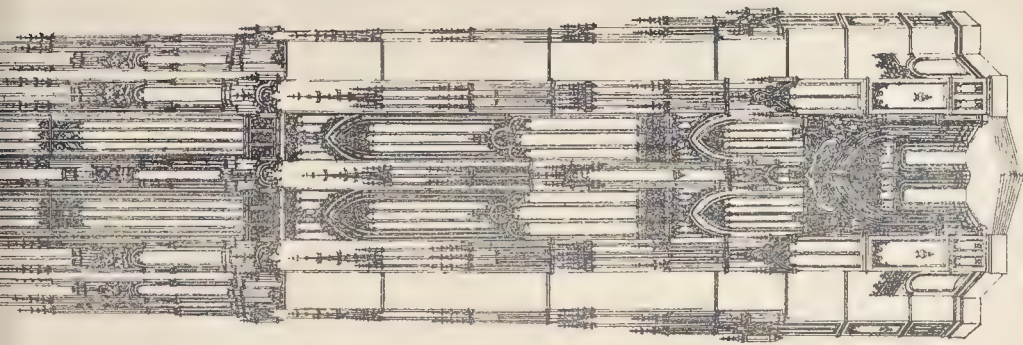
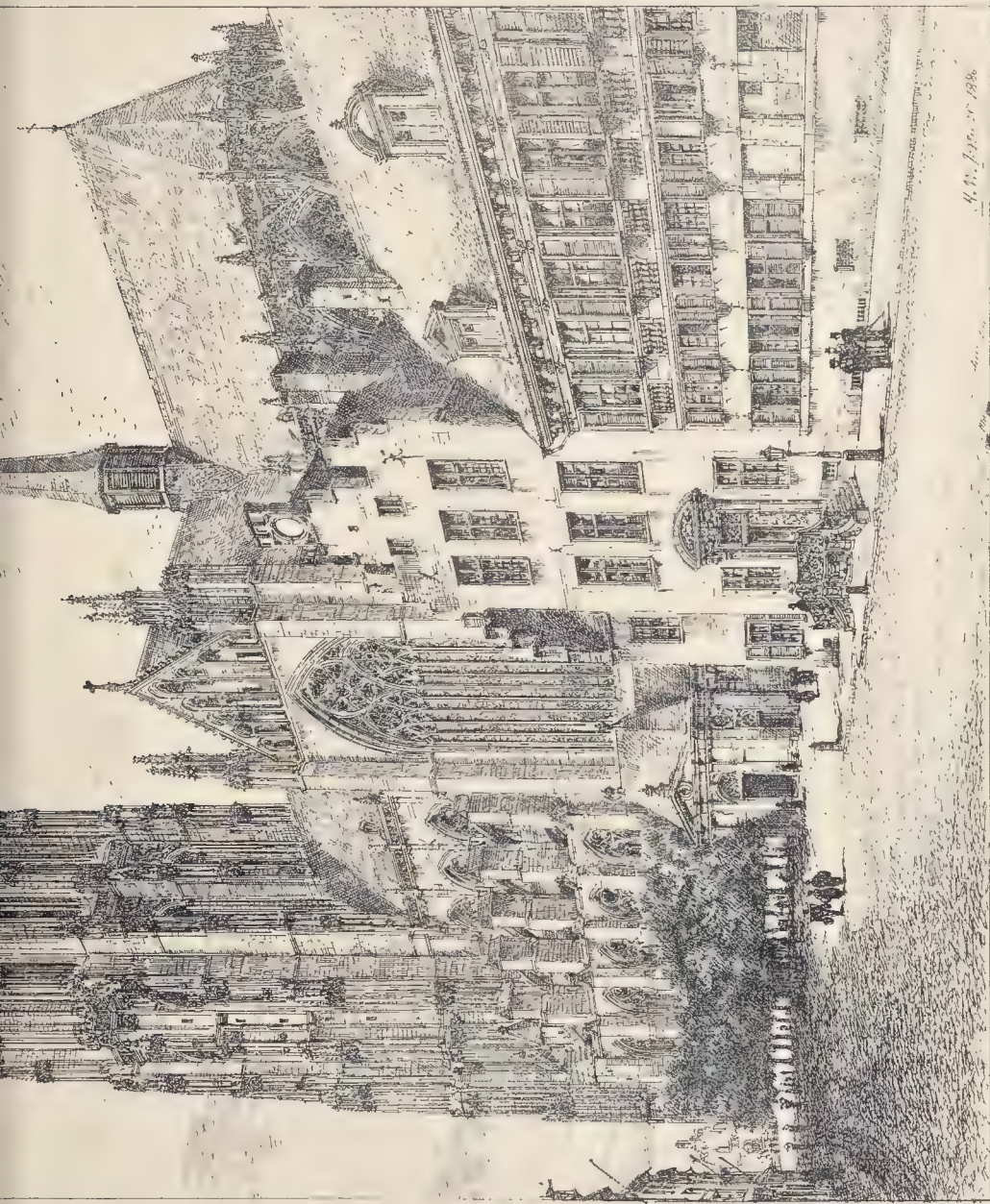


THE GWALIOR GATEWAY, COLONIAL AND INDIAN EXHIBITION.



THE BUILDER, JULY 2, 1886.





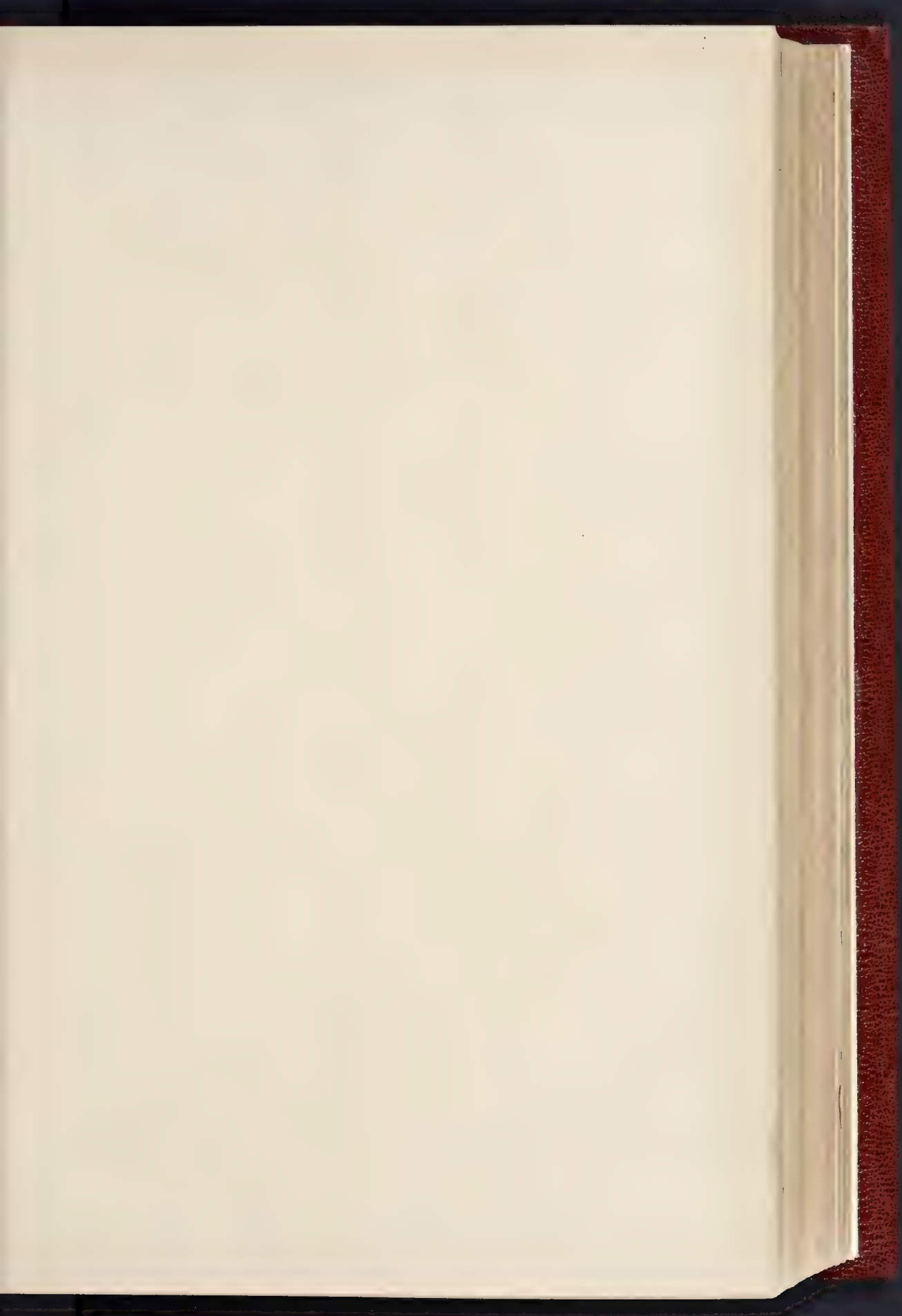
MECHLIN CATHEDRAL

MECHLIN CATHEDRAL TOWER AS ORIGINALLY INTENDED.

[THE ELEVATION IS REPRODUCED FROM AN ENGRAVING BY HOLLAR.]

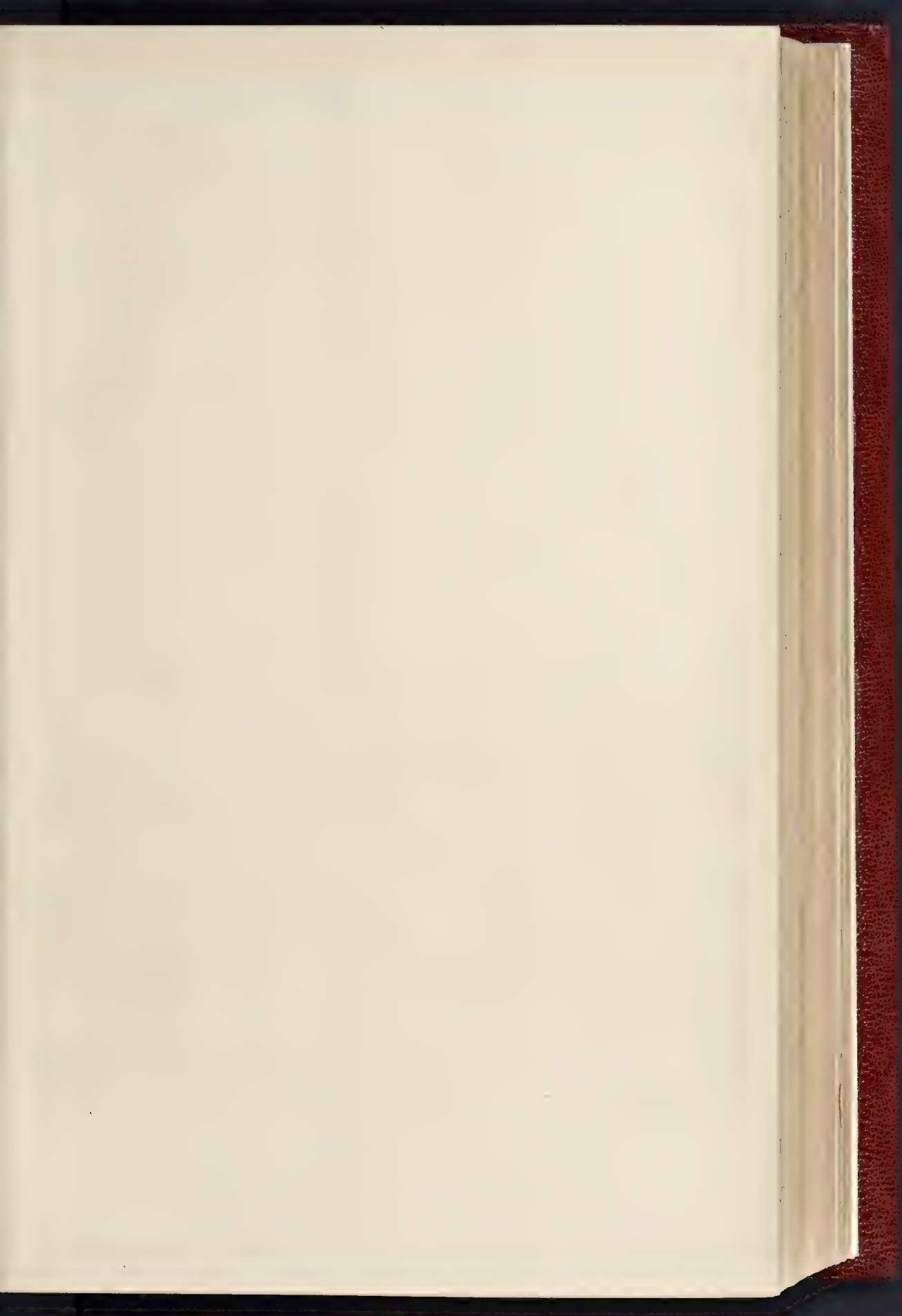
H. N. 1838

THE UNIVERSITY OF CHICAGO





DETAIL OF JAMB OF CARVED WINDOW FROM BHERA SHAHPUR, PUNJAB.
EXHIBITED BY THE PUNJAB GOVERNMENT AT THE COLONIAL AND INDIAN EXHIBITION.





THE TO

MR. HORACE JONES, F.R.I.B.A., ARCHITECT;

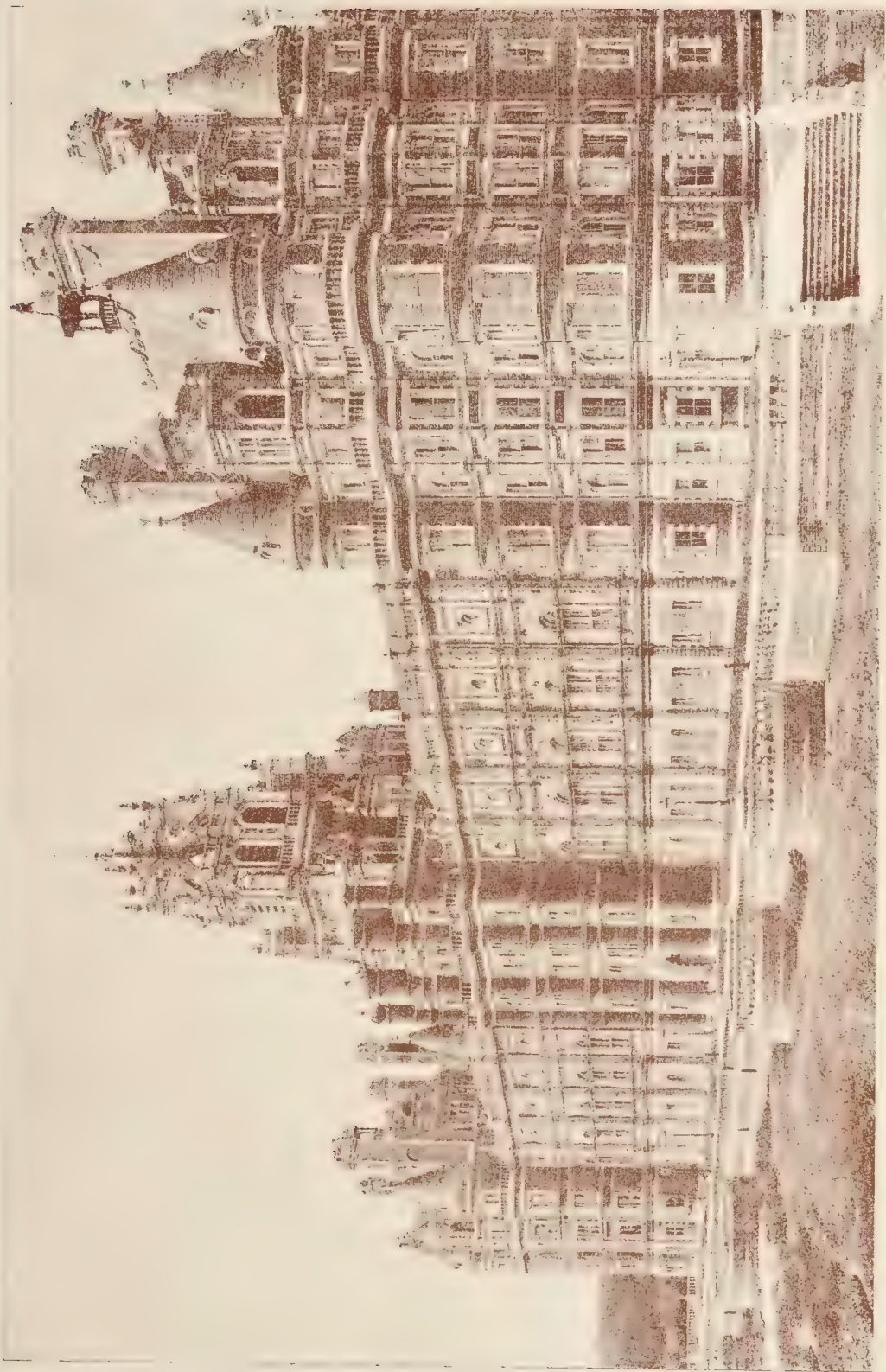


BRIDGE.

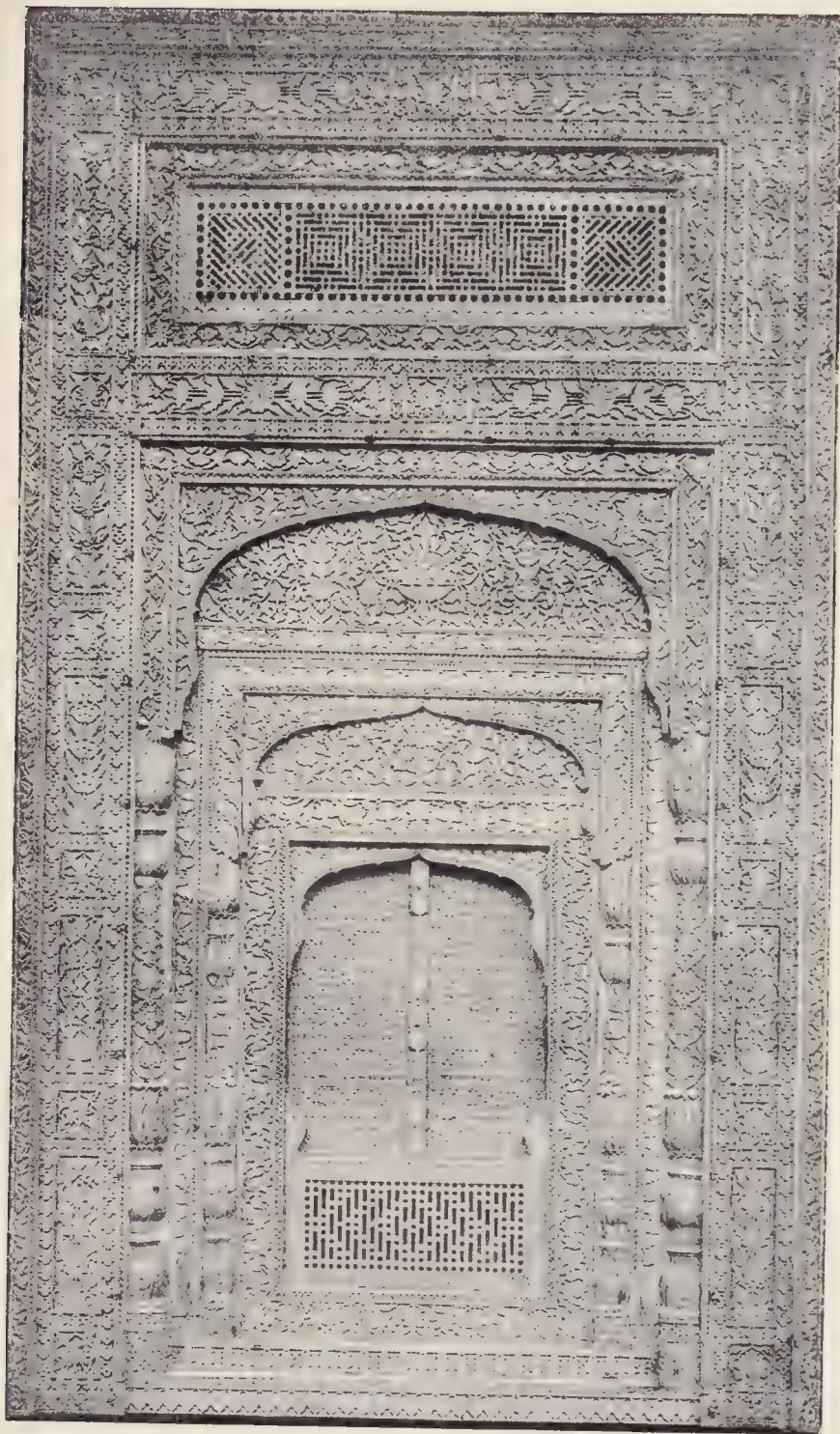
WOLFE BARRY, M. INST. C.E., ENGINEER.



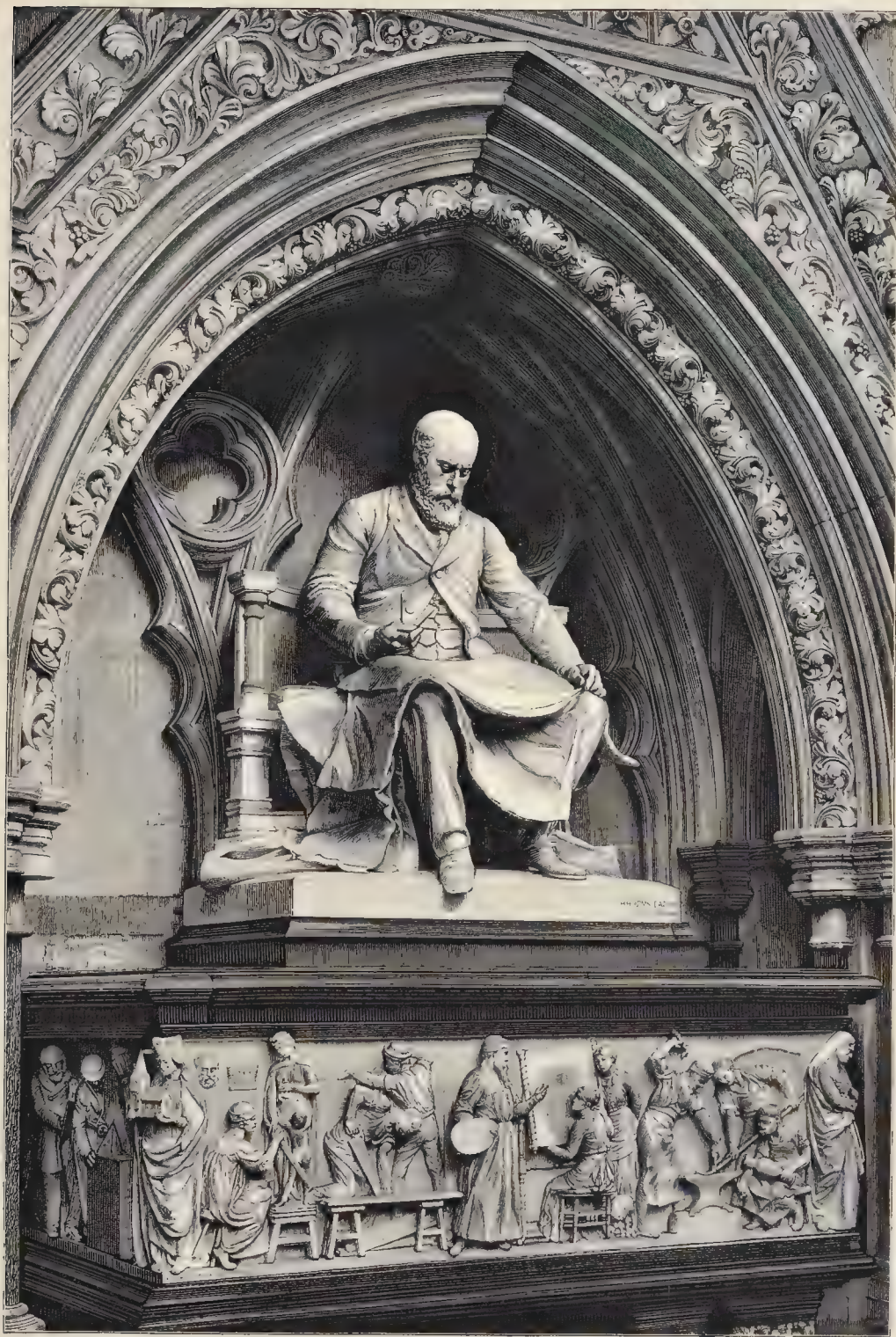
HOLLOWAY COLLEGE, EGHAM.—MR. W. H. CROSSLAND, F.R.I.B.A., ARCHITECT.
CORNER OF THE UPPER QUADRANGLE WITH THE RECREATION HALL.



HOLLOWAY COLLEGE, EGHAM.—MR. W. H. CROSSLAND, F.R.I.B.A., ARCHITECT.
THE SOUTH EAST FRONT.

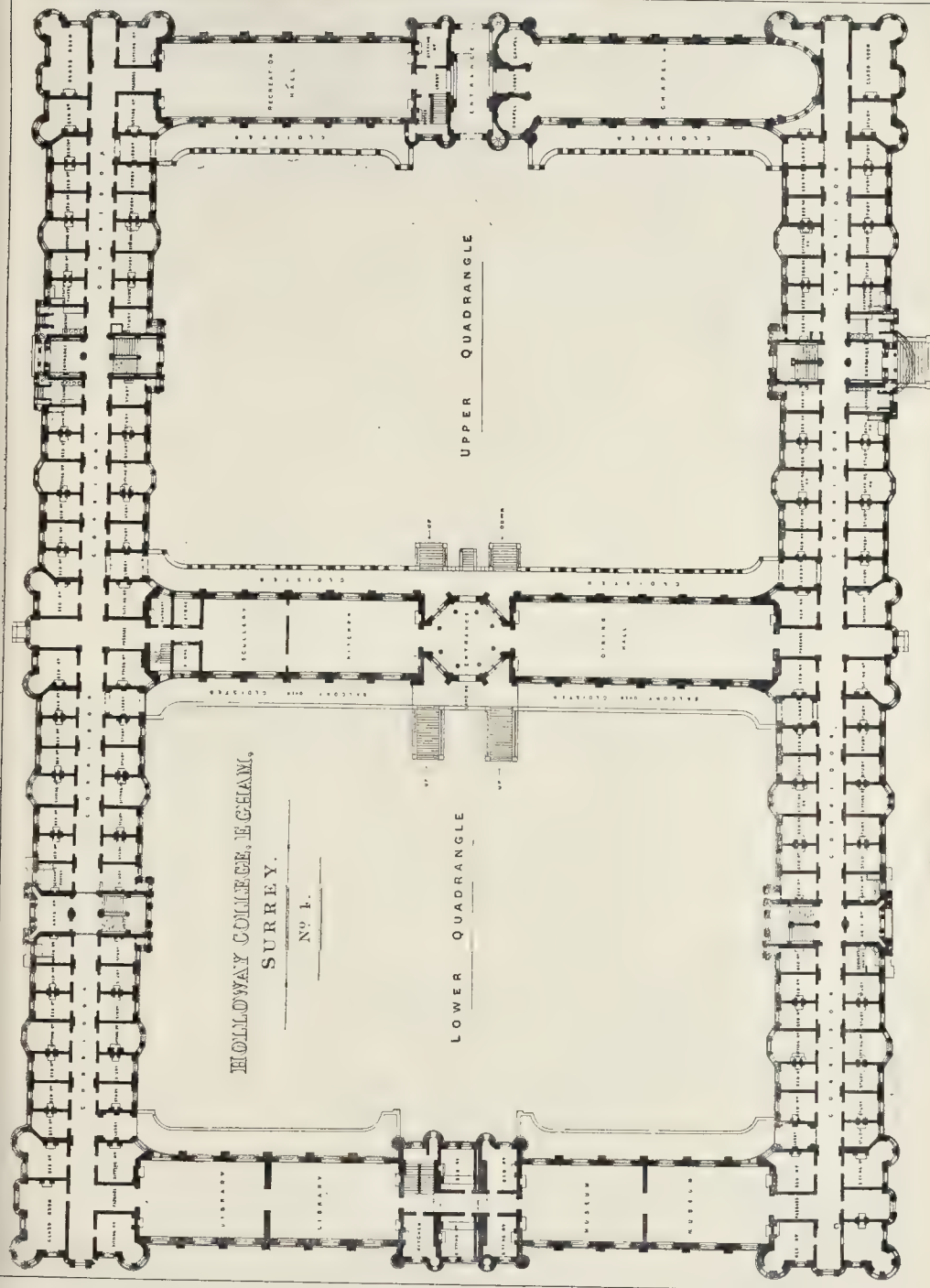


WINDOW IN CARVED WOOD FROM BHERA SHAHPUR, PUNJAB.
EXHIBITED BY THE PUNJAB GOVERNMENT AT THE COLONIAL AND INDIAN EXHIBITION.



MONUMENT TO THE LATE G. E. STREET, IN THE LAW COURTS.

MR. A. W. BLOMFIELD, M.A., ARCHITECT; MR. H. H. ARMSTEAD, R.A., SCULPTOR.



THE ROYAL HOLLOWAY COLLEGE, EGHAM.—Ground Plan.

will be in Portland cement concrete, the outer portions being fixed in the shape of permanent caissons filled with concrete. The brickwork is to be in specially hard stocks in Portland cement. The granite ashlar for machinery chases, &c., is to be fine picked; the granite facing to be rock face, with not more than 1 in. of rough; each course consisting of two adjoining stretchers and one header throughout, varying from 2 ft. 6 in. to 2 ft. on the beds. The face work will be similar to that on the

piers of the new railway bridge at Blackfriars.

The iron work will be bolted into the concrete, the bolts being either built in or grouted in after the work is done, as may be found most convenient.

The concrete foundation will be about 25 ft. in depth, coming up nearly to the surface of the river bed.

The permanent caissons will be rivetted together on platforms between the stages above

low-water level, and beams will be laid across, from which the caissons will be suspended by four 2½-in. lowering rods; each length of rod to be tested with 22 tons, to be applied for at least two minutes. By means of screws at the upper end of the lowering rods each caisson will be lifted clear of the platform, which will then be removed, and by reversing the screws the caisson will be lowered to the bottom of the river. The site of the caissons on the bed of the river is to be previously levelled by dredg-

ing or otherwise. Trial cylinders, about 10 ft. diameter, are to be sunk in the centre of the site of each pier, before commencing further work. If necessary, these trial holes will be sunk to a depth of 70 ft. below Trinity high-water mark.

The lifting-bridge being placed at such a level as to allow of the passage of the ordinary Thames traffic, the interruption by the passage of vessels of such size as to require the raising of the centre span need not, we hope, be so frequent as to materially interfere with the usefulness of the bridge. That, however, remains to be seen. A bridge that would have to be frequently open would, as we have already said, be little better than no bridge, as far as vehicles are concerned. Foot-passengers have a permanent way over the top, but at the cost of a considerable climb.

The design of the towers is effective, though we should have liked a little more power in the lower portion,—perhaps an even greater simplicity and rock-like character in this part of the design. The crowning stage seems to require a very massive-looking substructure.

THE ROYAL HOLLOWAY COLLEGE, EGHAM.

TO-DAY we give views of the south-east front and of a corner of the upper quadrangle, as well as a ground-floor plan, of this extensive and important building, which was opened by Her Majesty the Queen on Wednesday last. For an account of the building, see another article in the present number. Mr. W. H. Crossland, F.R.I.B.A., is the architect.

WINDOW FROM BHERA SHAHPUR, PUNJAB.

EVERY one who walks down the main avenue at the Colonial and Indian Exhibition must have been struck with this elaborate and beautiful piece of work, which is fixed against the wall on the left, behind the Punjab screen. We give an elevation of the whole, and a portion of the detail to a larger scale, both reproduced from photographs by the Woodbury Company.

THE OFFICE OF SUPERINTENDING ARCHITECT:

METROPOLITAN BOARD OF WORKS.

At the meeting of the Board to be held this Friday, the 2nd of July, the Works and General Purposes Committee will submit the following recommendations with respect to the office of Superintending Architect, which will become vacant on the 29th of September next:—

(a) That the duties of the office do remain as at present.

(b) That the salary be 1,500*l.* a year, inclusive of travelling and incidental expenses.

(c) That the age of the person to be appointed be not less than thirty-five, and not more than fifty years.

(d) That an advertisement be issued, inviting applications for the office, and that the applications, when received, do stand referred to the Works Committee, with instructions to select and submit to the Board the six candidates whom the Committee may consider most suitable, with a view to the Board making the ultimate selection."

Manchester Architectural Association.

On Saturday last, seventeen members responded to the invitation of the President, Mr. L. Booth, for an afternoon's practice in sketching, in the grounds of his residence, Crumpsall Green. Two hours (three to five) were allowed for sketching, two prizes of 2*l.* 2*s.* and 1*l.* 1*s.* respectively having been offered by Mr. Booth for the best and second best sketches. Competitors were allowed to finish their work either in water-colours, pencil, or ink, and Mr. A. Darbyshire was the judge. His decision is, no doubt, awaited with some interest. After sketching, the gentlemen present enjoyed the hospitality of Mr. and Mrs. Booth, and the remembrance of the kindly welcome they received, and the happy combination of work and play (bowls, tennis, music, &c.), were afterwards indulged in) would probably contribute to render the afternoon one of the most pleasant memories of what has in many respects been a very successful session.

THE ROYAL HOLLOWAY COLLEGE, EGHAM.

EXTERNALLY, this important building, which was opened by the Queen on Wednesday last, and of which we publish some illustrations this week (the views being from photographs by Mr. Vernon Heath), groups effectively, and is picturesque from almost every point of view.

Covering, as it does, an area of more than 500 ft. by 350 ft., and providing accommodation for upwards of 250 students, it is of a size which would alone make it imposing. The commanding pile of red and white building, standing on the hill-side among the trees, attracts attention at a great distance, and forms an appropriate centre to the natural landscape, the beauties of which are revealed and emphasised by it. The architectural critic, if so inclined, would have no difficulty in finding fault with many of the mouldings. Much of the ornament is coarse and heavy, and the proportions of many of the windows and openings are much lower than we are accustomed to consider correct. The omission of the bed-mould of the main cornice, leaving merely a row of exaggerated dentils, though there is some precedent for it, is not a successful device, and the capping of the small circular angle-battresses of the main central pavilions is absolutely ugly. But, after all, these are things which only the capacious professional critic notices; the only effect they can have upon the untrained eye is in diminishing a little the pleasure that might have been derived from a sight of the building, and as the untrained eye is only conscious of the great pleasure it does receive, and does not guess how much greater it might have been, such faults are felt only by those who know too much for their own complete satisfaction. In truth, the building generally is such an architectural success, in the more important matters of general grouping, arrangement, and proportion, that we willingly forget the faults of the detail, and desire only to remember and admire the stately magnificence of the angle pavilions, the picturesqueness of the lanterns over the main entrances, the dignified sobriety of the long horizontal lines, the pleasant balance of all the parts, and the brightness of the red brick and white stone work glittering among the trees in the bright sun under the blue sky, as it appeared on Wednesday afternoon when the Queen drove up to the main entrance.

The châteaux of the Loire have, we imagine, given the key of the style and general design, and superficially the college has something of the effect of one of the enormous Royal palaces of France, especially on the terrace side, but in the quadrangles and inside the building on a closer inspection, the English College is seen to have supplied quite as many ideas to the clever architect, whom we may congratulate upon the unusual completeness of the work when the opening day arrived.

Internally no money has been spared to make the students comfortable and provide them with pleasant and beautiful surroundings.

Messrs. Clayton & Bell have decorated the chapel and the octagonal vestibule in the water tower. In the chapel, gold and colour have been lavished without stint, the effect aimed at, we are informed, being quiet and rich rather than redundant. We cannot say that this aim has been completely attained. The lower section of the walls, forming a dado behind the stalls, is covered by an elaborate pattern of gold upon two reds. Above, the wall spaces are of a soft green. The dividing pilasters are partly gilded on the natural stone, which is of a warm ivory tint. This colour is reproduced for the flesh of the figures in the ceiling. The chapel is quite symmetrical, consisting of six bays and an apse. The organ is at the west end over the entrance, and flanked by circular recesses in two stories. The windows, equal in number on each side, are divided by niches, intended hereafter to contain marble effigies of St. Alban and the four patron saints of Great Britain and Ireland,—St. George, St. Andrew, St. David, and St. Patrick,—on one side, with, on the opposite side, five female saints, selected mainly as representatives of learning, viz., St. Scholastica, St. Agnes, St. Catherine of Alexandria, St. Catherine of Siena, and St. Etheldreda. At present the plain deep red of the empty niches is somewhat prominent and heavy, but this effect will no doubt be corrected when the statuary is placed. Springing from the cornice-line and continuing some distance above the arches of

the windows, are groups, modelled in high relief by the late Signor Fucigna, of the four Evangelists, with their emblems and attendant angels, and "St. John baptising Our Lord" on one side; and the four greater prophets and Samuel on the other. In the semi-dome of the apse are reliefs representing the Creation. These reliefs have been treated with colour in a light ivory-like key. The general surface of the vault is gold relieved by longitudinal and transverse belts of ornamental work, carrying a moderate amount of white, the object of these being to give an architectonic framing and steadying support to the groups already named. On the very crown of the vault (one in each bay) are medallions containing the six Archangels, viz., SS. Michael, Gabriel, Raphael, Uriel, Zophiel, and Chamuel. Right and left of the organ are groups of child angels singing and playing instruments. In the central division of the apse wall are three large figures, namely, Our Lord as the Good Shepherd, with St. Mary and St. Cecilia.

The octagonal vestibule in the centre of the building is also profusely decorated in colour and gold, the dome having a ground of graduated blue, upon which are arranged, amongst festoons and garlands of flowers and fruit, little boys holding objects suggestive of various branches of study,—a book, a writing-tablet, a globe, a plummet, &c., and in the four lunettes below are the Four Seasons.

We may usefully append some particulars of the engineering arrangements connected with the warming, ventilation, lighting, and drainage of the building.

With regard to the heating arrangements, the leading conditions were that the medium should be steam, the boiler-house to be 200 yards distant from the main building (the latter is 525 ft. by 360 ft. square), and that the four corridor floors, besides entrances, should be heated, the heat being capable of control from the basement or locally. These conditions have been met in the following manner: The steam heating plant consists of three Lancashire boilers (with two other boilers, one used for power purposes) 30 ft. by 7 ft. 6 in., with flues 3 ft. diameter, 6 ft. grates, $\frac{1}{2}$ in. shells, $\frac{5}{8}$ in. ends, of Sneddon and mild steel, and having $\frac{3}{4}$ in. flues with Adamson's flanges, set with the draught going under the bottom and returning along the sides. One of these is fixed in the boiler-house. From these boilers a 6-in. main steam-pipe leads direct to the centre of the main building, where a receiver is fixed. From this all branches are taken through reducing valves, the plan of the building lending itself to four main subdivisions. Connections for heating water for kitchen purposes are provided. The distribution of the steam in the corridors and to the radiators on each floor is as follows:—To insure the delivery of steam at all points three pipes are employed, a supply pipe, 4 in. bore, and a return pipe, 3 in. bore, both running in the same direction, while from the extremities a condensed-water pipe is led back to a container in the basement, from which the water of condensation returns by gravity to the boilers to be re-used. The radiators are made of 1-in. wrought-iron pipes fixed vertically in a hollow cast-iron base, with an entablature of ornamental design, and requiring no casing. The surface of each is about 25 square feet, and there are 160 of them. The positions selected are those best calculated to spread or diffuse the heat, whilst entrances and exposed situations are specially attended to. Each radiator has a separate flow and return pipe ($\frac{3}{4}$ -in. wrought iron), and is provided with valves in the basement, and others attached to itself. The Chapel is warmed by a box-coil of four 14-in. wrought-iron pipes placed behind the seating, with openings in the risers of the seats for the circulation of air. The Picture Gallery has six radiators in it, three on each side, with a total surface of about 150 ft. The Dining Hall has six cast-iron radiators. The Library and Museum have each eight circular radiators placed between the tables, and carrying upon their tops standards for lighting purposes. The Music Rooms (twelve in number) are treated with a simple loop of $\frac{3}{4}$ -in. wrought-iron pipe, 2 ft. high. The Lecture Theatre has four radiators, of the same design as those in the corridors. All available water of condensation is collected and returns to a tank in the boiler-house, from which it is pumped back into the boilers. The alignment of the pipes has been so arranged as to cause the steam and water of condensation to flow in the same direction.

The steam-power plant consists of two Lanca-

shire boilers, 30 ft. by 7 ft., with flues 2 ft. 9 in. diameter, grates 6 ft. long, and the usual fittings. They will work up to 75 lb. pressure. They have a chimney separate from that of the heating boilers, and supply steam to the electric light engines, which consist of two engines with coupled 16½ in. cylinders, 32 in. stroke, driving on to a long shaft from which the dynamos are run. The engines are fitted with Paxman's automatic expansion gear. These boilers will also serve the laundry and a hauling-engine which will be employed to operate trucks upon a tramway laid in a subway 300 yards long, going from the stores to the main building.

The gas supply is taken at present from the Staines and Egham Gas Company, through two coupled meters of 400 lights each, and the gas is conveyed by a 6-in. pipe (afterwards reduced to 4 in.) around the building, contouring the site. The building is treated in sections and on the main elevations, each side being divided into four divisions, each with 2-in. branches. In the interior each section is treated separately. The students' rooms (900 in number) have gas laid on for use if required. All common rooms are provided with a continuous system of float and spray gas-lights as a reserve or auxiliary to the electric light.

The water supply is taken from the South Western and Suburban Water Company by a 6-in. pipe connexion. It passes through a Kennedy meter. The whole building is contoured by a 6-in. pipe. At the south tower a valve-chamber is arranged, where a scum cock relief and air-valves are fixed. The water rises to a distributing tank at an elevation of 80 ft., from which it flows by gravity to the service-cisterns. For fire-extinction service the quadrangles have each four double standpost hydrants, and internally the building is protected by a system of fire-cocks on every floor, thirty in all being fixed on the half-landings of the staircase. Externally, standpost hydrants are fixed at all objective points. The London Brigade gauge, 2½ in., has been followed throughout.

With regard to the drainage arrangements, the line of drains passes around the building in straight lines from point to point, with man-holes at all changes of direction and gradient. The sizes of pipes are for the first half of the distance, 6 in.; two such converge, and the main outlet is 9 in. diameter. Bath, lavatory, and sink-wastes all discharge open-ended into trapped gullies with grates. The soil-pipes, 4 in. diameter, are of lead fixed within the building; together with the wastes they deliver into inspection-chambers, beyond which an intercepter trap cuts off direct connexion with the main drain. All pipes are ventilated. The minor branches are 4 in. diameter, and where discharging into the 9-in. main pipe 6-in. branches are used. Flush tanks of 500 gallons capacity, built in brick and cement, are fixed at the head of each main drain. Doulton's annular syphons are used, the outer case being adjustable to allow of any given quantity of water to be discharged. The heads of the drains are ventilated by cast-iron pipes, 8 in. by 5 in., carried above the roofs. The whole of these works have been carried out by Mr. R. B. Stirrat, engineer, of Palaco-chambers, Westminster.

We are informed that the well-known firm of Thomas Lawrence & Sons, of Bracknell, supplied the whole of the bricks used in the building under a contract made direct with the late Mr. Thomas Holloway.

In the *Builder* for Oct. 8, 1881, we published a double-page view of the upper part of the north-east entrance to students' stairs, from the east quadrangle; and in the same number (p. 449) we gave an article descriptive of the building generally. Another descriptive article appeared in our columns on June 10, 1882, and some particulars as to the aims and objects of the College were given by us last week.

We need not refer to the details of Wednesday's proceedings further than to say that in one of the balconies witnessing the opening ceremony were a number of the contractor's workmen. Earlier in the day they had presented an address to Mr. G. Martin-Holloway, representing the managers, foremen, and workmen in the employ of the contractor, Mr. Thompson, of Peterborough, who very considerately provided a special train from Peterborough for the conveyance to the College of about 200 workmen, making, with those still at work at the College, about 400 men. Mr.

Thompson subsequently entertained his men at dinner and tea, including in the invitation the workmen employed in the engineering and other departments. Mr. G. Martin-Holloway delivered a kindly speech to the men in reply to the address.

The total cost of the building, with site, furniture, fittings, pictures, &c., has been, as we stated last week, about 600,000*l.*, exclusive of endowment, for which purpose we understand that about 200,000*l.* has been invested.

THE LATE MR. RICHARD KYRKE PENSON, J.P., F.S.A., ARCHITECT.

AFTER the very just and well-merited compliment paid to the memory of this gentleman by Professor Kerr, as reported in the *Builder* of the 5th ultimo (p. 829), on the occasion of the announcement of Mr. Pensons's decease by Mr. W. H. White, at the Royal Institute of British Architects, our readers will perhaps be interested to learn some fuller details of his professional history.

Richard Kyrke Pensons was the eldest son of the late Mr. Thomas Pensons, F.R.I.B.A. and M.Inst.C.E., architect, of Wrexham, and who held the appointments of County Surveyor in Denbighshire and Montgomeryshire, Surveyor to the First, Second, and Third Districts of the Montgomeryshire Roads, and Surveyor to the Oswestry District of Roads, &c. Mr. Kyrke Pensons was, we believe, born at Oswestry, and was in his seventy-first year at the time he died, viz., on May 22nd last. He was sent to London to prosecute his studies for about five years, from 1843 to 1848, during which period he became a member of the old Water-colour Society, of which Mr. Henry Warren was at that time President. Mr. Pensons became an early exhibitor, and had then acquired some distinction as a water-colour painter. This connexion lasted for many years afterwards, when he continued to exhibit very clever and effective sketches. He also became an F.S.A. and F.R.I.B.A. Mr. Pensons afterwards returned to Wales. In 1852 he read a paper on "Ludlow Church," before the Cambrian Archaeological Association, an abstract of which will be found printed in the *Builder* for September 4th of that year.

In or about the year 1857 he was appointed County Surveyor for Carmarthenshire and Cardiganshire, and was then associated with Mr. A. Ritchie, now of Chester, architect, who subsequently became his partner and successor. Mr. Pensons then became established in very extensive practice; he went to reside at Ferry-side, Carmarthenshire, and Mr. Ritchie established the offices at Swansea, conducting among other works then in hand extensive alterations and restoration of Dynevor Castle, for Lord Dynevor. In 1859, Mr. Pensons's father died, and his son succeeded him in most of his public appointments, and the younger son, Mr. Thomas Mainwaring Pensons, became well known and established in practice as an architect, at Chester, where he died in June, 1864. Besides Dynevor Castle, Llandilo, Carmarthenshire, Mr. R. K. Pensons designed alterations and additions to Bronwydd, in the same county, for Mr., afterwards Sir T. D. Lloyd, Bart.; also the new church of St. Mark, Wrexham; new residence for Mr. F. B. Roberts, near Aberystwith; restoration of St. Peter's Church, Ruthin, Denbighshire; St. David's Church, Carmarthen; the new vicarage houses for St. David's and St. Peter's churches, Carmarthen; Christ Church (new) and St. Peter's Church Schools, Carmarthen; and St. Peter's new Church, Llanelli.

At Swansea and in the neighbourhood, the following works were executed by him:—New church and school buildings at the Cockit; new National Schools, Oystermouth-road; re-building and restoration of Oystermouth (the Mumbles) Church; additions to Kilvey Church; also restoration of Llanrhidian and Penmaen Churches, and new church at Morriston. In Pembroke-shire, the churches at Amroth, Angle, St. Petrox, Roch, Rosemarket, &c. Also in Carmarthenshire, further, the churches re-built, altered, and restored, at Llandarrog, Llanedey, Llanllwch, Llanfelfoel, Bettws, Mothvey, Merthyr, Llanglydwen, Llanfhangy-Croyddon, Langharne, and Llanilar, and Velinford new church, Llanelli. He was also engaged upon residences and parsonage houses at Talgarth, for Captain Thurston; Lliardi, near Aberystwith; at Westfar Velinford, Llanelli, for Mr. C. W. Nevill; new Vicarage, Llanedey;

National Schools at Aberystwith; new church, schools, and residence at Ferry-side, Carmarthenshire; Brymbo and Minera new schools, Denbighshire; new offices and buildings for the Welsh Insurance Company, Wrexham; new schools at Ludlow; schools and dispensary, Oswestry; Penyfont new church, near Oswestry, &c.; and upon numerous county works, lock-up houses, bridges, &c.

Mr. Pensons died at his residence, Dinham House, Ludlow, after a long and painful illness. His remains were interred on the Wednesday following in Ludlow Cemetery, when a large concourse of people assembled to do honour to his memory. He was a magistrate for the borough, but of late years was unable to attend the meetings. He retired from practice as an architect in 1864, when, as we have said, he was succeeded by Mr. A. Ritchie, of Chester, who had been associated with him as assistant and partner many years previously. He leaves a widow and only daughter to mourn his loss.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS & SURVEYORS.

THE Annual Meeting of this Association is announced to be held in Hanley on Thursday, Friday, and Saturday next, the 8th, 9th, and 10th July. The Members will assemble at 12 o'clock (noon) on Thursday, July 8th, in the Town Hall, Hanley (by kind permission of the Mayor). The Council propose the following among other amendments and additions to the rules:—

Rule III.—(a) That the Association consist of Civil Engineers and Surveyors holding Chief Permanent Appointments under the various Municipal Corporations or Sanitary Authorities within the control of the Local Government Board, or under the *Metropolis Local Management Acts*. *(b)* Civil Engineers and Surveyors holding Permanent Appointments under any Public Authority within the United Kingdom, or in the Colonies, or Foreign Countries, shall be eligible for election as Members, subject to the approval of the Council. The Council shall also have power to elect such Honorary Members as they may see fit.

New Rule.—That candidates successful in obtaining Certificates of Competency at any examination under the auspices of the Association, and who are not otherwise qualified as Members of the Association, shall constitute a class of Graduates, and as such shall be entitled to attend all General and District Meetings, and to take part in the proceedings thereof, but shall not vote in the Election of the Council. A Graduate shall be furnished with a copy of the Minutes of Proceedings on payment by him of an Annual Subscription of One Guinea, and shall be transferred to the class of Members when qualified, according to Rule III. A Graduate shall not be required to pay an entrance fee either on his becoming a Graduate or on his transfer as Member.

Subsequently to the consideration of these proposals, the President will deliver an address. During the three days of the meeting several papers will be read and discussed, and visits will be made to many works of special interest to the members.

COMPETITIONS.

Montrose Lunatic Asylum.—The Board of Management of the Montrose Lunatic Asylum lately obtained plans from several architects for the erection of a detached infirmary. These were submitted for report to Messrs. H. Saxon Snell & Son, who selected as the best those signed respectively "Lucidus Ordo," "Space," and "Good Samaritan." Ultimately it was determined to request the authors of "Good Samaritan" and "Space" to send in revised designs, and in the result the latter design, by Mr. Sydney Mitchell, of Edinburgh, has been selected for execution.

St. Saviour's Church, Hanley-road, Holloway. The competition for the erection of this church has been decided in favour of Mr. John P. Cutts, of 23, Southampton-street, Strand. Six architects were invited to compete, five of whom sent in drawings. The drawings were under motto. Mr. Ewan Christian was professional adviser to the committee. The church complete, and parish room, are estimated to cost about 8,500*l.*

An Ensilage Stack in London.—Acting on the suggestion of Mr. H. Kains-Jackson, Secretary of the Ensilage Commission, Messrs. F. W. Reynolds & Co. are erecting on their premises, Acorn Works, Edward-street, Blackfriars-road, a 50-ton stack of matted-grass silage. The silage will be compressed by Messrs. Reynolds's patent chain appliances. Some of our readers may be glad of the opportunity of inspecting the stack.

THE VICTORIA HOSPITAL FOR CHILDREN, CHELSEA.

THE new Out-Patients' Department and Nurses' Home were opened on Wednesday last by the Prince and Princess of Wales. As a memento of the occasion a specially-designed golden key, made by Messrs. Chubb & Sons, was presented by the architect, Mr. H. Saxon Snell, to their Royal Highnesses.

The hospital is situated at the junction of Tite-street and Queen's-road, Chelsea. It was established in the year 1866 for the treatment as in-patients of boys between the ages of two and twelve years of age, and of girls between the ages of two and sixteen; also as out-patients all children under sixteen years. It is also a training-school of nurses for children. Accommodation is provided for sixty in-patients in the old building occupying the original site, and which has been adapted to the purposes of a hospital. It is, however, contemplated, as soon as funds will permit, to add an additional wing, constructed upon more modern principles. Up to the present time the only accommodation for out-patients has been the basement of the old building, and there the arrangements were necessarily of a primitive and unsatisfactory character. The accommodation for the nursing staff was also very inconvenient, as part of it had to be located in premises on the opposite side of the Queen's-road. In the new building the arrangements are such that the ground-floor is devoted to the purposes of an out-patients' department, consisting of a waiting-hall, 53 ft. by 20 ft., and 16 ft. in height, and ranged down one side of it are the surgeons' and physicians' rooms, a dressing-room, and a small ward for the temporary accommodation of those patients who have undergone operations. At one end is a dispensary with a separate small waiting-room for nurses coming from the main building for medicines. This department is also entered by a gate from Tite-street, and the courtyard giving access to it has a low shed ranged down one side for the protection from the weather of the children's perambulators. The upper part of the building is entirely detached from all communication with the out-patients' department upon the ground-floor. It consists of three floors, containing twenty-nine bed-rooms for the nursing staff and sisters, and in addition a sitting-room and bed-room for a superintendent. Two sitting-rooms are also provided, the one for nurses and the other for lady probationers. The basement of the building contains the porter's apartments, a mortuary, post-mortem room, a drug store, and cellars. The cost of the new structure, which has been erected from the designs of Messrs. H. Saxon Snell & Son, will be 7,500l. The builder is Mr. Chas. Wall. The heating and gas fittings were supplied by Messrs. Berry & Sons; the locks and ranges by Messrs. King & Co., of Hull; the sinks and baths by Messrs. Cliff & Sons; and the tiling by Messrs. Simpson & Sons.

We gave a view of the new building a year ago, viz., in the *Builder* for June 27, 1885.

WATER SUPPLY.

Alvaston.—Some days ago Mr. H. D. Smith, of Alvaston Hall, invited a few friends to meet his employees to celebrate the opening of a miniature waterworks, the plant of which was provided by Messrs. George Fletcher & Co., of Masson Works, and erected under the supervision of Mr. Howard Marsh. It consists of an arrangement of pumps driven by a hot-air engine, all being compactly fitted on to a cast-iron bed-plate. It occupies a very small space inside a brick-built summer-house, which building also forms the water-tower, upon which is mounted a cast-iron receiving-tank to hold 2,000 gallons. Into this tank the water, drawn from a well at a depth of 18 ft., is delivered by the pumps at the rate of 500 gallons per hour. From this tank the water is circulated by cast and wrought iron piping to the various parts of the grounds and houses. In addition to the service of over 15,000 ft. of greenhouses, cucumber-houses, vineries, &c., over four acres of garden ground are irrigated.

Southampton.—The new Waterworks recently constructed at Otterbourne Hill, at a cost of 50,000l., and designed to supply Southampton with two million gallons of water per day, were opened on Tuesday last. A noteworthy

feature about the enterprise is that the entire quantity of water pumped from the wells will be softened before being transmitted to the town. This is effected by the process of the Atkins Filter and Engineering Company, whose softening plant at these works is said to be the largest in the world. The process by which the softening is effected consists in admixing lime-water with the water pumped from the well and then passing it through a softening cistern to precipitate the chalk in solution, and afterwards through a series of filters.

PROVINCIAL NEWS.

Huddersfield.—The Board of Management of the Huddersfield Infirmary have requested Messrs. H. Saxon Snell & Son to prepare designs for the enlargement of the building and also a report as to the sanitary condition of the premises generally.

Retford (Notts).—At the meeting of the Retford Town Council on the 25th ult., a report was received from the committee appointed to consider the disastrous floods from which the town suffers periodically, and, if possible, to devise a remedy. It stated, "The only scheme which would have a chance of effectually preventing floods in the future would be to do away with the present arches under the canal, and to carry the water of the canal over the river by means of a tubular aqueduct, and to raise the banks of the river above and below the aqueduct. This scheme would involve an outlay of many thousands of pounds, and your committee have therefore confined their attention to the best means of diminishing the frequency of floods, and of getting rid of the water when floods do occur. They recommend (1) the construction of a new weir adjoining the shuttles at Bolham Mill. (2) The enlargement of the culvert through which the Carr drain passes from the field in West Retford to the cricket-field. The cost would be about 600l. to 700l."

Richmond (Surrey).—There is a good deal of building work in hand here just now. One of the chief jobs is the erection of the new Post-Office in George-street. Important deviations have recently been made from the original plans, and the Post-office authorities have just bought the property known as Smith's Cottages, at the rear of the present new building. These cottages will be pulled down, and their site appropriated for an extension of the Post Office. The main portion of the building is nearly completed, awaiting only decoration and the erection of fittings. It comprises public office, 26 ft. by 25 ft., lighted by four windows; a sorting-room, 76 ft. 8 in. by 43 ft. wide in the widest part; parcels room, and several smaller rooms on the ground-floor, with two sets of offices and apartments on the upper floors. Up to and including the second story, the whole building is of fireproof construction. As an instance of the manner in which the lowering of the Parcels-Post rates on the 1st of May last has affected the service, it is stated that the deliveries from the Richmond Post Office since the beginning of May have increased 50 per cent., and it has been absolutely necessary to pay particular attention to increased parcels-post accommodation. The builders are Messrs. Pierce & Lansdowne (late Carless & Co.), and the architect is Mr. R. Boyce, of Her Majesty's Office of Works, Whitehall. The sorting-room is ventilated by Messrs. Boyle. The gasfittings throughout the building are in the hands of Messrs. Comyn, Ching, & Co., St. Martin's-lane, London. It is hoped that the building will be finished by the end of October.

Shoreham (Sussex).—Plans prepared by Mr. A. Loader, architect, of Brighton, for the cemetery to be constructed at New Shoreham, at a cost of 2,000l., were last week approved by the Burial Board, which also decided that the requisite works should be carried out under Mr. Loader's supervision.

Southampton.—At a special meeting of the Southampton Harbour Board, held on the 23rd ult., a letter was submitted which had been received from the Board of Trade, enclosing plans of the proposed new works in the Docks. It was estimated that the dredging would amount to about 125,000 cubic yards, and most of this it was proposed to deposit at the back of the Gymp, both at ebb and flow tides. The Harbour Board were asked what observations they had to make in the matter, especially in

regard to the deposit of dredging. A letter was received from the Town Clerk, intimating that the Corporation had received a similar letter to this. It had been submitted to the Committee of the Port Committee, and they desired to confer with the Harbour Board upon the subject. The Chairman remarked that there was a great deal involved in this matter. The Dock Company asked to be allowed to deposit 125,000 cubic yards of mud on the other side of the Gymp, and how far it would interfere with the works of the Harbour Board was a grave question, and required some consideration. He moved that the communication be referred to the Special Works Committee to report upon, and that the Corporation and Commerce of the Port Committee be invited to confer with them. This was seconded by Mr. Whitchurch, and carried.

Wednesbury.—At the meeting of the Wednesbury Local Board on Monday evening, the Chairman (Mr. Richard Williams) reported that the Board had now taken over the land in the Walsall-road for the purpose of a public park, but it would not be open to the public until it was properly laid out. The Clerk stated that he had received a memorial signed by about 150 ratepayers entering their protest against the proposed site at Foley-street and Walsall-road as being inappropriate for the proposed new Art Gallery. It is suggested that the Board should endeavour to secure a site adjoining the Town Hall.

CHURCH-BUILDING NEWS.

Church Broughton (Derbyshire).—The parish church of Church Broughton was reopened on the 21st of June, after restoration. The church dates from Norman times, some remains of that period still existing. The chancel, with its fine tracered windows, was erected in the fourteenth-century, and presents some interesting points for the consideration of archaeologists. It was re-roofed in 1827, and in 1846 the north aisle was rebuilt. The church appears to have suffered considerably from these works. Early last year the state of the tower and spire became such as to cause great uneasiness, and Mr. J. R. Naylor, architect and diocesan surveyor, Derby, was called in to advise the churchwardens and parishioners. He found that the ivy which covered the tower with so much picturesque effect was the cause of the mischief, it having forced its way to such an extent into the joints of the masonry that the spire was being displaced by it. The committee decided to carry out the works proposed in Mr. Naylor's report, and in addition to thoroughly restore and repoint the whole of the tower and spire, carefully removing every particle of the ivy. This has been done, and the works now carried out have also included the rebuilding of some part of the east end and re-setting the tracery of windows, repair of old decayed and defective masonry, lowering and replacing floors at the original levels; cleaning walls by washing (no tools being used), reseating in oak, new altar and tile floors, the panelling from old chantry screens being used as reredos. The chancel arch and the wall over were stripped of their plaster and whitewash, when it was found that the original arch was much higher than that then existing. It was determined to rebuild on the old lines, using all the old mouldings and stones that were in any degree perfect. The *Derbyshire Advertiser*, from whose columns we glean these particulars, says that the nave has also been restored "in character with its extremities. The whole has been cleaned from paint and whitewash, the arcade made safe, mouldings repaired and replaced where wanting, floors lowered, seating throughout in oak, and new floors of wood block introduced. The church now presents an example of that thorough restoration which is to be defended and supported in strong opposition to the destruction which wants guarding against by every possible means." The contractors employed for the whole of the work have been Messrs. Walker & Slater, of Derby, whose foreman was Mr. Peak. The heating was carried out by Mr. Jerrom, of Derby. The wrought-iron altar-rails were executed by Mr. E. Haslam, and the carving by Mr. E. Bridgeman, of Lichfield. The chancel tiles were supplied and laid by Messrs. Godwin & Sons, of Hereford, and Messrs. Jones & Willis, of Birmingham, supplied the altar-cloth and altar-deck, while the brass pulpit desk is the work of Messrs. Hart, Son, Peard, & Co., of London.

Swansea.—The foundation-stone of the new Church of St. Thomas was laid on the 17th of June by General Grenfell. The church, which will be Gothic in style, will seat 500 persons, the cost of the building being 4,000l. The architects are Messrs. Nicholson & Son, Hereford; and the contractors are Messrs. Loveday, Evans, & Co., of Swansea.

Tensor.—Tensor Church, Northants, which was until lately in a state of ruin, being roofless and floorless, is now being restored, under the direction of Mr. Ewan Christian, architect. Mr. Wade, of St. Neots, is the contractor, and the amount of his tender for the nave and aisles was about 1,300l. When the works were commenced, the open oak roof, which was decayed beyond all hope of mending, was taken down. The lead which covered it was carefully rolled up, and will be re-melted and used for the new roof, which will be the counterpart of the old one. The uneven flooring was then removed, and the old tombstones, have been taken care of, and will be re-laid in their old places as far as possible. The west portion of the north aisle wall was taken down. The south porch will also have to come down, as well as the roofs of both aisles, for they are hopelessly beyond repairing. A remarkable peculiarity in the church is that the floor is not horizontal, but rises by an inclined plane from the west end to the altar. The level of the top of the capitals is the same throughout, and the columns become shutes as they approach the east. The floor follows generally the fall of the original ground. When the pavement is re-laid this will not be altered, but the floor of the restored church will also have the same peculiarity. There is also a stone seat running for almost the entire length of the north aisle attached to the wall. This also will not be removed, but will be repaired where it is necessary. Under several coats of whitewash on the north aisle wall there are evidences, towards the east end, of old colouring, but it is too indistinct and partial for any judgment to be formed upon it. On the first column of the north aisle there is a portion of an apparently old piece of pigment. The form of a bishop in canonical robes and with a pastoral staff is clearly discernible. In the chancel, which needs restoration, the floor remains in the uneven state which characterised the rest of the church, for the present contract does not touch it. The sanctuary is three steps above the level of the chancel, the chancel not being raised above the level of the nave beyond its continuation of the inclined plane. In the chancel are several curious oak sedilia or stalls which originally belonged to the neighbouring collegiate church of Fotheringhay. A plain oak screen, in imitation of the Perpendicular work, but covered with paint, separates the chancel from the nave. There is no chancel arch. The east window is of the Perpendicular date, but the other windows of the chancel are Early English. Although the present contract does not include the chancel, it will, nevertheless, before the work of restoration is completed, receive the attention it requires. The nave consists of five bays. On the north side there are three Early English arches at the east end of the nave, and three Transitional arches at the west end; while on the opposite side there are three Early English arches, but only two Transitional. The arcades are shown in full detail in plates 2 and 3 of Johnson & Kersey's "Churches of the Nene Valley." The doorway leading from the north porch into the church is a remarkably good specimen of Transitional work (plate 64 in "Johnson & Kersey"). The tower will not be touched, and the ivy which surrounds it, and which gives to the whole edifice such a picturesque appearance, will be allowed to remain as it is.

SCHOOL-BUILDING NEWS.

Eurton Dasset.—The foundation stone of new church schools here was laid on the 21st of June by Lady Willoughby de Broke. Messrs. Duckett & Grant, of Fenny Compton, are the builders.

London.—The Endowed School buildings have just been completed. They comprise a central hall, around which are grouped six classrooms, in addition to master's rooms and lavatories. Accommodation is provided for 200 boys. In the playground are the offices and covered play-shed. The building is of red brick, with hard stone dressings, in the Domestic Gothic style. Over the entrance is an octagon tower with a

lead domed roof. The whole of the work has been very satisfactorily carried out by Mr. C. Cope, builder, of Tunstall, from the designs of Mr. Charles Bell, F.R.I.B.A., of Dashwood House, London, whose design was selected out of forty-four others, on the award of two professional advisers, and he is to be congratulated on having not only executed the building complete within the stipulated sum of 2,000l., but also without any extras whatever. The commencement and finish of this competition is a precedent which we hope may be often followed.

Treowirgie.—The new schools at Treowirgie, for the Redruth School Board, have just been opened. They have been erected from the designs of Messrs. G. B. Nicholls & Son, architects, Birmingham, by Mr. Arthur Carleek, builder, Redruth. The buildings are planned for the accommodation of 350 boys, 175 girls, and 175 infants, with the necessary class-rooms, cloak-rooms, and lavatories. Mr. W. Whetter was the clerk of the works. View, plan, and description of the schools appeared in the *Builder* for April 3 last.

STAINED GLASS.

London.—At St. Botolph's Church, Aldersgate-street, on St. Botolph's day, June 17th, in the presence of the Lord Mayor and Sheriffs of London and Middlesex, who attended in state, eight new windows were unveiled. They represent incidents in the life of our Lord, and were executed by Messrs. Ward & Hughes, of Frith-street, London.

Ramsgate.—The Wesleyan chapel at Ramsgate has just been entirely renovated and re-seated. The whole of the windows have been filled with stained glass, executed by Messrs. Jones & Firmin, of Blackfriars-road, London.

Waterloo (Liverpool).—Two stained-glass windows have just been erected in St. John's Church, Waterloo, Liverpool. One, in memory of the late wife of Mr. Brown, of the High School, represents "Christ Blessing Children." Above is a smaller subject, "Christ appointing Peter the Head of the Flock," and below an angel with scroll containing the text "Feed my Lambs." The other window, in memory of the late Miss Pick, illustrates the charitable deeds of Dorcas, and below an angel with the text "She laboured much in the Lord." The artists are Messrs. Mayer & Co.

Look before you Leap.—Artisans, mechanics, and others desirous of emigrating to New South Wales (says the Immigration Agent at Sydney) should first make inquiry of the Agent-General for that Colony as to the prospects of obtaining employment in the branches of industry with which they are accustomed. A large number of British manufacturing industries are yet unknown in Australia, and it would be folly on the part of those engaged in these to proceed to the Colonies for the purpose of obtaining employment in the same. There is practically an unlimited field for every kind of domestic and country labour, but many of what may be designated "town trades" are overcrowded. Professional men should be particularly careful in deciding to emigrate, although experienced surgeons and physicians willing to have a few years up country will find many good openings. Good aurists and other medical specialists can speedily obtain remunerative practice. The legal profession is very largely represented in New South Wales, and a stranger, without colonial connexions, would find the competition of his established rivals too much for him. In the mercantile and trading world the supply of labour is always in excess of the demand, and ledger clerks, invoice clerks, warehouse assistants, packers, shopmen, counter clerks, and others of the same class should stop at home. They are not wanted in the Colonies, and might have to wait months before situations were procurable. In the building trades there is always plenty of work, and skilled masons, bricklayers, joiners, carpenters, &c., can readily obtain employment, the current rates of wages being:—Carpenters and joiners, 9s. to 11s. 6d. per day (standard price, 10s. per day); stonemasons' labourers, 8s. to 9s.; plasterers, 11s. to 12s.; plasterers' labourers, 8s. to 9s.; bricklayers, 11s. to 12s.; bricklayers' labourers, 8s. to 10s.; painters, 9s. to 10s.; plumbers, 10s. to 11s.; gasfitters, 10s. to 11s.; sawmill hands, 9d. to 1s. per hour. In all these trades the working-day consists of eight hours.

The Student's Column.

STONE QUARRIES.—I.

THE CLASSIFICATION OF ROCKS.

THE rocks which compose the crust of the earth are divided into three great classes, according to their modes of origin. The first of these is termed *igneous*, and comprises rocks which have once been in a molten condition, or in a state of fusion. The second is known as *aqueous*,—those that have been laid down or formed in water. The third, *metamorphic* includes those portions of either of the foregoing divisions which have been subjected to sufficient heat and pressure to cause them to substantially change their form, but not quite enough to melt them up.

For our purposes they may then be subdivided in the following manner:—

The igneous rocks fall into two groups:—1, the *crystalline*, composed wholly of crystals, such as granites, syenites, and gabbros; 2, the *non-crystalline*, those made of a substance resembling glass, such as obsidian and tachylite, or which have crystals scattered about in a glassy matrix, as have most lavas.

The different aqueous rocks might be placed into three groups:—

1. *Sandstones*, being made of grains of mineral matter (mostly quartz) cemented together by materials which have, in the majority of cases, been introduced into the rocks subsequent to their deposition. Quartzose sandstones are more or less compact, according to the nature of the cementing material, extreme types being loose sand or concretionary matter, too soft for building purposes; and hard siliceous stone, breaking with a splintery fracture.

2. *Limestones*, being made wholly of calcareous organic remains in a more or less perfect state, or having been deposited chemically in the shape of little spherules, the nuclei of which are generally fragments of mineral matter or pieces of broken shells. We shall treat of dolomites under this heading, as they are magnesian limestones, having sometimes been formed in water, though occasionally by metamorphic action properly so-called.

3. *Clays*, composed mostly of silicate of alumina, which, although primarily derived from the decomposition of felspar rocks, eventually becomes impure, in a greater or less degree, by the addition of other mineral matter both at the time of deposition and subsequently.

Metamorphic rocks may be separated into four groups:—

1. *Gneiss and Crystalline Schists*.—The crystalline materials of which these are formed have arranged themselves in layers which may be composed of one or more minerals. These layers are not necessarily parallel to each other, but are frequently much twisted or contorted, especially in the schists.

2. *Quartzites*, which are sands or sandstones much altered by being greatly pressed into an exceedingly hard mass.

3. *Crystalline Limestones* (or marbles, properly so-called) are ordinary limestone rocks similarly subjected to great pressure, so that their original structure is obliterated, the calcium carbonate having entirely re-crystallised *in situ*.

4. *Slates*, which are clays also very highly pressed, so much so, that the major axes of the particles of which they are composed have been made to assume a position at right angles to the direction of the pressure, hence their characteristic fissile structure.

It must not be expected that all rocks are capable of being satisfactorily placed in the subdivisions here indicated; for nature will not allow any hard-and-fast lines to be drawn, but produces intermediate varieties which are difficult to deal with, inasmuch as they might respectively present characters common to two or more of the subdivisions. In order to understand the subject, it is absolutely necessary, however, that certain rocks be taken as types of the subdivisions. After these types are agreed on, and fixed, the principal intermediate rocks help to make up separate minor groups, whilst those refractory substances which will neither fall into the subdivisions nor these groups, usually receive two or three long names, and form most excellent debating ground, being shifted about from time to time, as this or that authority may think fit.

We will illustrate this difficulty by giving a

few examples. The classification at the outset states that igneous rocks may be either crystalline or non-crystalline. Now, suppose we take gabbro. This is a rock which contains no matrix whatever, but is made wholly of crystals more or less interlocking each other. If, in addition to its ordinary minerals, it contains much olivine, it is called olivine gabbro. This passes into dolerite, a rock which, although crystalline, contains a small quantity of amorphous substance here and there, as proved by microscopic examination. Dolerite passes into basalt, which in some cases presents a micro-crystalline structure; in others, a number of small needle-like crystals are seen porphyritically developed in a glassy matrix. This lava passes into a rock called tachylite, a glassy-looking material. All the gradations are so insensible, that at times it becomes difficult to decide whether a certain rock shall be called gabbro or dolerite, dolerite or basalt, and so on.

Again, typical granite is composed of quartz, felspar, and mica; but it frequently happens that the mica is present only in very minute quantities; and a fourth mineral, hornblende, gradually makes its appearance. Now, the rock known as syenite is composed typically of quartz, felspar, and hornblende: so it will be seen that in a case where all four minerals are present, the rock could not, strictly speaking, be called either a granite or a syenite, and the result is that it receives two names, viz., hornblende-granite, or micaceous-syenite.

At first sight, it seems quite simple to distinguish the difference between sandstone and limestone, but such is not actually the case. The types are easily recognised, after a little practice, but there are stones in which calcareous organic remains, and carbonate of lime help to form the rock, as much as do quartz grains, so that it becomes a matter of choice whether it be called sandstone or limestone.

The gradation is still more complete when arenaceous and argillaceous deposits are attempted to be differentiated. When we reflect on their modes of formation we cease to wonder at this; in fact, it would be difficult to conceive otherwise. The only reason why a particular stratum was made of sand, and another of clay, is that the velocity of the water off shore (whence the material for making the strata was obtained) gradually became less, and the most easily suspended particles and grains would, therefore, be carried farthest out to sea, before being deposited. The particles composing the clay would then, in the ordinary course of events, be deposited last; the quartz grains of the sand being left behind much nearer the shore line. Now, if the power of transportation of the sea-water always diminished in the same ratio, the supply being constant, sand would be laid down in one place and clay in another; but this is not so. During a storm, for example, this power is greatly increased; and during a calm, when the sea is like a sheet of glass, it is much diminished, so that in the one instance the sand is carried on and deposited with the clay, and in the other the clay is dropped with the previously deposited sand. No wonder, then, that it is difficult to draw the line between the two rocks when they are raised in a consolidated condition, above the water, and presented to our examination in after ages.

Turning lastly to the metamorphic rocks, we shall find a still greater difficulty to surmount. As they are the combined results of heat and pressure on either igneous or aqueous rocks which have thereby been very gradually altered, it will be seen that no line of demarcation can be made, for, although an aqueous rock, as it is followed up, is said to become metamorphic, no one can say where the one class of rock begins and the other ends.

We do not, of course, include the local phenomena of contact metamorphism under the above observations.

Rocks have been classified according to their chemical composition and also on the broad basis of structure, and although, from a purely scientific point of view, these methods may possess some advantages over the one here advocated, yet, for the sake of simplifying matters and introducing a practical element, we prefer to classify rocks by the older method according to their origin.

Trade Mem.—Messrs. Wm. Whitford & Co., constructive engineers, have removed from Limehouse to their new offices and works, West Ferry-road, and have laid down additional plant.

Books.

Zur Profan - Architektur. Von Dr. August REICHENSPERGER. Cologne: J. P. Bachem. 1886.

STARTING with the assumption that Gothic and German are synonymous terms, the author of this treatise devotes fifty pages to deploring the effect of the Renaissance on architecture in Germany, and the remaining thirty to demonstrating the adaptability of the Gothic style to domestic and public, as well as to ecclesiastical, architecture. He urges it as the duty of German architects to preserve an essentially German style, and deprecates what he expressively calls the "Misch-masch" of styles which offend and fatigue the eye in the new quarters of all the considerable towns of Germany. He contradicts with much force Lübke's enthusiastic praise of the age of the Renaissance as the beginning of a new era of deeper passion and more perfect form in literature and art, and cites many authorities, historical and artistic, to prove that the Renaissance was an age of irreligion and social confusion in Germany. The old landmarks were overthrown, and men strove to hide their want of artistic faith and truth behind a servile adulation of antiquity which had a *raison d'être* in Italy, but was utterly out of place north of the Alps. The object of Dr. Reichensperger's treatise may, perhaps, be best summed up in a passage which he himself quotes from a lecture on Gothic architecture by Dr. Wilhelm Lotz.

"As far as we are concerned, it is much to be desired that the architects of the present day should cease from their going to and fro among the styles of ancient and modern architecture, and, remembering the proverb, *vita brevis, ars longa*, should concentrate their efforts on the perfection of one style, which they may adopt as their own. This can only be successfully accomplished by the absolute rejection of all styles save the one. It would seem to argue a want of originality as a distinguishing feature of our age, that it alone has no architectural style of its own. We are driven to choose from among the styles already existing. Those who are thoroughly acquainted with Gothic can have little anxiety as to the choice they should make."

It is curious to see this phase, which we passed through in England more than a quarter of a century ago, just showing symptoms of starting in Germany. In one respect, perhaps, the modern German architects, who desire to take up and carry on Gothic, have more promising ground to work on than we had, since the Medieval Gothic of Germany is undoubtedly much more capable of improvement than that of England.

Les Artistes Célèbres—Pheidias. Par MAXIME COLLIGNON. Paris: Librairie de l'Art, 7, Rouam, Éditeur, 29, Cité d'Antin.

We have had occasion to notice M. Collignon's excellent little manual of Greek archaeology, which has recently appeared in English. He now, for the second time, brings out a popular book, of which a translation could scarcely fail to be acceptable. To write a history of the life and art of Pheidias is to write the history of the Parthenon marbles. The British Museum authorities have issued an excellent guide to the Elgin Marble-room, but we have as yet no popular account, simple yet complete, and thoroughly well illustrated of our greatest national treasures. This is what M. Collignon gives us. His book appeals in no way to the professional archaeologist. There is a somewhat marked absence of originality in view, but he has prepared a thoroughly pleasant, readable, lucid summary of the views embodied in more learned works. His six chapters are illustrated by 124 engravings, for the most part reproduced from the excellent photographs of Mr. Mansell, of Oxford-street. They are, for the most part, good; but we are sorry to note that the beautiful gold medal of the "Hermitage," representing the head of Athens Parthenos, as it appears in a woodcut at the end of Chapter III, is simply an offensive caricature. M. Collignon adds a very complete bibliography of his subject. He cites all recent interpretations of the pediment figures; but it is easy to see that he is a disciple of the elder school of commentators; he does not even mention Dr. Waldstein's "Gaia and Thalesa," theory,

though he quotes the book in which it is embodied.

Reichenbachiana: Orchids Illustrated and Described. By F. SANDER. St. Albans: F. Sander & Co.; London: Sotheran & Co.; Berlin: Paul Parey. 1886.

This is a book containing very fine chromolithographs of orchids; the plates are excellent specimens of this class of work, and may be of value to decorative artists as suggesting new combinations.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

9,435, Ventilators. J. Jenkins and R. B. Perress.

The ventilators are simple and convenient. The frame of the window is fixed a wire gauze pane covering an aperture formed all along the top of the window-sash frame. Two louvres of glass are also fixed in the recess or aperture, and a small shutter, which is actuated by a weight and cord. The ventilators can be left open at night without danger, and it is claimed for them that they do not detract from the architectural appearance of any building to which they are applied.

9,780, Artificial Stone. G. Lillenthal (Melbourne, Aus.).

In making the artificial stone a composition is used consisting essentially of ground limestones or marble, slacked lime, and curdled milk. A given quantity of slacked lime is reduced to a powder, and (say) for 100 parts is mixed with about the same weight of ground limestones or marble. The quantity should always be a little less cement than lime. The mass is mixed with curdled milk until it is just capable of being kneaded. It is then cut or separated into pieces of the size of the stones or other articles to be made, and then dried in the open air. For coloured stones, mineral or aniline colours mixed with a binding material and used dry are added to the composition.

9,703, Sliding Window-sashes. W. Youlten.

By combining the ordinary sash with that of a casement opening inwards, the outside window-cleaning and window-gardening can be more conveniently managed. In this invention, inside each of the ordinary sliding sashes is hinged an additional frame, thus making the outer sash a casement sliding frame. Either the top or the bottom window can be opened inwards or outwards at the level of the lower one. If, if desired, can easily be made to open at either or both levels. The casement opens like a door, when a knob or catch is turned, and the frame is pulled inwards.

9,621, Chimney-Tops and Ventilators. J. A. Macneil.

The chimney-pot or flue is made of terra-cotta, and is enveloped in a jacket or case, which slopes toward the inner pot of the flue, leaving an opening of $\frac{1}{4}$ in. or $\frac{1}{2}$ in., according to the size of the flue between such jacket or case and the inner pot or flue, the upper portion of the inner pot being carried up by a jacket of the same diameter. An opening about an inch wide is left between the bottom of the jacket and the sloping base of the inner pot as a mouth to admit the external air, and a similar space is left between the jacket and the inner pot. The cold external air passes into the jacket, and, becoming warmed by contact with the warm surface of the inner pot, expands and rises, forcing its way in a spiral direction, and in a somewhat rotary motion, into the flue. This motion is assisted by the wind blowing upon the opening at the bottom of the jacket and also on the distance pieces surmounting the same.

NEW APPLICATIONS FOR LETTERS PATENT.

June 18.—8,107, A. Dougill, Lining Sewers, Tunnels, Subways, &c.—8,113, R. Halliday, Securing Glass to Frames or Sashes for Roofs, &c.—8,120, S. Lowden, Portland Cement.

June 19.—8,145, W. Smeaton, senr., Water-closets.—8,146, W. Smeaton, senr., Flushing Apparatus.—8,152, H. Keene, Lead Glazing.

June 21.—8,173, E. Wilson, Window-sash Fasteners or Screws.—8,175, T. Howdill, Fitting Window-sashes and Sash Frames.—8,182, F. Crawshaw, Wall Decoration.

June 22.—8,222, J. Duleston, Wood-turning and Shaping Machines.—8,225, T. & J. Harger, Adjustable Bench Stops.

June 23.—8,257, J. Parker and T. Brook, Gullies.—8,286, W. Thomson, Metallic Pipes.—8,293, H. Cunningham, Metal Screws.—8,297, R. Adams, Convertible Sliding Window Sashes.—8,310, J. Faulk, Ventilators.—8,314, S. Watson, Corings and Gutters.—8,318, S. Wallis and T. Wiseman, Cowl.

June 24.—8,339, R. Steinau, Facing Bricks, and manner of setting same.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,638, F. Ruyes, Dies for Brickmaking Machines.—8,617, A. Best, Stoves.—6,678, C. Herz, Electric Bell and House Telephone Apparatus.—7,099, J. Cadbury and J. Rollason, Locks and Latches.—

5,080, A. Tucker, Looks and Latches.—6,370, R. Lavender, Oxide of Iron Pigment.—6,705, F. Fletcher, Atmospheric Gas-burners.—6,720, J. Illston, Combined Gas and Coal Fire Cooking-Ranges.—6,827, J. Robinson, Horizontal Saw-frames.—6,875, J. Sagar, Machines for Moulding and Shaping Wood.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

8,753, A. Cooper and T. Harbord, Cooking Ranges or Stoves.—8,931, W. Bruce, Water-closet Apparatus and Mode of Connecting Pipes.—10,282, T. Severley, Apparatus for Blowing, Ventilating, &c.—10,488, H. Choqueval, Screw-driver.—10,982, G. Hookham and W. Tonks, Lines for Suspending Window-shades, &c.—5,553, J. Dyson, Cows, &c.—6,061, L. Groth, Roofing Tiles.—6,691, J. French and J. Craig, Rolled Plate Glass.—10,760, G. Garson, Suspension Bridges.—12,221, D. Allport, Lessees the Slamming of Doors.—1,007, J. Spang, Automatic Fire-Alarm for Dwelling-houses, &c.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JUNE 17.

Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

JUNE 21.

By S. & G. KINGSTON.
Dorington, near—Freehold and part copyhold farm, 86a. 1r. 26p. £2,033

Hoblet's Farm, 11a. 1r. 24p. freehold £300
Aldershot—An enclosure of land, 19a. 1r. 20p., freehold 400
An enclosure of land, 14a. 0r. 24p., freehold 850

JUNE 23.

By BAXTER, PATYK, & LEPPER.
Bromley—The residence Hazeldene, freehold 2,600
The residence Larkfield, freehold 1,550

By H. N. NAYLOR & CO.
Forest Gate—Two plots of freehold land 100
By JOHN LEEB.
Reigate—The Dingle, and 13a. 1r. 30p., freehold 10,500

By RUSHWORTH & STREYNS.
Brockenhurst, Hants—The Ober and Brockley Farms, 214a. 2r. 23p., and a rent-charge of 145l. a year 10,000
Brockley Cottage, and 9a. 2r. 12p., freehold 2,450

Piccadilly—18, Bolton-street, 15 years, ground-rent 21l. 1,600
Brompton—9, South-street, 20 years, ground-rent 10l. 453

By VENTON, BULL, & COOPER.
Woking, near—The Beacon, and 5a. 2r. 27p., freehold 2,600
Dorking, near—The residence called The Knowle, 13a. 2r. 20p., freehold 1,595

Newdigate Place, and Oakley, and 309a. 2r. 36p., freehold 5,600
New House Farm, and 173a. 3r. 7p., freehold 1,900

The Jordans, containing 162a. 2r. 34p., freehold 1,800
The Glover's Estate, containing 353a. 3r. 20p., freehold 5,000

Boothland Farm, containing 91a. 3r. 6p., freehold 1,393
Roll's Farm, containing 141a. 0r. 6p., freehold 1,450

An enclosure of land, 6a. 0r. 31p., freehold 240
Bease Green, near—Four freehold cottages 1,735
Newdigate—Ten freehold cottages 1,735

Bease Green—Two cottages and the village smithy 830

JUNE 24.

By BEARDS & CO.
Horsham, near—The freehold residence Norman's, and 47a. 2r. 13p. 3,800
HUMBERT, SOY, & FLINT.
Pall-mall—7, St. James's-street, freehold 13,200

By WALTON & LEB.
Anerley—The freehold residence Ridge Mount, and grounds 2,300
By J. & R. KEMP & CO.
Camberwell—1 to 6, Victory-terrace, 94 years, ground-rent 42l. 1,250

By T. B. WESTACOTT.
Haton-place, S.W.—An improved ground-rent of 76l., term 38 years 1,630
Lowndes-terrace, S.W.—An improved ground-rent of 35l., term 42 years 700

Kentish Town—19, Rylands-road, 96 years, ground-rent 6l. 410
By L. FARMER.
Canonsbury—271, Essex-road, 59 years, ground-rent 6l. 16s. 445

By C. C. & T. MOORE.
Finsbury Park—9, Portland-road, 62 years, ground-rent 11l. 705
Poplar—29, 31, and 33, Pennyfields, copyhold 650

Commercial-road, E.—46 and 48, Morgan-street, freehold 325
Midland—17, 19, Edward-road, 92 years, ground-rent 16l. 400

Ratcliff—84, Brook-street, freehold 170
By NEWBORN & HARDING.
Kensington—Improved ground-rents of 12l. 16s., term 57 years 280

Baywater—Improved ground-rents of 22l., term 50 years 420
Hyde Park—Improved ground-rents of 21l., term 44 years 535

St. John's Wood—Improved ground-rents of 22l., term 49 years 675
Caden Town—Improved ground-rents of 10l., term 53 years 225

Anerley—Improved ground-rent of 10l. 13s., term 66 years 210
Holloway—Improved ground-rents of 6l., term 48 years 100

Walton-stow—1, Market-place, 90 years, ground-rent 3l. 10s. 285
Bethnal-green—1 to 4, Ames-street, freehold 1,070

Leightonstone—8 to 13, Harvey-road, freehold 1,070
1 to 4, Mornington-road, freehold 605

A plot of freehold land in Mornington-road 775
Stoke Newington—16, Midway-grove, freehold 680

Hackney—18, St. John's Church-road, 91 years, ground-rent 6l. 210
Kentish Town—19, Lismore-circus, 61 years, ground-rent 8l. 235

Barnsbury—23, Beltha-villas, 59 years, ground-rent 10l. 310
Caledonian-road—50, Frederick-street, 65 years, ground-rent 6l. 900

By E. SIMSON.
Brixton—10, 12, and 14, Bramah-road, 77 years, ground-rent 15l. 900
Walthamstow—160 and 162, Westmoreland-road, 66 years, ground-rent 8l. 10s. 845

Blackfriars—54, Nelson-square, freehold 690
15, Surrey-road, 89 years, ground-rent 3l. 390

Walthamstow—1, 60, and 62, Manor-road, 69 years, ground-rent 17l. 8s. 1,115
25 to 29 and 33 to 39, odd, Torrington-road, and ground-rents of 4l. and 11l. 5s. 2,935

123 to 131 odd, Westmoreland-road, 68 years, ground-rent 22l. 18s. 1,380
3, 13, 14, and 15, Sedan-road, 61 years, ground-rent 19l. 1,190

Kensington Park-road—No. 41, the nine years' lease only 60
Battersea—12 to 17, Simplot-street, 70 years, ground-rent 31l. 10s. 1,000

JUNE 25.

By TOMLINSON & CO.
Paddington—9, Hampton-street, 68 years, ground-rent 43l. 380
Croydon—33 and 34, Handcroft-road, freehold 430

Blackheath—108, Shooter's Hill-road, 73 years, ground-rent 16l. 2935
By R. REND.
Fulham—149, Greyhound-road, 79 years, ground-rent 0l. 810

Windsor—16 and 17, Thames-street, freehold 1,920
By C. DAVENPORT.
Regent's Park—29, Gloucester-crescent, freehold 870
City—86, Upper Whitecross-street, freehold 500

By BAKER & SONS.
Edgware—An enclosure of freehold land, 8a. 2r. 9p. 950

MEETINGS.

SATURDAY, JULY 3.

Architectural Association—Visit to Harrow (see advt. in last week's Builder for particulars).
MONDAY, JULY 5.

Clerks of Works' Association.—Paper by Mr. John Woodley. 8 p.m.
THURSDAY, JULY 8.

Association of Municipal and Sanitary Engineers.—Annual Meeting at Hanley. 12 noon.
Sanitary Institute of Great Britain.—Anniversary Dinner, Holborn Restaurant. 7 p.m.

FRIDAY, JULY 9.

Association of Municipal and Sanitary Engineers.—Annual Meeting at Hanley (continued). 10 a.m.
SATURDAY, JULY 10.

Association of Municipal and Sanitary Engineers.—Annual Meeting at Hanley (continued). 10 a.m.

Miscellaneous.

Presentation to Mr. Carbott, M.P.—On the afternoon of Monday, the 21st of June, a deputation of civil engineers belonging to the Indian Public Works Department waited upon Mr. E. H. Carbott, M.P., at his private residence, Hyde Park-gardens, to present him with an address in grateful acknowledgment of the valuable services which he has rendered that body for several years past in exerting himself in Parliament and otherwise to obtain redress for their grievances and to improve their position generally. The deputation, which was a representative one, consisted of six officers of the Indian Public Works Department, acting on behalf of their brother officers, numbering over 700. The address, which states that it is presented to Mr. E. H. Carbott, M.P., M.I.C.E., M.I.M.E., formerly Mayor of Leeds, &c., in grateful remembrance of the disinterested efforts he has persistently and successfully made in advocating the cause of the civil engineers of the Department of Public Works serving in the dominions of her Imperial Majesty the Empress of India, is richly illuminated in gold, silver, and various colours, surrounded by a rich border of flowers and other ornaments, all treated in a thoroughly Indian manner, and is placed under glass within a solid silver-gilt frame, the inner lines of which resemble an Indian archway. The work has been designed and carried out by Mr. Allan Wyon, of Regent-street, the Chief Engraver of her Majesty's Seals. Mr. Carbott, in accepting the address, expressed the pleasure it afforded him to have had the opportunity of assisting such a large number of civil engineers, of which profession he was himself a member. He dwelt upon the importance and magnitude of the engineering works they were engaged upon in India, and explained that owing to numerous changes of Ministry within a short time he was unable to effect all the reforms needed to put the civil engineering service of the Government in India on a proper footing, and to obtain full redress for all their grievances.

Institution of Civil Engineers.—The Birmingham students of this institution held a meeting at the Colonnade Hotel, Birmingham, a few evenings ago, to elect officers, adopt by-laws and regulations, and to transact other business in connexion with the association which they have formed of the Birmingham students. The chair was occupied by Mr. R. Green, and the other students present were Messrs. F. W. Cross, E. Dodd, A. Hill, J. S. Pickering, W. Simkins, F. D. Sharp, and H. L. Tarbet. The objects of this section of the Institution being to promote and encourage the acquisition of knowledge amongst the Birmingham students in all subjects connected with the profession of a civil engineer, a series of visits will be made to works of interest in the neighbourhood, and meetings will be held during the winter months at which papers will be read and discussed by the members. Mr. R. Green was elected honorary secretary and treasurer, and Messrs. F. W. Cross, R. W. James, and H. L. Tarbet were elected members of the executive committee.

Military Memorials at Brighton.—The officers and men of the 5th Lancers have undertaken to defray the cost of a memorial to their comrades who fell in the recent Egyptian campaigns. The memorial will be placed in St. Martin's Church, Lewis-road, Brighton. The memorial, which will very shortly be completed, will be placed on the wall of the eastern aisle, and adjacent to the new lectern. The walls of the aisles are divided by internal buttresses into bays about 8 ft. wide and 18 ft. high, and one of these spaces has been devoted to the memorial, the aisle roof above being also included. The work will consist of a high dado or wall-panelling in wood, which it is hoped may in time be carried along the whole length of the aisle wall. At a height of 7 ft. from the floor this panelling will be crowned with an embattled cornice, and above this line the memorial proper will be placed. It is being executed by Messrs. Simpson & Co., of St. Martin's-lane, London, from the designs of the architect, and will be painted upon tiles having a non-reflecting surface. The memorial painting will be divided vertically into three parts, by two long panels containing figures of angels bearing shields, with the date of erection, &c., upon them. The central division will be chiefly occupied by the inscription giving the names of those in whose memory the work is set up. The side divisions of the memorial will each contain a niche, in which will be painted figures of, on the one side, a soldier in full uniform; and, on the other, of a trooper in the khaki dress worn in hot countries. These figures will be about 3 ft. 6 in. in height. On each side of the memorial will be placed groups of three lances, leaning slightly forward and carried by iron brackets. Above the central panels and side niches the upper part of the memorial will consist of tabernacle work painted on the tiles, terminating above with a wide horizontal band on which the motto of the Regiment, "Quis Separabit?" will occur twice repeated. Above this a richly moulded cornice of wood will be placed, and on it four shields with badges. The sloping roof above will be divided by moulded ribs into six panels, with carved bosses at the point of intersection. These have been carved by Mr. J. E. Knox, of Lambeth, who executed the pulpit and lectern. The panelling and wood work generally has been made by Messrs. Lynn & Sons, of Marlborough-street, Brighton, whilst the whole has been designed by the architect of the church, Mr. Somers Clarke, jun., F.S.A., of Dean-yard, Westminster. It may be added that a handsome chancel-screen is now being constructed by order of the 4th Dragoons, the regiment quartered at Brighton Barracks previous to the Lancers, and which is intended to be placed in the church in memory of the members of that regiment who died in the recent campaigns.

Fire Protection of the Colonial and Indian Exhibition.—A trial recently took place of the Fixed Steam Fire Engine constructed by Messrs. Merryweather & Sons for the Colonial and Indian Exhibition. The buildings are protected by a system of seventy hydrants on the water company's main, the pressure in which is, however, insufficient for fire purposes, sometimes falling to 10 lb. per square inch. The engine pumps directly into the main, producing a pressure of 100 lb. per square inch. The Inventions Exhibition was protected by Merryweather & Sons' portable fire-engines, but this year General Festing preferred to have the pumps connected to the main, though in case of a burst in the pipe delivering outlets are provided on the pumps for the attachment of hose. The engine is of the "Greenwich" type, and capable of delivering 700 or 800 gallons per minute. Steam is supplied by a Merryweather patent boiler, in which the water is kept warm by a gas-jet in the fire-box, and steam may be generated and raised to 100 lb. pressure in six or seven minutes. The engine and boiler are mounted on a light wrought-iron frame, and the whole is enclosed in a neat house in the grounds. This compact little engine, weighing only 35 cwt., is a noteworthy contrast to the pumping machinery of a dozen years ago, when an engine to do the work would have weighed from five to eight tons.

Sanitary Institute of Great Britain.—The anniversary dinner of this Institute will be held at the Holborn Restaurant on Thursday next, Captain Douglas Galton, R.E., in the chair.

The Winter Palace at St. Petersburg.—Although this famous and but little-known castle was begun by the Empress Elizabeth, it was not finished till after the accession of Peter III., and the space in front was even then blocked up with shops and poor dwellings, whilst heaps of stones, timber, and rubbish interfered with the access to the palace. In order to get this removed, the Chief Commissioner of Police recommended that the poor should be allowed the materials on their undertaking to remove them. The plan was approved by the Emperor, and carried out in his presence in the course of a day. When the Emperor moved into the palace, he inhabited the suite of apartments facing this square and the so-called Millionaja. This part is called "The Apartment of the King of Prussia." The entry of the Emperor was unattended by any ceremony. The rooms occupied by his Majesty were decorated by the Russian artist Ischewakinsky, and the marbles for the floor and cornices brought from Italy. The Emperor's bed-room was in the western wing, and next to it the library. Above the entrance-drive Peter III. built a gallery which he used as a room for transacting business, it being, however, so elegantly furnished that the furniture alone cost 800l. The Empress Catherine inhabited the suite of apartments now named "The Apartments of the Empress Maria Fedorovna." On the day of the Emperor Peter III.'s removal to the palace, the royal chapel was consecrated, the name given being "The Chapel of Resurrection." But in the following year the name was, by command of the Empress Catherine, altered to "The Chapel of the Saviour," on account of an old painting of Christ being removed thither. The interior of the palace was greatly embellished by Peter III., but the decorations were not completed till the reign of Catherine. The total cost till the year 1768 is estimated at 250,000l., the architect-in-chief being the celebrated art-amateur, Johan Belzoy. In 1767, the annex to the palace, the present well-known *Ermitage*, was commenced under the guidance of Delamotte, a French architect. At first this building, oblong in form, reached from Millionaja to the Neva, and four years after a new building was added by Felton, a German architect. In 1780, several more wings were added; and the Empress commissioned an architect, Guaragni, to build a theatre, which was finished in 1784. This architect also built the gallery connecting the *Ermitage* with the theatre and the so-called "Rafael's Gallery." In 1786, the so-called "Marble Gallery," containing the Hall of St. George and the throne-room, was begun, and in 1784 a splendid throne, the *chef d'œuvre* of Staraw, was placed in the latter.

Hunter's Home.—Not long since we had occasion to draw attention to the impending destruction of John Hunter's house at Earl's Court. Now the work has been completed, and the place is being laid out as a square. A correspondent of a contemporary calls attention to the fact that the builders have obtained permission to name the new thoroughfare "Barkstone Gardens," and suggests that it should receive instead some appellation that would perpetuate the memory of Hunter. We heartily subscribe to this suggestion. The name fixed upon at present may not be inappropriate in itself, but the occasion surely warrants that the greatest person and circumstance connected with old Earl's Court House should be fixed upon to give the new nomenclature. It may not seem a matter of signal merit that here it was that John Hunter kept his cages lions, and prepared the skeleton of O'Brien. When, however, we contemplate the prodigious labours of the great anatomist, we cannot help feeling that anything, however small, done in laying the foundation of the magnificent collection at Lincoln's Inn-fields is worth recording; and surely the most fitting place is the scene where Hunter devoted a part of his life's work. We have placed "Cleopatra's Needle" on the Thames Embankment to commemorate, as we suppose, the "dalliance and the wit" of the swarthy Egyptian queen. Thousands of pounds were spent to bring and rear in our midst an obelisk of uncertain history. Why, then, should we from simple negligence fail to honour, if only by a name, one who has done a thousand times more to make the world healthful and happy than she who "rode on Fortune's neck" and "governed men by change?"—*Lancet*.

A New Building Estate at Aldeburgh.—A very large company of capitalists and others—upwards of six hundred in number—left the Liverpool-street Station of the Great Eastern Railway on Thursday week, by special train, for the quaint old seaside town of Aldeburgh, in Suffolk, attracted by the announcement of an extensive sale of freehold building land by Messrs. Baker & Sons. At the present time Aldeburgh proper consists mainly of three long streets running parallel with the sea front to the extent of nearly a mile, the ground level of the town rising gradually from the shore and esplanade to a lofty elevation, behind which is what is designated the terrace, or high parade. It is on the summit of this cliff, overlooking the old town beneath, and commanding a splendid view of the German Ocean, that the land last week offered for sale is situated. It forms the Crespieny Estate, about twelve acres in extent, upon which several roads have been laid out for building purposes. The property was offered in 117 lots, but before Mr. Baker invited biddings, Mr. Smyth, the local surveyor for the vendor, made a few remarks as to the increasing value of the property in the neighbourhood, observing that additional railway facilities would shortly be given to Aldeburgh, which, if not carried out by the Great Eastern Company, would be effected by the Midland Company. Mr. Baker remarked that the land he was about to offer was the only freehold building land facing the sea, all the rest being copyhold; and announced that the plots to be submitted would be offered absolutely without reserve. The sale then proceeded, when there was a very animated competition, the whole of the plots being sold, those having a frontage of 17 feet, and a depth of 60 feet, averaging from 35l. to 40l. each, whilst the plots having frontages of 20 ft. and 25 ft. realised from 60l. to 80l. each. A hotel plot, situated at the junction of the terrace and one of the newly-formed roads, having a frontage of 78 ft., and a return frontage of 65 ft., rounded to a radius of 18 ft., was sold for 325l. There being a demand for more plots to be submitted, 33 additional plots were offered, the whole of which were sold. The family mansion adjoining the estate, known as Crespieny House, was next offered, and was sold for 870l. The total proceeds of the sale amounted to nearly 7,000l.

Sheffield Too's.—Every workman knows the value of a good tool; and workers in wood especially know what a pleasure it is to work with a whole "kit" of tools of equable quality, temper, and cut. A gun-stock maker who does best work will sometimes spend years in making a selection of chisels for cutting away the delicate parts of the lock, and when he has got a set to his mind he will be as careful and as proud of them as a surgeon of a case of instruments; but he never thinks of trying any that are not Sheffield make. Files and rasps, too, of which such enormous quantities are used in the hardware trades, are almost universally preferred with the Sheffield brand, although many of them are made and sold in Birmingham, Wolverhampton, and other hardware centres. It is convenient to deal with a local fire-maker, especially where there is a large consumption, because of the recutting; but still, most workmen hold the belief that Sheffield files are the best and last the longest. Saws, again, of all kinds, from the monster "circular" to the tiny "fret," will be found, in ninety-nine cases out of a hundred, to bear some well-known Sheffield maker's name. And even in those cases where we see an occasional manufactory of Sheffield staples located in such towns as Manchester or Birmingham, we can scarcely call it competition; for the material used in nine cases out of ten will be Sheffield steel and the workmen Sheffield workmen. London has a reputation for fine cutlery, as for many other branches of high-class manufacture, and the general explanation of this will be that the best of everything is naturally attracted to the capital. But it has been stated that 99 per cent. of London cutlery is actually made in Sheffield; and, no doubt, the remainder is produced by men chosen from the pick of the Sheffield labour market. — From "Great Industries of Great Britain" for July.

Hydraulic Lifts.—Messrs. Archibald Smith & Stevens have just completed at Norfolk House, Thames Embankment, a hydraulic lift for the service of the entire height of the building. It is worked in connexion with the Hydraulic Power Company's mains.

The Proposed Gigantic Iron Tower at Paris.—The question of erecting a gigantic tower at Paris, as proposed and designed by M. Eichel, has suggested several considerations, not the least important of which is whether it is possible to erect such a tower. Supposing this to be satisfactorily disposed of from an engineer's point of view, there still remains another question,—whether the tower will ever be worth the money required to construct it. A third objection to the scheme is that the effect of such a vast structure would destroy all harmony in the great exhibition of which it is to form an ornament. Besides, it is positively stated in a contemporary that the assertion that from the top of the tower communication could be opened with Dijon, distant 188½ miles from Paris, is not quite correct. The altitude of the proposed monument being not quite 1,000 ft., the radius of the horizon could not exceed 50 miles. But the mountains which separate the basin of the Seine and the Rhône, in the Côte d'Or, although not very lofty, may possibly be perceived from an elevation of 1,000 ft. at Paris, under the most favourable condition of the atmosphere, and they are not very far from Dijon. In practice, therefore, such a tower could be used for placing Paris in communication with an army occupying those mountains.

A New Art Gallery in the City.—Last week the new Art Gallery of the Corporation of London was opened at Guildhall, by the Lord Mayor. Mr. Henry Squire, chairman of the Library Committee, in inviting the Lord Mayor to declare the gallery open, said it had long been felt that the City, with its great wealth and position, ought to possess a public art gallery in fitting companionship with its schools of education and music. Last year, on the motion of Mr. Clarke, the Court of Common Council agreed to a resolution, the effect of which had been to bring together into one centre the paintings and other works which are now on the walls, and which might be treated as the nucleus-collection of an art gallery worthy of the City. The Lord Mayor said it afforded him much satisfaction to be present on the occasion, and he congratulated the Court on the step they had taken. He trusted that the Art Gallery,—already so well filled,—might be added to by the liberality of the citizens from time to time. He had much pleasure in declaring the gallery open. Among the artists represented are Sir Joshua Reynolds, Copley, Opie, Seymour, Lucas, David Roberts, Breanski, J. P. Knight, Hoffner, Beechey, Northcote, Pickersail, Dicksee, Hayter, Smirke, Chantrey, Woolner, Noble, Calder-Marshall, and Durham. The Secretary and Superintendent of the gallery is Mr. A. G. Temple.

The Comte de Paris's Villa.—The Geneva papers give an account of the property near that city which the Comte de Paris is said, on good authority, to have selected for his residence in exile. The villa, which belongs to M. Hava, son-in-law of M. Favre, engineer of the St. Gothard line, was built in the middle of last century, and is beautifully situated on the bank of the lake, in a small but well-wooded park of some thirty acres. It consists of a centre with a slated dome, flanked on either side by a long pavilion, and contains ten large saloons on the ground floor, ten on the first floor, and seven in the upper story. Adjoining are coachhouses for six carriages, stabling for fifteen horses, besides a small theatre to hold 150 persons. The whole house is supplied with water on every floor. In one of the wings is a fine gallery with painted ceiling of Louis XVI. date, while the great drawing-room is furnished with valuable Boule, and contains a beautiful series of enamel decorations.

The Patent Office Library.—We are requested to state that the Free Public Library at the Patent Office, 25, Southampton-buildings, Chancery-lane, W.C., will, on and after July 1st, 1886, be open to the public daily, from ten a.m. to ten p.m., instead of, as heretofore, from ten a.m. to four p.m. This library, in addition to the specifications, indexes, and other publications of the Patent Office, contains a large collection of the leading British and foreign scientific journals, transactions of learned societies, and text-books in the various departments of Science and Art.

Beredos, Cashel Cathedral.—A new reredos, of pitch pine, has been recently placed in this cathedral. It was made by Messrs. Jones & Willis.

The Importance of the Fine Arts to Humanity.—On Thursday evening in last week Mr. T. H. Maguire delivered a lecture at the rooms of the Society for the Encouragement of the Fine Arts, 9, Conduit-street, on "The Importance of the Fine Arts to Humanity." The chair was taken by Mr. E. P. Loftus Brock, the honorary secretary of the Society. The lecturer took a hopeful view of the prospects of art in the present age, believing that, although many of the public affected to form a judgment in one minute of that which had cost years of thought and labour, there was a growing appreciation of true art, and that enlightened patronage would be more freely bestowed and the sympathy which acted as an inspiration to the artist would produce greater artists and greater works than we were accustomed to see. The artist was the product as well as the producer of the art surroundings and art society of his age. Michelangelo and Raffaele could never have become the giants they were had not their genius been fostered by the sympathy of powerful patrons. A generous tribute to the value of the engraver's art as a means of art-education, and to the chromo-lithograph of our illustrated papers was rendered, the lecturer believing that the result of this popular art-teaching would be a greatly-improved standard of taste through all classes of society.

The Proposed Liverpool Cathedral.—The Liverpool Post of Monday last contains the following—"Mr. Ewan Christian writes to Mr. Clarke Aspinall, one of the hon. secretaries to the committee, that he is preparing his report upon the plans sent in with the least possible delay, remarking, however, upon the importance of the task imposed upon him. It should be clearly understood that whilst no formal appeal is being made for funds until the final selection of a design, yet the committee will most gratefully accept any and every present help that is afforded to them, as considerable outlay has already been incurred in legal and other expenses."

PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	8 5 0	7 0 0
Teak, B.E.	load	11 0 0	15 0 0
Sesuvium, B.E.	load	0 2 4	0 2 0
Asb, Canada	load	3 0 0	4 10 0
Birch	load	3 10 0	4 10 0
Elm	load	3 10 0	4 10 0
Fir, Dantsic	load	1 10 0	4 0 0
Oak	load	2 10 0	5 0 0
Canada	load	4 0 0	6 10 0
Pine, Canada red	load	2 10 0	4 0 0
" yellow	load	3 0 0	5 0 0
Lath, Dantsic	fathom	3 10 0	5 0 0
St. Petersburg	load	4 0 0	6 0 0
Walnut, Kips	log	2 15 0	4 10 0
" Odessa, crown	log	3 7 8	0 0 0
Deals, Finland, 2nd and 1st, std. 100		7 0 0	8 0 0
" 4th and 3rd		6 0 0	7 0 0
Rigs		6 0 0	7 0 0

TIMBER (continued).		£. s. d.	£. s. d.
St. Petersburg, 1st yellow	load	8 0 0	14 0 0
" 2nd	load	7 0 0	8 0 0
" white	load	7 0 0	10 0 0
Deals, Swedish	load	6 0 0	15 0 0
White Sea	load	7 0 0	17 10 0
Canada Pine, 1st	load	17 0 0	30 0 0
" 2nd	load	13 0 0	17 0 0
" 3rd, &c.	load	6 0 0	10 0 0
" Spruce 1st	load	8 0 0	11 0 0
" 3rd and 2nd	load	5 0 0	7 10 0
New Brunswick, &c.	load	6 0 0	7 0 0
Battens, all kinds	load	4 0 0	12 0 0
Flooring Boards, sq. 1 in. Free		0 8 0	0 13 0
Second		0 7 8	0 8 0
Other qualities		0 5 0	0 7 0
Cedar, Cuba	foot	0 0 3½	0 0 4
Honduras, &c.	load	0 0 2½	0 0 4
Australian	load	0 0 2	0 0 3
Mahogany, Cuba	load	0 0 5	0 0 7½
St. Domingo, cargo average	load	0 0 5	0 0 7½
Mexican	load	0 0 3½	0 0 4
Tobacco	load	0 0 4	0 0 8½
Honduras	load	0 0 4½	0 0 6½
Maple, Bird's-eye	load	0 0 6	0 0 8
Rose, Rio	ton	5 0 0	10 0 0
Bahia	load	5 0 0	10 0 0
Box, Turkey	load	7 0 0	17 0 0
Satin, St. Domingo	foot	0 0 7	0 0 11
Pecky	load	0 0 8	0 0 2
Walnut, Italian	load	0 0 4	0 0 6

METALS.		£. s. d.	£. s. d.
Iron—Pig, in Scotland	ton	40 0 0	0 0 0
Bar, Welsh, in London	load	4 10 0	4 17 6
" in Wales	load	4 5 0	4 10 0
Staffordshire, London	load	5 5 0	6 10 0
Sheets, single, in London	load	6 15 0	8 10 0
Hoops	load	6 0 0	7 0 0
Nails, rods	load	5 10 0	6 10 0
COPPER.		£. s. d.	£. s. d.
British, cake and ingot	ton	42 10 0	43 0 0
Best selected	load	43 10 0	44 0 0
Sheets, strong	load	49 0 0	50 0 0
" India	load	46 0 0	47 0 0
Australian	load	0 0 0	0 0 0
Chili, bars	load	39 17 6	40 5 0
Yellow Metal	load	0 0 4½	0 0 4½
Lead—Pig, Spanish	load	13 5 0	15 0 0
English, common brands	load	13 15 0	0 0 0
Sheet, English	load	14 5 0	14 12 6
SPELT.		£. s. d.	£. s. d.
Silesian, special	ton	14 0 0	14 2 6
Ordinary brands	load	13 15 0	14 0 0
TIN.		£. s. d.	£. s. d.
Barca	load	0 0 0	0 0 0
Billon	load	0 0 0	0 0 0
Strait	load	102 5 0	0 0 0
Australian	load	103 0 0	0 0 0
English ingots	load	106 0 0	0 0 0
ZINC.		£. s. d.	£. s. d.
English sheet	ton	18 0 0	18 5 0

OILS.		£. s. d.	£. s. d.
Linseed	ton	21 0 0	21 5 0
Cocoonut, Cochon	load	32 0 0	32 10 0
Ceylon	load	36 5 0	0 0 0
Copra	load	0 0 0	0 0 0
Palm, Lagos	load	24 0 0	0 0 0
Palm-nut & rail	load	0 0 0	0 0 0
Reaped, English pale	load	23 0 0	23 5 0
" brown	load	21 10 0	0 0 0
Cottonseed, refined	load	18 0 0	19 0 0
Tallow and Oleine	load	25 0 0	45 0 0
Lubricating, U.S.	load	8 0 0	10 0 0
" Refined	load	8 0 0	13 0 0
TURPINE.		£. s. d.	£. s. d.
American, in casks	cwt.	1 4 8	1 5 0
Tar—Stockholm	load	0 17 0	0 17 6
Archangel	load	0 10 8	0 11 3

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
New Station, Hertford.	Gt. Eastern Ry. Co.	Official	July 5th	ii.
Painting and Repairing Urinals	St. Mary, Islington	do.	July 7th	xv.
Wood Paving	Westminster Bd. of Wks	G. R. W. Wheeler	do.	ii.
Whitewashing, &c.	Mile End Guardians	J. M. Knight	July 8th	xv.
Erection of Schools, &c.	School Bd for London	Official	July 9th	ii.
Painting Works	Bristol Corporation	J. W. Girdlestone	July 10th	xv.
Repairs, Painting, &c.	St. Giles, Camberwell	do.	do.	do.
Red Deal and Battens Ends	City of London Union	Official	July 13th	ii.
Old York Flagging	Maidstone Local Board	do.	do.	xv.
Wood Paving	West Ham Local Bd.	Lewis Angell	July 13th	ii.
Carving, Carving, Metalling, &c. Works	Lewisham Board of Wks	Official	do.	do.
Laying Cast-Iron Water Mains, &c.	Southampton Corporatn	W. Matthews	do.	ii.
Repairs to the Shire Hall	County of Hertford	U. A. Smith	do.	ii.
Refract-Iron Lamp Posts	Hackney Board of Wks.	J. Lovegrove	July 14th	ii.
Broken and Chalked Stone	Hull Corporation	J. Fox Sharpe	July 15th	ii.
Watch House, Portland	Com. of H.M. Works	Official	do.	do.
Two-floor Transit Shed	Bristol Corporation	J. W. Girdlestone	July 17th	xv.
New Station, Odessa, &c., Gipsy Hill	L. B. and S. C. Ry. Co.	Official	July 19th	ii.
Reservoir, &c., Gessway	Liverpool Corporation	G. P. Deasch	do.	xv.
Erection of Shed	Rochester, & Gaslet C.	Official	July 22nd	ii.
Town-hall, Municipal Offices, &c.	Dewsbury Corporation	H. Holton	July 27th	ii.
New Church (Holy Trinity), Shrewsbury	The Committee	Oswell & Smith	Not stated	xv.
Reinstatement of Foresters' Hall, Clerkenwell	The Trustees	do.	do.	xv.
Business Premises, High Wycombe	T. Thurlow	do.	do.	xv.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Assistant Surveyor	Hackney Board of Wks	180l.	July 6th	xxii.
Clerk of the Works	West Bromwich	2l. 10s. per week	do.	xxii.
Surveyor	Stockton U. S. A.	350l.	July 10th	xxii.
Surveyor and Sanitary Inspector	Henley-on-Thames Cor.	130l.	July 19th	xxii.

TENDERS.

BEDFORD.—For new house in Spring-grove, Bedford, for Mr. R. H. Combs. Messrs. Usher & Anthony, architects:—

Smith	£1,250 0 0
Foster	1,350 0 0
Spencer	1,330 0 0
Freshwater	1,210 0 0
Haynes	1,210 0 0
White	1,150 0 0
Warton	1,167 0 0
Harrison	1,167 0 0

BEITHAL GREEN.—For building ten houses, Hart's lane and Florida-street, Bethnal Green-road, for Mr. P. J. Dixon. Messrs. Thos. & Wm. Stone, architects, Great Winchester-street:—

Hawkins	£3,875 0 0
Ames	2,875 0 0
Wire	2,750 0 0
Forrest	2,475 0 0
Higgs	2,300 0 0
Peppiat	2,169 0 0

BRIMSDOWN.—For sewerage works, Brimsdown Estate. Mr. J. Cooley, surveyor:—

Williams, Tottenham	£1,700 0 0
Turner, Dulwich	3,800 0 0
F. Vokes, Islington (accepted)	1,600 0 0

BROMLEY.—For erection of new Banking House at Bromley, Kent, for the London and County Banking Company (Limited). Mr. W. G. Bartlett, architect. Messrs. Storer & Sons, surveyors:—

Parsons	£2,970 0 0
Payne	3,867 0 0
Taylor	3,800 0 0
Adcock	3,798 0 0
Crosley	3,740 0 0
Naylor	3,690 0 0
Armand	3,641 0 0
Smith	3,640 0 0
Colla	3,600 0 0
Stimpson & Co.	3,480 0 0
Cox	3,443 0 0

CANNOCK.—For additions to the male wards at the Cannock Union Workhouse. Mr. J. R. Veall, architect, Wolverhampton:—

Hughes & Co., Churchbridge, Cannock	£280 0 0
G. & F. Higham, Wolverhampton	320 0 0
H. Lovatt, Wolverhampton	740 0 0
Bradford & Linford, Cannock	725 0 0
Horrocks & Co., Wolverhampton	710 0 0
J. Gilbert, Penkridge	691 0 0
Jones & Son, Sedgley	690 0 0
E. Wootton, Blithwick	681 0 0
T. Mason, Hednesford	658 0 0
J. Greenhill, Great Drifley	638 0 0
Anderson, Cannock	613 0 0
J. Guest, Bettle-lane	610 0 0
J. Reynolds, Cannock (accepted)	565 0 0

CHATHAM.—For new vestries and organ-chamber to Wesleyan Chapel, New Brompton. Mr. J. W. Nash, architect. Quantities by architect:—

Eider & Bookham	£1,000 0 0
G. Gates	790 0 0
T. Calland & Son	747 0 0
C. E. Skinner (accepted)	645 12 0

CHATHAM.—For repairs and alterations to stables at Sun Hotel, Chatham. Mr. J. W. Nash, architect:—

H. & J. Bathurst	£118 0 0
Eider & Bookham	143 0 0
F. Field	138 0 0
T. Pankhurst (accepted)	130 0 0

CHELSEA.—For pulling down and rebuilding premises, 52 to 56, Blane-square, Chelsea, for Mr. I. J. Stronger. Mr. F. Knight, architect. Mr. F. R. Smith, surveyor:—

Pearce & Landowme	£5,363 0 0
Higgs & Hill	5,240 0 0
Adamson & Sons	5,335 0 0
C. Wall	5,198 0 0
Hall, Randall, & Co.	5,023 0 0
Lathey Bros.	5,030 0 0
Nightingale	4,940 0 0
Stimpson & Co. (accepted)	4,730 0 0

* 15l. credit. † 25l. credit.

CROYDON.—For the finishing of premises, George-street, Croydon, for Mr. W. J. Bacon. Mr. J. Webster, architect, Doughty-street:—

Morris & Harper	£273 0 0
F. R. Docking (accepted)	516 0 0

CHESTER-LE-STREET (Durham).—For alterations and additions at the Hermitage, near Chester-le-Street.

Mr. H. T. Graden, architect	—
John Jopling, Chester-le-Street	£295 9 0
Thompson & Parshon, Chester-le-Street	—
Street	851 13 1
Geo. Gradon & Son, Durham	799 9 0

GOOSEY.—For alterations to farm house, Goosey.

Mr. T. Hartas, architect, Manchester. Quantities by Mr. J. G. Petherick, B.A., Wexley:—

General	Granary	Electric	Total
Acton	£1,000	£290 0 0	£1,093 0 0
Brown	997	78 0 0	1,076 0 0
Haywood	838	105 17 0	1,043 17 0
Massey	925	75 0 0	1,000 0 0
Harrison	905	79 0 0	987 15 0
Holt	890	75 0 0	965 0 0
Coates	870	73 0 0	943 0 0

* Accepted.

HAMPSTEAD.—For the erection of dwellings, Flask-walk and Back-lane, Hampstead. Mr. Peter Dollar, architect. Mr. B. Skidmore, surveyor:—

Wall Bros.	£5,727 0 0
Scriveners & Co.	5,489 0 0
Stimpson & Co.	5,388 0 0
Stimpson & Son	5,300 0 0
Flew & Co.	5,378 0 0
Manley	5,125 0 0
Toms	5,743 0 0

HAMPSTEAD.—For road and sewer-making on the National Standard Land Company's Woodbine Estate, Hampstead:—

J. Ford & Co., Carterot-street, Westminster (accepted).

[For list and amounts see Builder for June 12, p. 871.]

HASTINGS.—For making new entrance to Blacklands Church, Hastings. Messrs. Jeffery & Skiller, architects:—

Austin	£124 0 0
Warman (accepted)	105 0 0

LONDON.—For alterations and additions to schools and offices, Gravel-lane, Houndsditch, in the City Division, for the London School Board. Mr. T. J. Bailey, architect. Mr. C. W. Brooks, surveyor:—

Sabey & Son	£2,869 0 0
Pritchard	4,344 0 0
Oldrey	5,953 0 0
Gibbo	5,948 0 0
H. L. Holloway	5,865 0 0
Hart	5,860 0 0
Kirk & Randall	5,870 0 0
Green	5,850 0 0
Johnson	5,846 0 0
Stimpson & Co.	5,800 0 0
Jerrard	5,777 0 0
Atherton & Latta	5,600 0 0

LONDON.—For alterations and additions to the Clarendon Tavern, Tidal Basin, Victoria Dock-road, for Messrs. Smith, Gerritt, & Co. (Limited). Mr. James F. Wesley, architect:—

J. A. Taylor	£269 0 0
Harris & Wardrop	623 0 0
M. A. Palmer & Co.	590 0 0
J. Walker (accepted)	590 0 0

LONDON.—For alterations, &c., of 83, Fleet-street, for Mr. S. Weingott. Mr. W. Ralph Low, architect:—

J. T. Chappell	£250 0 0
B. Cook	592 0 0
Holliday & Greenwood	639 0 0
Dove Bros. (accepted)	785 0 0

LONDON.—For rebuilding 31, Hertford-street, Mayfair, for Mr. F. J. Merriess. Mr. W. Flockhart, architect. Messrs. Evans & Descon, surveyors:—

Jerrard	£4,120 0 0
Shaw	4,100 0 0
Foster & Dickson	4,068 0 0
Pusey & Lumley	3,925 0 0
Brass	3,786 0 0
H. & E. Lee	3,793 0 0
Lawrence	3,695 0 0
E. & E. Bywater	3,698 0 0
Colls & Son	3,645 0 0
Toms	3,943 0 0
Braid & Co.	3,698 0 0
Stimpson & Co.	3,470 0 0

LONDON.—For rebuilding 124, Holborn, for Mr. A. W. Gamge. Mr. Jas. Webster, architect, Doughty-street:—

	Main Structure	Shops	Total
W. & H. Salmon	—	—	£1,619
J. M. Macey & Sons	£1,220	£393	1,613
Brown & Harris	—	—	1,567
D. W. Green	1,273	235	1,513
Gould & Brand	1,216	198	1,413
H. L. Holloway	1,127	120	1,247
Pusey & Lumley	974	245	1,220

MUNDON (Essex).—For repairs and new buildings, Parsonage Farm, Mundon, Essex:—

N. Sanderson, Dedham, Essex	£1,100 0 0
Reed, Burnham, Essex	988 10 0
Dive, Colchester	850 0 0
E. Litch, London	840 0 0
Cooper, Golding, London	750 0 0
Ridley, London	748 0 0
Warren, Puteleigh	730 0 0

PIMLICO.—For shop-front and alterations, &c., for Mr. H. Overton, Pimlico. Mr. Jas. Young, architect. Geo. Colls (accepted):—

Geo. Colls (accepted)	£430 10 0
-----------------------	-----------

RAINFHAM (Kent).—For house and shop, High-street, Rainham. Mr. J. W. Nash, architect, Rochester:—

S. Alloway	£280 10 0
W. C. Snow	638 0 0
R. Sampson	619 0 0
A. H. Riley	590 0 0
W. Boorman (accepted)	487 0 0

ROCHESTER.—For alterations and renovating Wesleyan Chapel, Rochester. Mr. J. W. Nash, architect, Rochester. Quantities by architect:—

H. & J. Bathurst	£298 14 0
J. G. Naylor & Son	765 0 0
G. Gates	710 0 0
T. Calland & Son	680 0 0
C. E. Skinner (accepted)	689 0 0

SHOREDITCH.—For erecting warehouses, 63 and 60, Scruton-street, Curtain-road, Shoreditch, Mr. J. Groom, architect. No quantities:—

Goodman	£1,447 0 0
Valley	1,327 0 0
Stimpson & Co.	1,320 0 0
Holloway	1,293 0 0
Beale	1,264 0 0
Maitland	1,193 0 0
Cheesman	1,190 0 0

TOTTENHAM.—For the construction of a storm overflow receiver and precipitating tank, for the Tottenham Local Board:—

J. Bloomfield	£4,033 2 4
B. Cook & Co.	3,978 0 0
G. Osmaston	3,260 0 0
C. Killingback	3,143 0 0
George Bell, Tottenham (accepted)	3,058 0 0
Perival Hart	3,030 0 0

WINDSOR.—For preparatory schools, Beaumont, Old Windsor. Mr. J. F. Bentley, architect. Mr. W. B. Catherall, surveyor:—

Silver & Son	£21,000 0 0
Knight & Son	21,000 0 0
Williams	20,376 0 0
Adamson & Son	19,118 0 0
Watson	18,800 0 0
Lawrence & Son	18,791 0 0
Higgs & Hill	18,750 0 0
Norris	18,773 0 0
Stimpson & Co.	18,563 0 0

WINDSOR.—For seven houses and shops, St. Leonard's road, for Mr. E. O. Seaker. Messrs. Edgington & Sumner, bell, architects:—

T. H. Ringler, Banbury	£2,992 0 0
W. Borton, Reading	2,980 0 0
W. Woodbridge, Maidenhead	2,988 0 0
Snell & Co., Maidenhead	2,983 0 0
D. C. Jones & Co., Gloucester	2,936 0 0
R. Cornwall & Son, Eastbourne	2,950 0 0
W. Watson, Ascot	2,930 0 0
Woolgar & Son, Hornham	2,925 0 0
C. Clargie, Banbury	2,177 0 0
A. Kimberley, Banbury	2,902 0 0
Turtle & Appleton, Wandsworth	2,975 0 0
E. C. Howell & Son, Lambeth	2,988 0 0
Kirk Bros., Battersea	2,760 0 0
B. Jarvis, Banbury	2,900 0 0
T. Martin, Maidenhead	2,780 0 0
R. Bishop, Windsor	6,900 0 0

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY,

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

Vol. LI. No. 2593.

SATURDAY, JULY 10, 1886.

ILLUSTRATIONS.

Church of SS. Peter and Paul, Fareham, Hants.—Mr. A. W. Blomfield, M.A., Architect	56-57
Church of All Saints, Warley, Essex.—Mr. F. W. Tasker, Architect	60, 61
Holloway College, Egham (Two Views).—Mr. W. H. Crossland, Architect	64, 65
The New Carmelite Monastery, Kensington.—Messrs. Goldie, Child, & Goldie, Architects	69
The Original Design for the New Residence, S.J., Farm-street, W.—Messrs. Goldie, Child, & Goldie, Architects	69

CONTENTS.

The Prevention of Floods: An Irish River Case	45	New Residence, S.J., Farm-street	54	Provincial News	75
Recent Excavations on the Acropolis	46	Holloway College	54	Church Building News	76
The Lottery Loan for the Panama Canal	46	Carmelite Monastery, Kensington	54	Disseminating Church-Building News	76
Notes	47	Restoration of the Tower of the Church of St. Nicholas, Ipswich (Illustrated)	71	Roman Catholic Church Building News	76
Dr. Schillmann's Discoveries at Tizmas: Society for the Promotion of Hellenic Studies	48	The Architectural Association's Excursion to Harrow	71	Stained Glass	76
Kingsbury Church (Illustrated)	51	The British Orphanage for Fatherless Girls (Illustrated)	72	The Student's Column: Stone Quarries.—II	77
The Sculptured Slab in the South Aisle of the Choir of Chichester Cathedral	53	Country Roads and their Maintenance	72	Recent Patents	77
Fareham Church, Hants	54	University College, London: Distribution of Prizes	74	Recent Sales of Property	78
All Saints' (R.C.) Church, Warley	54	The Plumbers' Company	75	Meetings	78
		Architectural Association Vacation Visits	75	Miscellaneous	78
				Prices Current of Building Materials	79

The Prevention of Floods: an Irish River Case.



T was found by an Irish Commission recently appointed to hold an inquiry respecting the drainage of the district traversed by the river Barrow and its tributaries that at the head of the river there is a watershed area of 408,000 acres, the water from which pours through a neck at Athy. If the watershed area were squared, it would be about twenty-five miles each way, north to south and east to west, and three-fourths of the area consist of table-land, the shallow depressions which the water-courses follow being separated by lands of low elevation and gentle undulations. On the river and its tributaries within this area are situated the towns of Athy at the southern border, Monasterevan and Portarlinton near the centre, Kildare towards the north-east, Mountmellick on the west, Maryborough on the south-west, and Philipstown on the north-west, with other towns and places. Around and near to these, 22,000 acres of land are frequently covered with water to the average depth of a foot, and 23,000 acres around and beyond the flooded land are saturated up to the surface, although not covered with water. This water remains for many weeks together after a wet time, and even months, the condition of the river being such that the flood-waters run off very slowly. Here, as in England, flood-water standing upon land for a day or two,—a sufficient time to allow the silt which it holds in suspension to sink through it and be deposited on the land,—does no harm, it is rather a benefit to the land: but if it remains a long time it is very injurious in several respects; it kills the fine herbage and increases the growth of weeds and worthless grasses; it creates miasma; and Dr. MacCabe, the chief medical officer of the Irish Local Government Board, said that when the land is flooded or the subsoil waterlogged by recent floods, the solar heat which should be absorbed by the soil is wasted in evaporating the water, and from this evaporation result fogs along the valleys and a cloud-laden atmosphere, which favours a lowered condition of vital power; "one of the worst effects produced on the health of the inhabitants is that general lowering of the vital power always associated with the absence of sunlight. Where there is an absence of sunlight, a cloud-laden atmo-

sphere, and fogs along the valleys, the whole surroundings are depressing, and the result is that the vital powers which all possess are unable to resist ordinary diseases." Dr. James Kilbride, of Athy, said: "A number of people are permanently lamed by rheumatism. They are young people, and they will never get better as long as they live in the locality. If the river were lowered the surrounding land could be made dry, and this part of the country would certainly become much more healthy than it is at present." In a flat district like this fogs extend laterally several miles from the river. It appeared, indeed, that the fogs could be seen from any point above them to extend like a lake, 15 ft. or 20 ft. deep, far away across the valleys.

In Athy, Monasterevan, Portarlinton, and Mountmellick, the wells are sunk in the inhabited area through limestone drift or gravel. These being superficial wells, when the floods occur the level of the subsoil water is raised, and it flows into the wells and pollutes them, for, as there is no outlet for the drainage of the houses, the sewage is carried into the wells along with the flood-water.

Mr. Fitzgerald, who valued all the different tracts of land in the district for the Irish Board of Works, had examined the whole watershed area twenty years ago, and, on comparing the river and its tributaries now with what he found it to be then, he finds the channel has become narrower, that there are islands in its bed, and that the discharging power is less. Aquatic plants are growing, and the silt brought down by the floods clings to them, and the river channel is reduced in capacity. The people living there told him the floods were far larger within the last few years than ever they were before. The native grasses have died away, and are supplanted by coarse stuff. In estimating what the present value of the land is, and what it would be if the river were so managed as to prevent the land being flooded, Mr. Fitzgerald acted on the assumption that the submerged lands would be permanently relieved from floods, and that the adjoining land which is injured by being waterlogged, although not flooded on the surface, would be enabled to be drained to the depth of 4 ft. The area thus to be improved is 45,640 acres, the increased value of which would be 10,018*l.* a year.

The means to be adopted to effect the improvement of the district in the threefold respect mentioned, *i.e.*, the riddance of the fogs and miasma now arising from the ground, the lowering of the water level in the ground, so that the wells should not be affected, and the drainage of the land to the depth of 4 ft. for the improvement of agriculture, were

stated by Mr. Manning, the Chief Engineer to the Irish Board of Works, to be to begin at Athy, the lowermost point of the drainage area, and to widen and deepen the river to the dimensions of 160 ft. bottom width, with side slopes, and at such levels as to produce a maximum depth of 9 ft. 6 in. of water, while the surface of the water would be low enough to afford an outlet for the drainage of the land into the river at all points. For sixteen miles, from Athy to Monasterevan, the inclination would be 15 in. per mile, and the discharging capacity of the river at Athy would be 400,000 cubic feet per minute, with a maximum mean velocity of 4 ft. per second.

The dimensions of the channel would be reduced as the work advances upwards, so that, combined with the increased inclination, the dimensions would be proportional to the quantity of water coming into the river at all points. This is estimated by Mr. Manning to be one cubic foot per minute per acre of the watershed area in the lower portion of the district, advancing to 3 cubic feet per minute per acre in the upper portion. These are founded on the following observations and calculations. The river Bann, at Toome, immediately below the immense reservoir of Lough Neagh, discharged during the flood of February, 1877, 682,000 cubic feet per minute from a catchment area of 1,193,600 acres, or 0.57 cubic feet per acre, the area of the lake being 100,000 acres. On that day the lake rose 4 in., which represented a discharge of 0.845 cubic feet per minute per acre of the catchment area, so that but for the interposition of the reservoir the discharge into the lower Bann would have been 1.417 cubic feet per minute per acre. But more numerous observations were made on the river Brosna, 20 miles to the westward of the Barrow, where the watershed area or catchment is 285,232 acres. Mr. Kane made observations extending over thirty years, from which it appears that the greatest rainfall in a year was 39.90 in., the least 14.42 in., and the mean 27.94. The greatest in twenty-four hours was 2.09 in., which occurred in June, 1877. At Ferbane, where the watershed area is 285,232 acres, the greatest observed discharge was 267,477 cubic feet per minute, being 0.932 cubic feet per minute per acre.

It must be said that the Commission had the advantage of having for one of its members Mr. Richard Hassard, C.E., who was able to elicit from the engineering witnesses much information which might not otherwise have been given, and Mr. Hassard asked Mr. Manning to give other instances. Accordingly he stated that on the Woodford river, a tributary of the Brosna, where the watershed

area is 101,455 acres, the flood discharge was 1.12 cubic feet per minute per acre. The upper Erne district is 309,000 acres, and the discharge 0.88 cubic feet per minute per acre. The rain basin or catchment area of another river, the Inny, is 231,116 acres, and the discharge 0.88. But here there are some lakes, which make a difference in the discharge when taken per minute. The Ballinamore and Balliconnell district, 90,000 acres, discharge 1.12. The Fergus district, county Clare, 104,960 acres, discharge 0.76. But here again there are lakes, and also swallow holes in the bed of the stream, so that this last is not a good example. The Boyne district, 304,139 acres, discharge 0.50, and this was admitted to be a fair example for comparison. Then there are Loughs Oughter and Gowna, counties Cavan and Longford, 309,000 acres, discharge 0.83. Lough Corib, county Galway, 780,000 acres, discharge 0.89. So that, when Mr. Manning puts the discharge from the 408,000 acres of the Barrow district at 400,000 cubic feet per minute, it is pretty sure that it will seldom if ever be exceeded. It might possibly be so to some extent in the course of twenty or thirty years, but it is safe as a calculation of frequent floods, which are, practically, the floods to be guarded against. For the upper parts of the district, and for smaller and steeper areas, the flood discharge is estimated at 3 cubic feet per minute per acre. On these bases the dimensions of the channels and other parts of the works are calculated, and the estimate for the work, including contingent expenses of sluices, &c., is 474,664*l.*, and, as the area of the land injured by the flood is 45,641 acres, the average cost per acre of this land would be 10*l.* 11*s.* 3*d.*

But here comes in an important consideration—whether only those lands which are directly benefited by the main or arterial drainage should contribute to the cost of the works, or whether the whole area within the watershed should contribute in some degree. A witness, Mr. James Stewart Kincaid, gave evidence on behalf of a landowner in the county Kildare, within the area to be dealt with, who is himself a trustee of some Drainage Boards. He has had a good deal of experience on many estates in different parts of Ireland, and said that the contribution to the drainage works should not be confined to the lower lands actually injured by floods, but should embrace the entire watershed area of each portion of the river, as regards the maintenance of the main waterway. "I would say that every acre of enclosed and profitable land which contributes its drainage or surface water to the river should bear a portion of the assessment of maintaining the waterway. There is no doubt that every one having land within the watershed area or catchment basin has a right of free passage for the water down to the sea; but, then, they should maintain that highway for the water in a proper condition. In this instance the taxable area would only amount to about one-eighth of the whole area, all of which ought to bear some proportion of the cost of maintaining the channel." He would charge a rate upon the whole area for maintaining the waterway, and another rate upon the lands actually improved. It is inequitable not to tax the upper lands at all, for, owing to the steeper declivities of these parts of the watershed area, the soil is more easily carried away, and they contribute not only the water which falls upon them and descends at a rapid rate,—they have a right, no doubt, to send down the water,—but they also send down what they have no right to send, that is the *débris*. Of course the rate for the upper lands should be a small one, and not at all equal to the rate upon the lands actually freed from floods. The only exception should be plantations. They delay the run of water off the ground and fasten the soil. Another witness, Mr. Joseph Fennell, agreed with this. He thought the whole area of the basin should contribute more or less, for the silt is brought from the higher grounds.

All the points of this subject of the improvement of rivers which we have brought forward from this case are such as will also have to be considered in any English case.

RECENT EXCAVATIONS ON THE ACROPOLIS.

THE first issue of the "Museums of Athens," the work to which we called attention a few weeks ago, has just appeared. It contains eight beautiful phototype plates, all of which are devoted to the illustration of the recent "find" near the Erechtheion. We may say at once that we have seen no finer phototypes; they are exceedingly clear, sharp, and effective. If the succeeding numbers keep up the same standard of execution, there is nothing left to desire, and criticism at a distance from the original will be rendered as little hazardous as possible. Plate I. shows the scene of the discovery and the excavators at work, with,—if our memory serves us aright,—M. Kabbadias himself inspecting operations. He gives us in the accompanying text some interesting particulars as to the actual circumstances of his find. At a depth of between 3 metres to 4½ metres below the ground the workmen came suddenly on a deposit consisting of three strata of sculptural and architectural remains, each stratum being separated by an intervening layer of rubbish stones. What we may call the "monumental" strata consisted of pedestals, statues, inscribed slabs, fragments of architectural decoration, feet and hands, heads, pieces of potsherd and some coal and earth; the rubbish stones which intervene between these layers are said to have come from the Acropolis wall. The theory respecting the burial of all this sacred treasure held by Dr. Kabbadias is as follows:—"When the Persians forced their way into the Acropolis they burned the Temple of Athene and demolished the statues which they met with here and there, throwing them from their pedestals, crushing and knocking off their heads, hands, and feet. The Athenians, on their return, determined to restore, and succeeded in restoring, the sanctuaries of the gods in a more beautiful and magnificent style; but the ruined statues were useless, not being objects of adoration, but simply offerings, and being ruined they had no longer any value. At the same time they wished to level the surface of the Acropolis by heaping it up and raising it, they were even compelled to do so in order to erect its splendid edifices. But for this heaping up they wanted material, and so they collected whatever was found on the surface of the Acropolis after the destruction by the Persians,—statues, inscriptions, also the stones of the burned and demolished building. These statues were then regarded by the Athenians after the Persian War as worthless, and therefore they made use of them to fill up and heighten the surface of the Acropolis. But supposing that they had a religious value, and a very high one, the Athenians, nevertheless, as they were in a mutilated condition, could use them to supply the material they required, and, at the same time, depositing them in the ground, preserve them from every desecration."

This is, of course, pure theory, but it is possible that such a blending of religious sentiment and material economy might commend itself to the ancient,—as it assuredly would to the modern,—Greek mind. We may note, once for all, with regret, that the English version of the text is very feeble and long drawn out and far from clear; in fact, either the French or German version is easier reading. Perhaps, had England, as well as Germany and France, possessed her archaeological "school" at Athens, some member of it might have revised for us the English text.

After all, however, the main value of the publication is not the commentary, but the plates. Seven of these give us six of the most important statues discovered, one in two views. These statues, as is well known, are for the most part of uniform type, though in details they offer peculiarities of treatment. They represent a female figure,—whether goddess, priestess, or worshipper, is as yet unknown,—in standing posture, draped in long chiton and himation. The hair is arranged in long formal curls, and bands falling before and behind; on the head a head-dress, ornamented

with various patterns. The right hand in some of the fragments contains a fruit. The type, as a whole, is near akin to the archaic female torsos found at Delos by the Ecole Française, but the work of the Athenian statues is much finer. They have also this marked advantage, that they have been originally richly adorned with colour, which has remained in remarkable good preservation; red, blue, green, light-grey, are all still clearly to be seen. A very noticeable feature in several of the statues is a "large upright bar of bronze" just in the centre of the skull. M. Kabbadias conjectures that, if, as is supposed, these statues stood in the open air, this may have served as a support for an umbrella to protect them from sun and rain. Such a protection would be specially necessary to statues so richly coloured.

Another noticeable thing about the statues is that the pieces of which they are made up are found together in a peculiar, and, so far as we know, unique fashion; one of the portions to be joined has a long stone projection of wedge shape, and thus fits into a corresponding hole. The junction is made more secure by being cemented with a white substance, which experts declare to be lime.

Nothing definite is known about the sculptor of these statues; but among the inscriptions found occur the names of six artists, one of them known to us by literary tradition, Antenor, who made the statues of Harmodios and Aristogiton. Eight more plates relating to these discoveries are promised for the next issue.

THE LOTTERY LOAN FOR THE PANAMA CANAL.

THE *Projet de Loi*, having for object "To Authorise the Universal Company of the Inter-oceanic Canal of Panama, to issue a Lottery Loan," which was presented to the Chamber of Deputies, on the 17th ultimo, is signed by the President of the Republic, and by the Ministers of the Interior, of Finance, and of Public Works. The *Exposé des Motifs* states that M. Ferdinand de Lesseps, on the 27th of May, 1885, addressed to the Minister of the Interior a letter, which is reproduced *in extenso*, asking for the authorisation to issue a loan of 600 millions of francs by way of lottery. M. de Lesseps states that 471 millions of francs had been called up, and expended or engaged for the execution of the canal, and that 12 millions of cubic metres (being less than ten per cent. of the estimated total) of excavation had been moved. The persons interested in the canal are 102,116 shareholders and 217,623 loan or bond holders. The approximate cost of the construction of the canal was estimated by M. Voisin, in 1879, at 1,070 millions of francs. The tariff of 15 francs per ton (or rather more, per mile, than three times that of the Suez Canal), is proposed; and the annual charge of 6½ millions of francs is put down for maintenance and working.

On receiving the application the Minister of Public Works sent, in December 1885, M. Rousseau, an engineer-in-chief of the Ponts et Chaussées, to Panama, to report on the state and prospect of the undertaking. M. Rousseau's report has not been published, but the *Exposé des Motifs* says: "M. Rousseau, in his conclusions, admits the possibility of succeeding in piercing the Isthmus of Panama; he points out the grandiose character of the work, the importance of the efforts already made, and the interest which attaches to ensuring its success by the means of a French company. He adds that, as the approbation of the designs and the contracts is beyond the province of the government, as well as the direction of the works, the enterprise presenting in other respects serious contingencies, the government cannot give to the company either counsels or any guarantee."

But the government, in M. Rousseau's opinion, ought to make sure that the company pursues its work with reflection; that it does not ignore its difficulty, and that it should guide its measures by the advice of men considerable for their science and moral authority

—in a word that the future measures should be submitted to a serious and profound study.

The Government, on this, applied to the Company for a special report on the undertaking, and the latter replied that, while the technical Commission did not deny the difficulties which opposed the realisation of the programme, it expressed the conviction that they could be overcome. It was of opinion that the 600 millions now applied for would be "at least sufficient to conduct the enterprise to a degree of advancement which would, it thought, leave no doubt as to a final success, which might be assured by means of a last effort, measurable with precision."

It should be noted that the original capital of 12,000,000*l.*, together with the loans already raised in 1882, 1883, and 1884, come to an aggregate of 36,747,740*l.*, which the lottery loan will raise to 60,747,740*l.*, or upwards of a milliard and a half of francs. The length of the canal is 45 miles. The decree with which the *Projet de Loi* terminated authorises the issue of a loan to the amount of 600 millions of francs, at a rate of interest not less than 3 per cent., and not more than 4 per cent.; the difference between the two rates being distributable by way of lottery.

The actual debit of the Company is as follows:—

To original capital (including 10,000 shares given to Promoters, as paid up)	£12,000,000
To 5 per cent. loan of Sept. 7, 1882	5,000,000
To 3 per cent. loan of Oct. 3, 1883	12,000,000
To 4 per cent. loan of April 25, 1884	7,747,740
	£36,747,740
To lottery loan	24,000,000
	£60,747,740

The interest that the Company is paying out of capital is:—

5 per cent. on £12,000,000	£600,000
5 " " 5,000,000	250,000
3 " " 12,000,000	360,000
4 " " 7,747,740	309,909
	£1,519,909
Add $\frac{1}{2}$ per cent. on loans for amortisation	123,369
Present annual charge	£1,643,278
Add $\frac{1}{2}$ per cent. on lottery loan and amortisation	1,080,000
	£2,723,278
Annual charge when new loan is raised for interest and amortisation	£2,723,278

From the proceedings which have taken place before the Committee of the Chamber of Deputies, it appears that M. Rousseau has distinctly reported as to the impossibility of completing the canal for the sum above stated. M. Jacquier, an engineer-in-chief of the Ponts et Chaussées, who has been recently appointed Director of Works on the canal, has given evidence that, in his opinion, it will be impossible to construct the canal without locks. As to this, M. de Lesseps states that he has not come to any decision, but would act according to the requirements of science. Judging from the section of the line, and the necessity for obtaining a full water supply for the summit pond, a cutting of 200 ft. in depth may be avoided. But this would require forty locks, of 10 ft. lift each, or equivalent works. This, under the most favourable circumstances, would add four hours to the time for transit in one direction. And, as to backward and forward traffic, the experience of the Suez Canal seems to indicate that the locks must be double.

Llandoverly.—The memorial stones of "The Williams Pantycelyn Memorial Chapel" were laid on June 16th by Messrs. David Davies, M.P., and D. Pugh, M.P. The style of the building is Gothic of the Decorated period. Accommodation is provided in the chapel for about 260 persons, and in the schoolroom at the rear for about eighty. The cost will be about 2,200*l.*, and the contract is being carried out by Mr. Morgan, builder, Swansea, from the designs and under the superintendence of Mr. J. H. Phillips, of Tynte Chambers, Cardiff.

NOTES.



THE discussion on the subject of Tiryns at the special meeting of the Hellenic Society last week, of which we give a full report in another column, cannot be held to have established a case in any certain or conclusive manner for either of the views maintained. That Dr. Schliemann and Dr. Dörpfeld should have thought it worth while to come over from Athens to give their personal answer to the criticism of Mr. Penrose is a high practical compliment to that eminent English student of Greek architecture, and a proof that the German savants admitted that there was something that called for a reply. Dr. Schliemann was received with the cordiality which his energy and enterprise and his remarkable career as a discoverer must ensure for him everywhere, but it cannot be said that he made any figure as an advocate of his own views, as his speech in reply to Mr. Penrose almost entirely evaded the arguments brought forward by his English critic, and was little more than an *ad captandum* appeal to the sympathies of his audience; and had it not been for Dr. Dörpfeld's assistance he must have been adjudged to have lost his case. Dr. Dörpfeld, who thoroughly secured the respect of his audience, and whom we are very glad to have seen among us, gave a thoughtful and well-considered *résumé* of his reasons for believing in the antiquity of the Tiryns remains, and his reference to the "personal" feeling pervading the attack of Mr. Stillman in the *Times* seems not to be without reason. The real point which remains for contention is that of the date of the employment of the tools, the tubular drill and saws, of which the marks are found on the stones of the Tiryns walls. Dr. Dörpfeld admits the marks, but insists on the ancient character of such tools; on which point Professor Middleton, whose recent work on Rome has established his reputation as an extremely acute observer, is with him. Both Professor Middleton and Dr. Dörpfeld made a strong point in favour of the prehistoric view by references to the archaic character of the frieze of *σάρος*, which we selected for illustration as the most remarkable of the details figured in Dr. Schliemann's book, and which Dr. Dörpfeld showed very logical reasons for believing was discovered in its original position. On the other hand, there are some curious discrepancies as to fact between Mr. Penrose and Dr. Dörpfeld, the latter asserting that no bricks were found except in the admittedly Byzantine remains, while Dr. Schliemann appears to have admitted the bricks, but attributed their appearance to the action of the conflagration. We quite concur with Mr. Penrose in the conclusion that previously unburned bricks could never assume the similitude of regularly burned bricks by the accidental process of a conflagration; so that here is a double discrepancy as the result of this triangular duel. Dr. Dörpfeld, again, showed some of that too great readiness of belief which we remarked on in reviewing his chapter in the "Tiryns" volume (which, in fact, makes the architectural value of the book). His argument that a wall is to be reckoned as the same age with the Cyclopean wall, because it is built parallel with the latter, can hardly be accepted as sound, except by those who are very desirous to agree with him. The defence of Dr. Dörpfeld and Professor Middleton, however, in favour of the pre-historic theory is strong in many points; and the case for the present remains an open one.

THE case of Nosotti v. Saunders is perhaps the most interesting to readers of this journal of any of the decisions which have been given during the last month or two. It decided that a person who is asked to tender for work cannot, if the work goes off, receive from the employer any cost incurred in making out the tender, unless there has been an express contract with the employer that he will repay these expenses. From a legal point

of view nothing can be clearer than this, and we confess to some surprise that the question should ever have been raised. But, since it has been argued and decided, it must be noted as a legal decision which should be borne in mind by all builders and contractors. If they are likely to be put to expense in getting out a tender, they should, before doing so, obtain an undertaking that such expense will be repaid. If they prefer to trust to chance, they cannot complain if from time to time they are out of pocket by sending in tenders which are not accepted.

IN reference to the drawing by De Witte, dated 1669, in the collection at the Institute of Water-colour Painters, Mr. J. C. Robinson denies that it is a real De Witte, or of that date, and asserts that it is only a water-colour copy, at a much later date, of one of De Witte's oil-paintings.

THE business of the Light and Air Special Committee of the Institute of Architects, which has been in existence three or four years, is to be transferred, we understand, to one of the standing committees of that body. The special committee on this subject has in one sense been very much a standing committee, and we have doubts whether the committee to which the business is now referred will be able, for a long time to come, to make any report. Whether in the end any practical result will be obtained from the deliberations and the investigations of these committees is doubtful. But no doubt, when their report is published,—perhaps we are over sanguine in looking so far into the future,—it will be certain to contain much interesting material; and if these bodies produce no other fruit, they will only be like innumerable Government Committees, whose labours are to be seen in piles of almost-forgotten blue books.

FROM the *Δελτίον της Έστιας* (No. 489) we learn that the upper part of a very fine statue,—the lower half of which was dug up some months ago,—has been discovered on the Acropolis. The face is reported as of very fine workmanship, the iris of the eyes and the lips are painted red, and there are other remains of colour. On the head is a wreath. The style is archaic, but the modelling of the limbs is distinctly seen beneath the drapery, which is full and heavy. The statue is life size; it has been placed in the Central Museum.

OUR contemporary *Invention* says that the latest rebuff to the press has been administered by the South Kensington authorities to the *Chemist and Druggist*, whose representative was refused admittance to a "conference" on some subject of interest to the readers of that journal, on the ground that "the question of allowing representatives of the press to report the proceedings had not been raised." We are able, from our own experience, to corroborate the remark made by *Invention*, that "the importance of the scientific and technical press is curiously under-rated by the powers that be at South Kensington." There is a "Literary Superintendent," it is true, but representatives of the press object to being "superintended" by any but those to whom they are responsible. It is evidently no part of the "Literary Superintendent's" duties to see that the press have adequate facilities for doing their work, for it was only after repeated applications for a press pass for the Colonial and Indian Exhibition that we obtained one. The same thing occurred last year in relation to the Inventions Exhibition. It is usual in connexion with other exhibitions, even where there is no "Literary Superintendent," to offer the usual facilities for the free admission of the properly-accredited representative of every journal which can fairly claim to be interested in the contents of the exhibition. But, to do them justice, niggardly as the authorities at Kensington are in the matter of press passes, they are very liberal in dispensing printed circulars and paragraphs for insertion in the news columns of the journals to whom they are so illiberal in other respects.

THE Employers' Liability Act has given rise to far too much litigation. For the parties to actions arising out of it are, on one side, usually persons ill able to embark in litigation. A case reported in the July number of the *Law Reports*, *Howe v. Finch*, further explains this Act. The first section speaks of "defects in the condition of the . . . works . . . connected with or used in the business of the employer." A Court of the Queen's Bench Division has held that this means works actually used for a business, not works in course of construction or intended to be so used. In the case in question a part of an incomplete wall fell on the workman. This wall formed part of a warehouse not yet in use. Both the County Court Judge and subsequently the Divisional Court decided that there was no remedy under the Employers' Liability Act, but they gave their opinion that there was a right of action under the general law for negligent construction; but with this we are not now concerned.

THE Richmond Vestry have now resolved to apply to the Local Government Board for sanction to borrow, on the security of the district rates, the sum of 96,000*l.* for the construction of their Mortlake drainage scheme, by which they have now decided to stand or fall. But the opposition to the scheme is strong, and the Local Government Board inquiry into the application for the loan is likely to be a protracted one. It shows with what leniency the Thames Valley Urban Authorities have been treated, when it is mentioned that though Richmond, under the provisions of the Thames Conservancy Acts, 1857 and 1864, and the Thames Navigation Act, 1866, and subsequent Acts, is forbidden to divert its sewage into the Thames, that town still allows large quantities of sewage to flow into the river. It may be mentioned that the adopted scheme is that of Mr. John Charles Melliss, C.E., who proposes to convey the sewage to a plot of land at Mortlake, where it would be purified; the site, eleven acres, is to be purchased from Mr. Thomas Keane Fitzgerald for the sum of 10,000*l.* In the carrying out of this scheme the Richmond Rural Sanitary Authority and the Richmond Vestry unite, and the parishes comprehended in the scheme will be Barnes, Mortlake, Kew, and Petersham. The present rateable value of the district of the Richmond Urban Authority amounts to 167,970*l.*; and that of the Rural Authority to 137,327*l.*

A CORRESPONDENT draws our attention to the fact that in the accepted design for the Sunderland Municipal Buildings, which we published on June 26th, some of the chimneys which must exist according to the plan, are ignored in the elevation; this appears to be the case, unless the flues are artfully carried away into some unseen stack in the rear. The omission in competition elevations of necessary features which are shown in the plans, but which would injure the effect of the elevations, is, we fear, not an uncommon form of evasion of inconvenient facts, which ought not to escape the eagle eye of "the assessor."

DR. SCHLIEMANN'S DISCOVERIES AT TYRINS.

SOCIETY FOR THE PROMOTION OF HELLENIC STUDIES.

UNDER the auspices of this Society, a special meeting was held in the Rooms of the Society of Antiquaries, Burlington House, on Friday, July 2, for the purpose of discussing the questions at issue between Dr. Schliemann, Dr. Dörpfeld, and others, on the one side, and between Mr. Stillman (the *Times* correspondent at Athens), Mr. Penrose, and others on the other side, as to the antiquity of some of the remains discovered by Dr. Schliemann at Tyrins. There was a very crowded attendance.

Mr. John Evans, President of the Society of Antiquaries, was voted to the chair, and expressed his satisfaction that Dr. Schliemann and Dr. Dörpfeld had come over expressly to defend their views against their critics.

Mr. Penrose's Remarks.

Mr. F. C. Penrose opened the discussion by reading the following paper:—

When I visited Tyrins in April last I little thought that I should be called upon to say anything about it on a public occasion, but circumstances not of my own seeking have led to it, and now I am not proposing,—indeed, I am not able,—to come before you with any detailed statement. My visit to Tyrins and Mycenæ was a very hurried one, undertaken solely in the desire to understand better Dr. Schliemann's descriptions. My companion, however, whose letters in the *Times* are doubtless familiar to you, had been over the ground before, and was also familiar, by the study of many years, with Pelagic work in Greece and Italy. We were led by what we saw both at Mycenæ and Tyrins to doubt the extreme antiquity assigned by Dr. Schliemann to the remains he has excavated, and I gave my companion leave, if he thought fit, to state that I agreed with him in this respect. As to any suggestion of the date which ought to be attributed to them, it was a mere matter of conversation, and nothing more. The only question which I wish to raise is this, Do the walls which have been uncovered by Dr. Schliemann belong to the same epoch of civilisation as the so-called Treasury of Atreus and the Gate of the Lions at Mycenæ? It is more convenient to take these works as the standards than the walls of the citadel of Tyrins itself, which are probably of a still earlier date. But whilst raising this question, far be it from me to undervalue the munificence, the zeal, and self-devotion of Dr. Schliemann and the very remarkable discoveries which he has made (applause), and, if the end of this discussion should be to establish more firmly than before the pre-Homeric character of the remains referred to, it will give me much more pleasure than would the contrary conclusion; but, when I think of the character of the work I saw at Tyrins and Mycenæ, notwithstanding all I have read or heard since on the subject, I must think that a case can be made out for still further sifting the evidence before these structures can be assigned unquestionably to the Pelagic epoch; but such examination ought to be conducted carefully and leisurely, and with freedom from mental bias. I readily admit that very strong arguments are adduced in Dr. Schliemann's books on Tyrins and Mycenæ in favour of the great antiquity of his discoveries; but an examination such as I have advocated is wanted to satisfy those who are studying the subject that he has not,—as very naturally might be done by one who is so fully persuaded as he himself is,—overlooked circumstances which tell against his view.

The position I take up is this, that there is such a fundamental difference in character of work between the undoubted Pelagic architecture of Mycenæ, that is the Treasury and the Lion Gate, &c., and the so-called Palace of Tyrins, that they have nothing whatever in common. The meanly-built walls of the latter, generally of quite small stones, easy for one man to lift, but with somewhat larger stones inserted here and there, which have been worked with the saw and chisel, and also with a tubular metal drill, and with, not unfrequently, bricks introduced,—fairly burned red bricks, and burnt lime-mortar in many places,—all these circumstances seem to be quite inconsistent with the Pelagic period, and they appeared to pervade the larger portion of the walls. Dr. Schliemann seems to attribute the presence of burned bricks to the action of the conflagrations which have destroyed the palace. In the opinion of an experienced brickmaker whom I have consulted, no regular bricks could be produced from sun-dried bricks built up in a wall by such a cause, although they might be partially vitrified in an irregular manner, and would probably be cracked.

The bricks I am referring to had all the appearance of kiln-burned bricks, whereas the stones of the undoubted Pelagic walls are large, dressed without metal tools. They have their surfaces even, but undulating, having been smoothed by rubbing, and not by cutting tools, and the drill-holes which are found in them are quite different from those in question, the figure of the cut being exactly what would have arisen from the action of a hard stone point. The saw cuts, too, which are seen all over the newly-discovered remains, are not

found in the standard Pelagic works. Dr. Schliemann in his book certainly notices these saw-cut stones, and still maintains their antiquity; but is it possible that a people who used only bronze for their weapons could have used steel or iron for their workmen's tools? The tendency, alas! of the human race is to adapt every invention that increases force to the service of war.

Certainly at Mycenæ, and I think at Tyrins, there are, mixed up with the walls claimed as pre-Homeric, stones taken from older structures as borrowed materials,—and these appeared to me as of regular Hellenic workmanship of classical times. At Mycenæ, part of the house adjoining the tombs is built over a well in such a manner that the well could not have been used after the house was built. That the plan of the building at Tyrins is that of a Greek house I do not question; but that it coincides with Homer's plan is disputed by so high an authority as Professor Jebb. The analogy of certain very rude and mean walls recently unearthed on the Acropolis of Athens has been thought to confirm the date of the Palace of Tyrins; but the walls of Athens, though they seem to be older than the Persian invasion, carry us only a very small way backwards towards the age of the Atrides. That in their meanness of construction they have analogy with the Tirynthian walls may be allowed. But, indeed, they are probably mere foundations, whereas the walls at Tyrins are above the pavement. Their mean and slovenly construction appears to me to be about the strongest argument against these walls being the work of the great Pelagic builders, namely, that the same men could not have done both. It would seem that these builders could not venture to tackle a stone which weighed a few hundredweights, whereas the Pelagic builders lifted up a stone more than 120 tons weight to form the lintel of the door of the so-called Treasury of Atreus. To these archaic builders it would have been easier to have placed the stones in bulk in the walls than to have reduced them to fragments. These remarks apply quite as much, or more, to the house and tombs at Mycenæ. I believe the treasures and pottery found at Tyrins, as well as at Mycenæ, have their own difficulties before they can be recognised as pre-Homeric, but they cannot of themselves prove the great antiquity of the structure in which they were found. I must leave to others the discussion of the objects found in the tombs at Mycenæ, observing merely that, if a single specimen can be shown to belong to a later epoch, it brings the whole collection down to its level, whatever may be the probable date of all the rest. Only on three points will I venture a remark. There is some similarity, I think, between the buttons, or *bulas*, found in these tombs and others found at Olympia, which, of course, cannot be pre-Homeric. A comparison between these is desirable. Again, the swords, especially those of the leaf pattern, have great resemblance to swords with which we are familiar in the North, of Celtic or Teutonic make. And I lately saw, in the Museum at the pump-room at Bath, a mask, of which I produce a photograph (obtained for me by the kindness of Mr. Elton), which has a remarkable family likeness, although of meaner material, with the golden masks of the Mycenæ tombs. This mask, made of lead or a kind of pewter, was found among the Roman baths, and was probably used in the sepulture of some Celtic ally of the Romans, in the first, second, or third century of our era.

As respects the decorations,—I speak from the drawings, for I did not see the originals,—although there may be some archaic character about them, they are so rude and inartistic that they might be bad imitations of earlier work. The pottery fragments seem to be of a very mixed character. That there are some archaic specimens on so ancient a site is not surprising; but these fragments are, to say the least, inconclusive, except so far as to show that the site has been occupied and reoccupied, and that the walls we now see may be entirely or chiefly of the latter construction. However, as I said at the beginning of this paper, I make these statements in the hope that these newly-discovered works may be examined by those who have opportunity, research, and leisure to go carefully into all doubtful points; and, if the final report should be in favour of their great antiquity, I doubt if any one, except, of course, Dr. Schliemann and Dr. Dörpfeld, will be more gratified than I shall be (applause).

Dr. Schliemann's Remarks.

Dr. Schliemann, who was very enthusiastically applauded on rising, next addressed the meeting. He said that in July, 1876, he solicited and obtained from the Greek Government permission to excavate at Mycenæ, because, by a certain passage in Pausanias, which he considered to have long been misunderstood, he hoped to find the tombs which had been shown to that traveller as those of Agamemnon and his companions. On his way to Mycenæ he had to pass by Tiryns, and he could not resist the temptation to stop a week to sound the ground of that ancient stronghold. The surface of the soil on the upper plateau appeared to be very uneven, owing to a number of house walls, apparently composed of lime and bricks, which peeped out all over the surface and formed hard and compact masses, so that he could not cut them, even with an ordinary pickaxe. He then thought most decidedly that those walls were late Byzantine, and that they belonged to a villa of the eleventh or twelfth century of our era. He was strengthened in that belief by the floor of lime and concrete, now covered up with pebbles to the depth of from 3 ft. to 5 ft., between the walls, as well as by some potsherds of a distinct Byzantine character found in the place where, two years ago, had been found what were believed to be the fragments of the walls of a Byzantine church, and fifty or sixty Byzantine tombs. His hearers would generously pardon him as a layman in architecture for the mistake made by him, when they considered that all travellers, even the greatest luminaries in architecture, who had previously visited Tiryns, had fallen into the same error. If it had been otherwise, the prehistoric palace of Tiryns would have been excavated years ago, and would not have been left to be discovered by himself and his collaborator, Dr. Dörpfeld. The architecture of the ancient Greek house had hitherto been a great mystery to them all. They could not boast of knowing the plan of a single dwelling-house, and therefore it was natural that their discovery of a vast palace of remote age should be received with incredulity. It was not surprising that Dr. Dörpfeld should be mistrusted, and that it should be here believed that he had mistaken a Late Byzantine villa for the vast palace of Agamemnon. Such a suspicion could not have been put forward in Germany, because there the character of the man and his achievements were too well known. He was a leading architect, and was entrusted with the charge of the German Emperor's excavations at Olympia. It was not surprising that the greatest men of science went out to Tiryns to discover the truth. But to such investigators he would say that it was necessary not only to look at his book, but to study it, and take it with them and to test the remains by the plans figured in it, and which the late Mr. James Fergusson had called masterpieces of architectural skill. Probably some of his critics had never read his book on Tiryns, and perhaps had not even seen it before they went out. Without having the plans before him, it was impossible for the visitor to the remains at the present moment to clearly understand what he would see, because the floors had, by order of the Greek Archaeological Society, been heaped up with earth, in order to preserve them from injury by exposure, and, therefore nothing could now be seen of the work; but with the plans in hand the visitor could easily have ascertained all he wanted to know by digging a little, or even by removing some of the covering earth with his foot. That was the reason why they made the enormous blunder of mistaking the walls of a prehistoric for those of a comparatively modern Byzantine structure of lime and brickwork. Walls which appeared to some of his critics to be of lime and brickwork were really composed of quarried stones pointed with clay mortar. The quarried stones had been calcined by the burning of the beams and pillars of wood by which the space within the walls was divided, and the same act of combustion, acting on the clay joints of the walls, had produced all the appearance of very well-burnt brick walls. The traveller now saw, or thought he saw, brick everywhere, particularly in the glare of an Oriental sun. How easy it was to see in walls what there was not, and to make mistakes of more than two thousand years in stating the antiquity of such remains. [There was some apparently ironical applause at this point.] Mr. Stillman, according to his letters in the *Times*

of April 24th and 29th, went to Tiryns accompanied by his (Dr. Schliemann's) much-honoured friend, Mr. Penrose, with an eminent Oxford professor, and two distinguished members of the American School at Athens; they arrived at the conclusion that the walls were Celtic, and belonged to the third century B.C., and that the tombs must have been of the time of King Pyrrhus, 285 B.C. But was it not an historical fact that the Celts never reached the Peloponnese, and that the walls which his critics believed to have been built before Christ were not yet ten years old? They were misled by the very shabby look of the buildings, and what they thought could only have been built by the Celtic barbarians were really the foundations of prehistoric buildings which had always been underground. He said those walls were not ten years old, because, as could easily be seen, the Archaeological Society of Athens, in reconstructing them, had taken some of the materials brought up by his excavations, and used them, belonging to classical times as they undoubtedly did, almost intact. He thought it almost superfluous to reply to the objection raised that walls of quarry-stones bonded with clay mortar were unworthy of the Heroic age, and that they were the work of the barbarous builders of late Byzantine times, because it could be easily proved that in prehistoric times the lower parts of all house-walls were of quarried stones and clay, and the upper part of sun-dried bricks. He had found them in the remains of all the five successive cities of Troy, in Samos in Cephalonia, in all the treasures of Mycenæ, in the thalamos of Orchomenos, in walls on the Acropolis at Athens, and last, not least, in a prehistoric city of the Island of Thera, where they were found buried in three layers with volcanic stone and ashes more than 2,000 years older than the Byzantine Empire of 395 years after Christ. It was a stubborn fact that an ancient ruin might be more ancient, but could not possibly be less ancient, than what they found upon it. Now, they found on the walls of the palace at Tiryns a thick layer of lime, polished and smooth, and covered with decorative patterns accordant in character with the most ancient that had ever been found, and most important of all, the thalamos ceiling. Such remains had been found by M. Renan in Syria. He himself had found them at Mycenæ, and they could be seen at Thera and Therasia. Generally speaking, the objects found were in shape, in fabric, and manufacture like those found at Mycenæ, except the terra-cotta idols, the arrowheads, and the knives of obsidian, which for rudeness could only be compared to those found in his excavation of the great tomb of Marathon, which had been thought to be the tomb of the 192 Athenians who fell at Marathon, but which was probably nearly 300 years older than the battle of Marathon. Dr. Schliemann went on to say that he hoped that other scholars, after having read his book on Tiryns, would go with it to the site of his discoveries and examine the remains on the spot by the light of the plans which he had given. His collaborator, Dr. Dörpfeld, and himself would willingly leave it to the gentlemen of that illustrious society to say whether the result of their hard work at Tiryns deserved to be called "one of the most extraordinary hallucinations of unscientific enthusiasts which literature can boast of," a title which the *Times* correspondent, Mr. Stillman, very liberally bestowed upon it. He asked whether they deserved the censure of Mr. Stillman, a man who never in his life made an excavation, and probably had never witnessed one? In his letter to the *Times* Dr. Dörpfeld had proposed that Mr. Stillman should accompany him to Mycenæ and Tiryns in order that he might have the remains explained to him, but Mr. Stillman had chosen to leave that honorable proposal unnoticed. In conclusion, Dr. Schliemann said,—"I assure you that the terrible outbreaks of scorn and contempt in this country have not in the least daunted or discouraged us in our disinterested labour. Indeed, we have just now planned an excavation on a vast scale on an island which has hitherto been virgin soil to the archaeologist, and which every student must desire to be explored, and by none will it be desired more than by the great Hellenic Society, whose appreciation will be a great encouragement to us in the new campaign (applause)."

Dr. Dörpfeld's Remarks.

Dr. Dörpfeld having made a few prefatory observations in German, Professor Newton read

the following translation of Dr. Dörpfeld's detailed reply:—

I have accepted with great pleasure the invitation to give you my opinion, as an architect, on the results of the excavations at Tiryns and Mycenæ. Having had the good fortune to assist Dr. Schliemann in his excavations of recent years, I am in a position to give you every information that may be desired on the architecture of the buildings at Troy, Mycenæ, Tiryns, and Orchomenos. Whoever of this honoured company may have any doubts regarding the architecture or the age of the edifices brought to light in those places, will, I hope, bring them forward.

Some time ago doubts were expressed in the *Times* regarding the age of the buildings at Tiryns and Mycenæ. The correspondent of that newspaper at Athens, Mr. Stillman, has maintained that the buildings at Tiryns, and the tombs of Mycenæ, which are designated as Heroic, were constructed in the Macedonian time by a Celtic tribe. In a second article he, however, corrected himself, and declared the Palace of Tiryns to be Byzantine. I have no fear of any scholar approving the peculiar assertions of Mr. Stillman; however, it is but natural that many a man should again have put to himself the question, Is it, then, really certain that the Palace of Tiryns and the Tombs of Mycenæ date from the Heroic age? We would also propose to ourselves this question once more on this occasion, and I will endeavour to give you an answer to it from an architect's point of view. I will first propound another question. How were the Homeric Royal Palaces constructed, and what would be the appearance of walls which we might with confidence declare to have belonged to such palaces? It is a universal opinion that nearly all the buildings of the Classical age were made of squared (or rectangular) stones; and consequently many persons believed that the ancient Royal Greek palace consisted of rectangular work, and hitherto if walls of a different construction were excavated, they were generally considered not to be Greek. If they were built with lime mortar, they were held to be Roman or Byzantine; but, if of irregular quarry stones, bonded with clay, they were declared to be barbarian or modern, and people did not hesitate to destroy them; but this opinion, in consequence of which we have hardly any plans of a Greek dwelling-house, is altogether erroneous. Not only have we many occasional references in ancient historians, but our principal authority on antique architecture, Vitruvius, so expressly states the contrary, that it excites wonder how such an erroneous opinion could ever have originated. Vitruvius describes the different kinds of masonry, and he praises, above all, the walls of sun-dried bricks, whilst walls of quarry stones, bonded with mortar, lose every year in value, as they last at most only eighty years. Walls of unbaked bricks always maintain their value, "Quanti fuerint olim facti tanti esse semper estimantur." Therefore, not only public buildings and private dwelling-houses, but also royal palaces, were built of unbaked bricks. Of the latter class, he mentions as examples the Royal Palace of the Attalidae in Trolles; the Palace of Croesus at Sardis; and, lastly, the palace of the powerful king Mausolus of Halicarnassus. He concludes by saying:—

"Cum ergo tam magna potentia reges non contempnerint laterum parietum structuras, quibus et ventis et pluvie sæpius lictum fuerat non modo cementis aut quadrato saxo sed etiam marmore habere, non puto oportere improbari que sunt e latericis structura facta ædificia."

The buildings discovered agree entirely with this description of Vitruvius. In many places in Greece and Asia Minor, city walls, the temples, and dwelling-houses of sun-dried bricks have been found. I will here only specify Eleusis, Olympia, Athens, Tiryns, Mycenæ, and Troy. Every where the walls of unbaked bricks consist only in their upper parts of that material, but in the lower parts they are composed of irregular stones, with or without clay mortar, and they are on both sides wainscotted with clay or lime plaster, which is often covered with painting. Their angles are provided with regular cut squared stones, or with timber beams. Now, if we consider that the same style of architecture occurs in a great many of the most ancient edifices of Mesopotamia and Egypt, there can hardly be a doubt that the Greeks learned it from the people of those countries, and that in Greece, even from the remotest ages down to the Roman conquest,

the buildings were principally constructed of quarry stones, bonded with clay mortar, and of clay bricks. Of regular square blocks only a small number of buildings have at any time been erected, and these especially after the Persian War. He who in the teeth of these facts still maintains the opinion that walls of quarry stone, bonded with clay mortar, or of clay bricks, cannot date from the Classical or the Heroic age, shows that he has bestowed but little study on the art of building among the Greeks and Romans. To our first question, therefore, "What would be the appearance of walls which we might with confidence declare to have belonged to the Homeric royal palaces?" we must give the answer that walls of irregular quarry stones and clay, or of unbaked bricks, could very well belong to an edifice of the Heroic age. We might even go so far as to say that the walls of a Heroic palace can hardly have been constructed in any other fashion. But, as in Oriental countries, from the remotest ages to the present time, walls have been made in the same simple way, it is clear that it cannot at once be discovered from a wall of quarry stones and clay from what period it dates. If in the course of our excavations we come upon such a wall, we cannot at once say whether it dates from Heroic, or Classical, or Mediæval, or Modern times. We possess, however, several indisputable means of determining the age of such walls. (1) The later a wall is, the greater is the probability that, besides the simple quarry-stones, there will occur other materials (fragments of Classical buildings, pieces of baked bricks, and especially clay tiles). If such products of Classical or later times are found in the wall, it is certain that the wall cannot date from the Heroic age. (2) If a wall is wainscoted with lime, and covered with paintings, the determination of its age can present no great difficulties. As a wall cannot possibly be later than the plaster with which it is covered, a wall which is decorated with paintings of the Heroic age must date at least from that time. (3) The antæ of the walls, the free-standing columns, and the door sills, must in the case of clay walls be made of more substantial materials (such as stone blocks or wood). Since it is well known how stone blocks were wrought in Classical times, and how they were wrought in Heroic times, we can, from the workmanship of the parastades, of the column bases, and the door sills, determine the age of the walls. (4) It is self-evident that the individual finds of potsherds, bronzes, &c., which are discovered above, near to, or below a wall can be brought forward in evidence for the determination of its age; but I, as an architect, will not take this point into consideration. Let us now apply these propositions to the case of Tyrians. (1) All the walls of Tyrians which are indicated on their lower parts, from the rock up to their present height, of quarry stones bonded with clay; in their upper parts, partly of the same materials and partly of unbaked clay bricks. I myself have ascertained during my four months' residence at Tyrians, and other architects have confirmed my impression, that the walls contain no trace of other materials (such as fragments of Classical buildings, pieces of baked bricks, or tiles). At first sight one is apt to believe (as has happened to many travellers, including Mr. Penrose and Mr. Stillman) that some of the walls are built with lime mortar, but any one who has bestowed on these walls a close examination will recognise that originally they consisted of quarry stones bonded with clay, and that the conflagration by which the whole palace was destroyed altered some parts of the walls. The quarried limestones were calcined by the fire and slackened by the rain, and so, in conjunction with the red baked clay, they were transformed into a solid mass. Walls which contain other material besides quarry stones and clay occur only in the southern part of the Acropolis of Tyrians, and belong partly to the foundations of a Byzantine Church, partly to Byzantine tombs. They are accurately indicated on the plan, and one recognises at once that they have no connexion whatever with the walls of the Palace. Inasmuch, therefore, as these do not contain any later materials, they can very well belong to the Heroic age. (2) In the apartments of the Palace many fragments of wall-plaster, with paintings on them, were found. For the most part these fragments had fallen from the walls and were lying on the floor. Some of them, however, are still adhering to

the walls. The ornaments represented on the fragments agree perfectly with those which we find on the stone reliefs of the dome-shaped tombs at Mycenæ and the famous ceiling of the Thalamos in the dome-shaped tomb at Orchomenos. But, as nobody has ever doubted the great antiquity of the dome-shaped tombs, the wall paintings of Tyrians, and consequently, also, the walls themselves, must date at any rate from the pre-historic age. (3) With regard to the working of the square blocks of the antæ and the door-sills in Tyrians, it was carried out with a stone saw, the simple pickaxe, and the cylindrical borer; that is to say, precisely with those instruments the application of which is so characteristic of the dome-shaped tombs and the Lions' Gate at Mycenæ. The pick, with several separated teeth, which was always employed for the building stones of Classical times, was not used for the squared blocks in Tyrians. We cannot find fault with the *Times* correspondent for being unacquainted with these details; but, as he has, nevertheless, written on this subject, he has had the great misfortune to adduce the best proof of the great antiquity of the walls of Tyrians and Mycenæ as an evidence of their Celtic origin. Mr. Stillman found in Tyrians and Mycenæ stones bearing distinct traces of the application of the stone saw, and thereupon having boldly, and without any proof, assumed that the stone saw only occurs in later times, he, with the help of this argument, comes to the conclusion that the buildings at Mycenæ and Tyrians must date from a late period. The boldness of such a proceeding is, indeed, to be wondered at. If Mr. Stillman had bestowed a closer examination on the well-known buildings of the Heroic age (e.g., the Lions' Gate and the dome-shaped sepulchres of Mycenæ, and the treasury of Minyas at Orchomenos), it could not have escaped him that the huge stone blocks of these buildings have nearly all been worked with the stone saw, many of them with the tubular drill. And these instruments he pretends to be a later invention. I am at any time ready to accompany Mr. Stillman and anybody else to Tyrians and Mycenæ, and to convince them there on the spot of the application of these instruments. Therefore, the material of the palace walls of Tyrians, the existence of the most archaic paintings on them, and the manner of the working of both antæ and doorsills,—all these items are so many proofs for the highest antiquity of the Palace of Tyrians. To the same age belong also the house walls before and behind the tomb-terrace at Mycenæ, for here have been preserved the same antæ and thresholds, and near them have been found fragments of similar wall-paintings, but the small cross walls between the tomb-terrace and Cyclopean outer walls belong to a later period, which I do not venture to determine. Besides these reasons, we can still furnish further the evidence for the remote antiquity of the Palace of Tyrians: (1) It cannot escape any one who examines the plan of Tyrians attentively, that there exists a narrow connexion between the outer Acropolis wall and the wall of the palace. The angles of the Acropolis wall correspond for the most part exactly to the walls of the palace. This connexion distinctly proves that (apart from some small later alterations) the palace has in its present shape been erected contemporaneously with the outer Acropolis wall. Nobody has ever doubted the high antiquity of the huge Cyclopean outer walls, and consequently the palace walls also belong to the same remote age. For the rest the masonry of the outer Cyclopean walls and the walls of the Palace are perfectly identical; both consist of almost unwrought limestones bonded with clay-mortar. The only difference is that in the outer walls the stones are of larger dimensions, because, as walls of defence, they had to give greater resistance to the assailants. (2) I can still adduce for the high antiquity of the Palace another evidence, which has hitherto not been sufficiently noticed. In the vestibule of the great men's hall we found on the left wall a frieze about 2 ft. high, consisting of alabaster, which is inlaid with small pieces of blue Egyptian glass (*chavoc*). I formerly believed on technical grounds that this frieze was not *in situ*; that it had originally stood at another place of the palace, and that it had later on been removed to the vestibule as ornament of the wall; what led me more than anything else to believe this was the circum-

stance that the frieze does not stand close to the wall, but that it is separated from its quarry-stone masonry by a layer of earth as thick as the hand. But having now, in company with Dr. Schliemann, minutely examined the Treasury of Orchomenos, and having found that the thalamos wall, which consists of quarry stones bonded with clay, is covered with perfectly identical relief slabs, I have to give up my former opinion, and I believe now for certain that the frieze of alabaster and kyanos is still standing in its original place in the vestibule of the Tyrrhian palace. The relief slabs in Tyrians and Orchomenos not only consist of a very similar material and not only show kindred ornaments (spirals and rosettes), but both have also the circumstance in common that they are separated by a thick layer of earth from the quarry stone masonry behind them, and that they have an identical connexion with the squared antæ blocks. The existence of the alabaster frieze in the palace of Tyrians permits us to draw two important conclusions. (1) Similar friezes of alabaster have been found on the walls of most ancient palaces in Mesopotamia; our Tyrrhian palace, therefore, resembles them, and this is an additional evidence of its high antiquity. (2) When formerly somebody wished to adduce a proof that the Homeric poems do not represent the reality, but that they are the offspring of a poet's imagination, the palace of Alcinoos was pointed out as imaginatively described by Homer. According to Homer the walls of this palace were of bronze, the doors of silver; and all along on the wall was a frieze of kyanos, namely, of blue Egyptian glass. Now, it is known that traces of former metal covering have been found in the dome-shaped tombs; and if we also find in the royal palace of Tyrians a frieze of kyanos along the wall, can we then doubt that Homer describes only such royal palaces as really existed, and that Tyrians is such a palace? These are the most important proofs which I, as an architect, can lay before you to prove that the walls discovered at Tyrians are the remains of a pre-historic palace. Finally, there is still another proof, which, however, does not belong exclusively to the domain of the architect, for the philologist has a share in it; I mean the evidence that the plan of Tyrians has a striking resemblance to the plan of the king's house, such as it is depicted to us by Homer. I will not enter here on this evidence, for all I have to say in this respect is stated explicitly in the book "Tyrians." Permit me only a twofold observation. In the first place, Homer does not give a detailed description of the palaces of his heroes, but he makes occasional references to them; but the different references do not suffice for a trustworthy reconstruction of the Homeric palace, as is evident from the fact that the many plans which were formerly made thereof all differ essentially from each other. It is, therefore, a daring enterprise to prove that the Palace of Tyrians does not agree with the royal house of Homer, for this latter is in many points not an ascertained fact. In the second place, Homer speaks of the dwelling-houses of Ulysses, of Alcinoos, of Menelaus; but he is silent on the palace of Tyrians. Now it may be taken for granted that in the main all heroic dwelling-houses agreed, but there are some differences of detail. Thus, for instance, the description of the murder of the suitors cannot be followed out in its circumstances without encountering some small difficulties. But in my opinion there do not exist any essential difficulties; for I think the agreement of the plan of Tyrians with the Homeric dwelling-house is beyond all doubt. You will agree with me that the technical evidence adduced by me are perfectly overwhelming, and that they repose on sure foundations. You will, I trust, also share my opinion that he who nevertheless still maintains that the Palace of Tyrians dates from Macedonian or even from Byzantine times, is bound to bring forward real counterproofs, and that it is not sufficient to write articles which are more personal than matter of fact. We are at all times ready for a discussion on the real points at issue; we much desire that every one may frankly express his doubts, for only in this way can we come nearer to the truth and advance science.

Mr. Stillman's Remarks.

The question, said Mr. Stillman in his paper (which was read for him by Mr. Pelham), which is involved, is, fortunately, one that does

not require or admit of much investigation, but must be answered by experience in the examination of ruins which can be, with tolerable certainty, attributed to the epoch in which Dr. Schliemann has placed his pre-historic palace. To be judged in any way, the ruins must be examined with care as to technique, and must be examined with a knowledge of wall-structure, especially of the pre-historic periods of the architecture of Greece and the islands. He made no pretension to be an expert in Greek architecture, but he had been able to substantiate the probable accuracy of traditions which attributed the ruins to a civilisation which extended over the southern part of Italy, and which was known as Pelasgic or Cyclopean. That of that class of remains Tiryns was an example, there was some proof; certainly it was of that early date when the art of working in stone was in its very rudest phase. So far as he could judge, that class of remains included the ruins of Cephalonia, Cythera, Crete, the Troad, and almost all the work at Mycenae and the cities of Alatri, Arpino, and others in Italy. Those remains showed no stones cut with edge tools, chisels, &c. In all that work there was no evidence of shaping other than by grinding one stone on another. In those examples which he had been able to examine with any degree of precision, there was nothing to show whether the drill used was a hard stone, such as that used for cutting gems. But at Tiryns he found stones, cut with a chisel apparently rather modern, and of excellent metallic make, and laid in mortar, indications pointing to a comparatively modern date, say 500 B.C. There were found bases of columns, cut in a rude and slovenly style, and, as Tiryns was overthrown not far from that time, an undisturbed ruin like that would show something of that kind. The work of Dr. Schliemann was of a solid, deliberate, and painstaking character; but, while admitting that, he must point out that these walls were entirely unlike any pre-historic work he had seen, and he could see no other alternative than to come down to the hypothesis of a relapse into barbarism after the fall of some antecedent period of Greek civilisation. But there was nothing to indicate any occupation of Tiryns between Pausanias and the Argives. There was no indication of an occupation subsequent to the period to which the walls which Dr. Schliemann attributed to a prehistoric palace belonged, but there was the laying of parts of the walls on debris, which showed clearly that this was at least a second construction. Nor was there, as Dr. Schliemann held, a difference of character in different parts of the ruins, but only a difference of the more or less use made of stone found *in situ* and employed in the reconstruction. But there was distinct evidence of Byzantine occupation, and no evidence of anything between that and the destruction of the city. The better as well as the poorer parts of the walls contained the same evidences; holes out with the drill, mortar and bricks. The only conclusion he could come to was that a Byzantine occupation took place after the destruction of Tiryns by the Argives. It must not be forgotten that a previous explorer had tried that site and had abandoned the work from its evidently non-antique character. Another early excavation of Dr. Schliemann was also abandoned for the same reason. He believed the hypothesis of a re-occupation of Tiryns in the Byzantine period would explain every detail, and that insuperable difficulties offered themselves to any other attribution.

Professor Middleton's Remarks.

Professor J. H. Middleton said that among the reasons which had been adduced why the remains found at Tiryns by Dr. Schliemann were not to be regarded as being of the extreme antiquity ascribed to them was, firstly, that the stones of the walls were small, and secondly, that they showed marks of various tools not generally believed to have been in use at the period assigned by Dr. Schliemann as the date of the wall. With regard to the first objection, the walls in question were themselves small, and it was, therefore, not possible to use very large stones in their construction. With regard to the second objection, all the tools which had been used seemed to be tools which were used in Egypt at a very early period. Such drills and saws as those which had been referred to had certainly been used in Egypt, in conjunction, probably, with sapphire dust or emery

powder. In some of the Egyptian remains it could be seen with what rapidly similar tools had cut into the stone; the distance of cut at each stroke of the saw, and the quickness of the spiral formed by the drill, could be noted, and it was tolerably clear that such work could not have been done without the use of diamond-studded drills or without the aid of bort or corundum-powder. The use of drills of this kind for hard stone was of extreme antiquity. Mr. Flinders Petrie had shown that they were used in Egypt as early as the Sixth Dynasty. Another objection urged against the antiquity of the walls at Tiryns was that mortar was used. Dr. Dörpfeld had shown that that was not so, not that it would prove very much if it were so, for in the earliest stone buildings of Rome mortar was used for the joints, as, for example, in the Tullianum or Mamertine prison. The character of the painted wall-decorations, again, was decidedly in favour of the high antiquity ascribed to the remains by Dr. Schliemann. [In regard to this latter point, Professor Middleton particularly referred to the drawing (exhibited on the walls) of the scroll ornament, of which we gave a representation in connexion with our notice of the "Tiryns" volume in the *Builder* for November 14, 1885 (page 671), and which is certainly of a very archaic character.]

Dr. Schliemann in Reply.

Mr. Pelham and Mr. Lansdell having made a few remarks, a hearty vote of thanks was, on the motion of the chairman, accorded to the readers of papers, and Dr. Schliemann was called upon first to reply. He said that when, ten years ago, he discovered the walls at Tiryns, his first conclusion was that they were Byzantine, but subsequently he went down to the rock and found that the walls were pre-historic. He found also drains, as at Mycenae, which were Cyclopean, and he found a perfect system of drains going from the brick bath-room. There is a slab there still, which weighed 23,000 kilogrammes (23 tons).

Dr. Dörpfeld in Reply.

Dr. Dörpfeld was next invited to reply. Speaking in German, he said that there were no kiln-burnt tiles whatever in the remains of the palace, and that any such tiles that had been found were in the walls of what was known as the Byzantine Church at the side, which, though near the Palace, had not been regarded by Dr. Schliemann or himself as forming any part of it. In regard to the use of the saw and the cylindrical borer, though none of the large stones in the fortifications of Tiryns showed the use of those tools, yet in the Lion Gate at Mycenae, in the Treasury House at Orchomenos, and at Tiryns in the larger stones, the use of similar tools was shown, namely, of a saw employed probably with some material, such as corundum, and a cylindrical drill.

Mr. Penrose in Reply.

Mr. Penrose, on being invited to reply, said very few words would be necessary. He regretted the absence of Mr. Stillman, whose intelligent study of the question would have enabled him to throw great light on the matter, and he agreed that further discussion should be, as Dr. Schliemann and Dr. Dörpfeld had suggested, as far as possible carried out on the spot, and he hoped this would be done. He had looked at the walls, when there, with the greatest interest, as an architect, but he could not agree with Drs. Schliemann and Dörpfeld on certain points. He was surprised to hear that kiln-burnt bricks were only found in the church. His memory had served him ill if there were not such bricks in other parts. Dr. Schliemann attributed the burned bricks to a conflagration, but this contention he (Mr. Penrose) had already met with the opinion of an experienced brickmaker. He would like to ask Dr. Dörpfeld on what authority he said that Vitruvius spoke of sun-dried bricks? He understood the reference of Vitruvius to be to bricks as used by the Romans. He apprehended that the term "burnt bricks" would be used in the sense that Vitruvius employed the term *lateres*. They could not, in that company, expect to get to the bottom of the question, but the discussion had served a useful purpose, and one or two instructive points might be extracted. Whatever might be the differences of opinion with regard to the points at issue, they must all be gratified at an enterprise which, whatever the issue of

the present discussion, must always reflect the greatest credit upon Dr. Schliemann and upon Dr. Dörpfeld, his coadjutor.

Mr. Karl Blind, having said a few words in reference to the late Mr. Ferguson's endorsement of Dr. Schliemann's estimate of the antiquity of the remains found at Tiryns,

Prof. C. T. Newton, C.B., moved a vote of thanks to the chairman, and the proceedings terminated.

KINGSBURY CHURCH.

SITUATED in the heart of a charming bit of natural scenery is the small but interesting church of Kingsbury, dedicated to St. Andrew. It is nearly a mile and a quarter distant from the Neasdon Station, on the Metropolitan Railway, and about four miles east of Harrow-on-the-Hill. The walk to the church from the station is through a pleasant winding lane, crossing the Brent by a temporary wooden bridge, which has done duty since the old one was destroyed by the flooding of the river a few years since.

A neat little school-house, by the river's edge, has also been recently erected, and would really be effective did not the bell-cote, &c., display too prominently the fussy desire of its designer to exhibit his technical skill in timber-framing.

Passing the schools and ascending the hill beyond the river, until some farm-buildings are reached; then turning to the right, and passing through a lovely lane, skirted by spreading elms, the ancient fane (a glimpse of the small spire being seen between the trees) is at last found, almost hidden away among the abounding foliage.

Climbing over a stile, you find yourself in a churchyard, sylvan in the highest degree; trees and shrubs, shrubs and trees, confront you on all sides. Many of the tombs are secluded and have to be sought out. William, third Earl of Mansfield, who died in 1840, lies here; also the Earl of Orford.

"Chingeburie," as it is written in the Domesday Survey, or "Kyngeabyrig," as it appears in a deed of gift of Edward the Confessor, has no doubt an unwritten history far more remote than that of the invasion of the Norman conquerors. Dr. Stukeley seems very certain that Kingsbury was a Roman station, and that Julius Caesar formed a camp or prætorium on the spot after crossing the Thames.

Before the Norman Survey there appear to have been two manors, Edgware and Kingsbury, the latter only being mentioned in Domesday.

This ancient record states that one Albold held a manor in Chingeburie of Ernulf de Heding, containing seven and a half hides of land. A mill is also mentioned, the rent of which was three shillings; also a meadow and wood for 1,000 hogs, the value of which altogether amounted to 4*l.* In Edward's reign it was valued at 6*l.*

Edward the Confessor presented Kingsbury by royal charter to the Abbey of Westminster. It then contained two hides and a half of land.

For 300 years there appear to be few records, and little is known of Kingsbury until the reign of Edward II., when, in 1317, the manor became the property of one Baldwin Poleyn. From Poleyn it passed in 1329 to Walter de Galinge, who left three daughters co-heirs.

Thomas, Earl of Lancaster, became Lord of the Manors of Edgware and Kingsbury by marriage with the daughter and heir of Henry de Lacy, Earl of Lincoln; and Lestrange, who married his widow, died in 1335 seised of the manor of Edgware and hamlet of Kingsbury. Thomas Chichele with others purchased the manor in 1439 as trustees for All Souls' College, Oxford.

At the Dissolution, Henry VIII. granted the manor and rectory to the Dean and Chapter of St. Paul's. In 1547 the valuation stood at 16*l.* 16*s.* 8*d.*, and had increased enormously during the next hundred years, when, in 1650, it was valued at 170*l.*

By the terms of a lease of the manor and rectory granted to Guthlac Overton by the Priory of St. John of Jerusalem in 1525, for sixty years, it was covenanted that the lessee "is to find a fit chaplain for the cure of the church, and to keep the chancel in repair."

From the appropriation of the rectory the church became a donative or curacy. Kingsbury is one of the few churches not included in the taxation of Pope Nicholas, 1291.

The parish register does not go back further than the year 1733.

The date of the foundation of the church is unknown. The few remains of architectural features, namely, the windows as we now see them, were probably inserted at a time

convenient approach to the interior of the church, which it is now wanting.

The plan of the church is a parallelogram, 58 ft. by 18 ft. 3 in. internal measurement, no break or division separating the nave from the chancel, neither are there any aisles. The

vions building standing here. The mortar does not appear to be so tenacious as may be found in many remains, especially of the Saxon period, less lime having been used; but, however this may be, in respect of the work remaining unexposed, the walls are undoubtedly sound and substantial. The exposed north-east angle shows quoins of squared freestone.

The walls are pierced by eight windows, three being on the north and south sides respectively, and one is placed at each end. There is also a small window-opening at the north-west corner.

The tracery is of the Perpendicular era in its early days, much decayed and fallen away. No two windows are alike in detail, although uniform in size and effect. The roof, which is high-pitched, is covered with tiles. Internally the timbers are at present hidden by a plaster coved ceiling, flat in the centre, but no doubt it was originally open.

Rising from the roof, at the west end, is the belfry, containing three bells. It is of timber construction, in the village carpenter style, but by no means bad.

The largest bell is inscribed,—

"Lever, Jackson. Churchwardens.
Made by, Sm. Newton, 1708."

The second has the following,—

"God save King James F + H + B anno Domini 1604."

And the oldest bell has,—

"+ Petrus : de : Westmo : me : fecit."

Whether the latter inscription refers to the Abbey of St. Peter, Westminster, with which it has been shown this church was connected, or relates solely to the founder's name, is matter for conjecture.

The belfry is reached by creeping through a trap-door in the ceiling situated over a gallery, the latter obstructing the interior. The less said about this piece of joinery the better.

The gallery has the merit, however, of hiding to some extent the thick posts that spring from the floor to the roof to support the belfry, which would otherwise have a very obtrusive appearance.

The window openings have on the interior a modern reeded architrave with corner blocks, quite "Soanean."

The glazing of some of the windows is in quarrels with glaring pot metals; others are filled in with stained paper, the whole unworthy the place.

The church possesses three monumental brasses. That to the memory of John Shephard,



pray for the Soules of John Shephard Anne & Maude
his Wyfe & Maude the 20 day of April
the yere of our lord mccc lxxvii



Brasses, Kingsbury Church.

who died in 1520, his two wives, viz., Anne, with seven sons and three daughters, and Maude, with five sons and three daughters, is on the north wall at the eastern end. Near to it is a smaller brass, date 1607, bearing the following inscription:—

"Swan late wyfe of Thomas Gawen and
Daughter of Thomas Sevdamore by Francis Borne
Lyes buried here, by death's vnpartial hand.
Reft from her dearest friends, they left to mourne
Their losse of her who was through all her life
A loyal daughter and a loving wile.
She died A Dai. 1607."

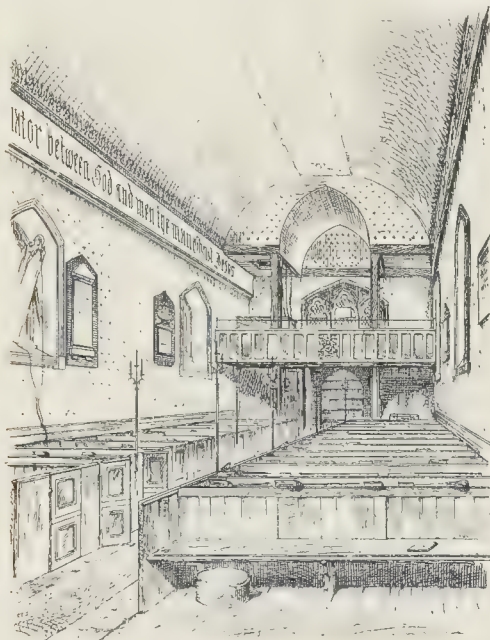


Kingsbury Church.—Exterior View.

when the property was made over to the trustees of All Souls' College, when the whole of the fabric may have gone through repair.

The porch, which stood on the south side, near the west end, until 1830, was of timber, and in an engraving of the church, published in 1807, where the porch is distinctly shown, it

vestry, situated at the south-east corner, is of no archaeological value whatever, being quite modern, and the walls built of common bricks. This is not so with the main walls of the church, as they are the most interesting feature of the building, and where examination permits (for the walls are coated with rough-cast, and it is



Kingsbury Church.—Interior View.

would appear to be contemporary with the windows; the sides are divided into four panels by mullions, the tracery being pierced with quatrefoils.

Why this porch was taken down it is hard to say, as it must have formed a suitable and

only at the exposed portions that the construction may be seen) they appear to be built with flints of large size, roughly squared on the face, mixed up and bonded irregularly with red Roman bricks or tiles, of the usual thickness, or, rather, thinness, giving evidence of a pre-

Attached to the south wall, opposite, is a similar incised brass, with the words:—

"Here lyeth the body of Thomas Seydamore gent. servant unto Queens Elizabeth & Ke James 47 yeares who had two wives Syssan and Francis and had leave by them 6 sonnes & 5 daughters and changed this life in the feare of God the 30 daye of September 1628 being of the age of lxxvii yeares."

There are eight marble tablets on the interior walls of the church; that on the north side, beginning at the east end, is "to the memory of William, third Earl of Mansfield, born March 7, 1777; died February 18, 1840; and Lady Cecilia Sarah Murray, fifth daughter, whose remains are deposited in a vault in this churchyard." The adjoining monument is to other members of Lord Mansfield's family. The next tablet is inscribed "Isabella Caroline, Lady Vernon, wife of fifth Lord Vernon, and eldest daughter of Cuthbert Ellison, Esq." The westernmost tablet, on the north, commemorates a sad event, which must have caused extended sorrow and sympathy at the time of its occurrence: "Sacred to the memory of Charles Radclyffe, aged 31 years; Alexander Henry, aged 10 years; William George, aged 17 years; and Edward, aged 15 years; four of the sons of Alexander Radclyffe Sidebottom, Esquire, who were drowned in the reservoir near this church on the 14th of August, 1835."

On the south side there is a tablet to Joseph Maile, "late of the New-road, St. Pancras," and his wife. Another to "John Tebbs, Esq., late of Jernyn-street, and eldest son of Sir Benjamin Tebbs, Knight." There is another tablet to the Tebbs family, and the last is to Mr. John Field, "of Oxford-street, Marylebone, and Kingsbury Green," and family.

The font, placed on the north side, is of no historic value. It is made of artificial stone or cement, and is of the ordinary octagonal panelled regulation pattern; not so, however, with the original and ancient one, which is placed in the grounds of a gentleman's residence in the neighbourhood. This font is simply a circular bowl, the upper portion being octagonal, well worn, and bearing evidence of its antiquity.

We subjoin sketches of the exterior and interior as at present existing, and of one of the Shepherd brass. The church is, we believe, to be "restored." How much this means we do not know, but we hope it will be treated with reserve, and as little touched as possible, —on the exterior, at all events.

THE SCULPTURED SLABS IN THE SOUTH AISLE OF THE CHOIR OF CHICHESTER CATHEDRAL.

In a paper recently read at a meeting of the British Archaeological Association by Mr. W. de Gray Birch, F.S.A., the author states:—The Rev. Prebendary Stephens, in his "Memorials of the South Saxon See and Cathedral Church of Chichester," 1876, p. 31, gives two photographs of these sculptures, very much reduced; but his account of them is unsatisfactory. He writes of the primæval see at Selsey:—"The present village is two miles distant from what was the old parish church, and the nave of it was, therefore, taken down a few years ago and rebuilt in the village, stone for stone, with a new chancel. The old forsaken chapel, however, is still used for burials and baptisms, and the extremely far older font may fairly be coeval with the removal of the see to Chichester, and, therefore, may have probably stood in the ancient cathedral of Selsey. Relics, treasures, and works of art were, no doubt, for the most part removed to Chichester when the bishop's throne was transplanted there. Among those we may, perhaps, venture to include the quaint, rude, yet forcible pieces of sculpture, representing 'The Raising of Lazarus,' of which an illustration is subjoined. They were discovered in 1829, behind the stalls of the choir in the present cathedral. Not improbably they had been concealed there to escape the soldiers of Waller, who, during the siege of Chichester in 1643, made havoc of the cathedral monuments with their pikes and pole-axes." This is all that Stephens states, and, insufficient as it is, it appears to have directed all subsequent ideas as to the origin of the sculptures under notice. Indeed the sculptures themselves have never received the attention they deserve at the hands of church antiquaries.

1. The first *tableau* only has a cresting of carved foliage, arranged in semicircular cusps

of a clearly twelfth-century style. The moulding or carved plinth running round the base of the font in St. Nicholas's Church, in the scene which illustrates the "Baptism of our Lord," by St. John the Baptist, has much detail in common with this cresting on the sculptured slab; and I am inclined to attribute them both to the middle, or at best the early part of the twelfth century. The Ven. Archdeacon Hannah, Vicar of Brighton, in his paper on this font, printed in the March *Journal* of the Association for this year, thinks that this font "cannot be far removed from the date of the Conquest"; but I fear he has slightly exceeded the furthest limit which I would venture to assign to it.

English sculpture at the time of the Conquest was for all intents and purposes Saxon, and Saxon feeling remained dominant for years afterwards, both in sculpture and drawing. Architectural constructions and details were the first to succumb to the Norman influences, and sculpture followed (no doubt) not long afterwards. But there is not the least Saxon feeling in the font. However, to return, after this parenthesis, I will proceed with the description of the first picture. On the left is a castellated structure, with round-headed arch or portal, or engaged shafts with foliated capitals; the valve-doors are thrown wide open, and show ornamental metal hinges. The first story of this castle-like edifice is enriched with an arcade of round-headed arches; over this is an overhanging story with battlemented masonry, topped with three conical towers striated to represent thatch or shingle, and finished with an ample knob. This peculiar style of finishing off the conical roofs of turrets with a knob is frequently seen on seals of the twelfth century, as, for example, those of Canterbury Cathedral, engraved in Dugdale's *Monasticon Anglicanum*, vol. i.; Battle Abbey; Leeds Priory, Kent; Chertsey Abbey, Surrey; and others well known to students of seals. It may be noticed also in the building behind the Virgin, on the painted wall of the crypt at Canterbury, which is of the twelfth century. Martha and Mary are at the gate, one standing, the other kneeling, with hands clasped and uplifted in supplication. Their sleeves and the flowing skirts of their dresses are not far removed from the Saxon style of vestments. We may compare the dress of St. Pega in the twelfth century Guthlac Roll, in the British Museum (Harley Collections, Y. 6), where she is about to enter into a boat.

The figure of our Lord, a man of colossal proportions, occupies the centre of the subject, with cruciformed nimbus, long hair, and curled beard, book in the left hand, and a flowing robe, reaching to the feet. The right hand is wanting, but the right hand of the Lord's figure on the second picture appears to belong to this one, and I have so placed it in my suggested arrangement. The position of this hand in the second picture is out of symmetry with the attitude of the body. Behind the Lord are four disciples, in two tiers of two each, standing on the peculiar hilly or hummocky ground, which is so characteristic of eleventh and twelfth century art. They form a balance to the two women on the left. These figures have the nimbus plain; the head of one is wanting, but the heads of the other three clearly indicate the excellent skill of the artist in rendering the various emotions of astonishment and grief. The hair is treated differently in every instance. From the depressed cavities of the eyes it has been suggested (I believe) that the eyes themselves were formed of glass or precious stones introduced into the sockets, and there is a slight evidence of this in one instance. The treatment of the eye by ancient sculptors has never been satisfactorily explained, and I am not a sculptor that I should essay to explain it. We see in the rudest sculptures—as, for example, the Easter Island idols under the portico of the British Museum, in the first statues of Greece, in the busts of the Roman period, and in Mediaeval and modern sculptors' work,—that, while for all other parts of the body, concavity is rendered by concavity, and convexity by convexity, yet the markedly convex eye is reproduced by a concave depression. Why this is so I am unable to say. This panel, just as the other, is not now composed of a single slab of stone; whether it was so originally I do not know, but on looking at the photographs, it is clear that

it consists of six horizontal courses. The fir runs along the arcade over the doorway, under the Lord's neck, and through the lower nimbus of the two lower disciples. The second can be seen running through the book held by our Saviour; the third, across the shoulder of the standing woman; the fourth, along the arm of the kneeling woman; the fifth line, at the end of the carved moulding of the right-hand column of the doorway. We may compare the way in which the round-headed arches of the external arcading on the north wall of the chancel of the Saxon chapel at Bradford-on-Avon have been carved on rectangular slabs of stone, regardless of the position of the joints.

Besides these six horizontal courses of ashlar work (if the term may be appropriately attributed to this system of building up a composite slab, which was afterwards covered with its intended relief by the sculptor), there are numerous vertical joints and fragmentary cracks which show themselves. Some of these have been badly put together, either at the time of the discovery behind the stalls of the choir in 1829, as related by Mr. Stephens in the preceding extract, or at a more remote period. There is no record, so far as I know, of these slabs at the date mentioned, nor of the condition of the back at the time when they were let into the wall which they now adorn. I venture to suggest that the drapery of the left arm of the standing figure of the Apostle on the left side of the second slab belongs to the right arm of our Lord in this first panel, and the hand of blessing, with the first two fingers extended, the last two closed, which stands now in the second slab, belongs to the right hand of our Lord in the first slab. The drapery of our Lord and the Apostles composing the two lowest courses in the first slab is wrongly united, and in some cases the original stone has been pared down by the mason who put up the slabs in their present state, and made up deficiencies with cement. The folds and plaits do not altogether coincide, and the advanced foot of our Lord, with the curled-up kind of ground below it, seems to belong more appropriately to the other or left leg in the second panel. If these pieces are taken out by an experienced mason, and the cement or mortar which has been used in bedding them into the wall carefully removed, the original lines of fracture will be revealed, and the disjointed pieces can be reinstated into their pristine and proper places, to the evident and manifest amelioration of the slab. A plate-glass front ought to be placed before this and the second slab to protect them from dust, weather, and dirty fingers. This could easily be effected in the same way as the Babylonian slabs have been treated in the British Museum.

II.—The second slab is of the same dimensions, and from the hand of the same artist, as the first. It also exhibits equally clearly the six horizontal courses of the neck of the Lord; the first joint runs along the neck of the Lord; the second, through the lower part of the book which he holds; the third, where the cut break in the dress of the Lord is seen; the fourth, just below the uppermost hands of the two gravediggers; the last, where the break in the dresses, on the right hand side, is seen. This slab represents "The Raising of Lazarus," and when complete, and correctly put together in the way suggested, it becomes perfectly intelligible. No doubt many MSS. at the British Museum in Oxford and Cambridge, and such works as treat of Early Christian art, would furnish examples to show that we have here a purely conventional picture in stone relief, designed after a manner perfectly intelligible, and requiring no strained or mystical explanation with which some have sought to invest it.

It has, indeed, been sadly disgraced by the misplacement of most of the pieces of the four lower courses, which has resulted in joining the head and upper trunk of Lazarus to the left arm and hand of a disciple; and by way of balance, I suppose, the lower part of the bandage-wrapped, mummy-like body of Lazarus has been surmounted with the head and neck of one of the three assistants who are helping to extricate him from the tomb. This incongruous medley has not been easily carried out, and the result is that two Lazaruses are made, and there are a hand and arm without visible junction to any other limb. Besides this, the confusion made with the dresses of all the figures is very considerable. I am told that some mystical

* Mr. J. E. Allen speaks of these slabs as of "perhaps Saxon date" in a recent paper on Norman sculpture read before the Society of Antiquaries of Scotland, p. 421.

The pr
than th
The
chur
tec

suggested; that the two
- (1), the rising Lazarus,
grave; (2), the unwrapped
to the waist, raising his arms in
oration of his Redeemer, repre-
a second stage in the action, and
by a hand and arm which have been
ded with no other motive than to signify the
wonder-working might of the Saviour, and to
give a practical turn to the biblical verse,
"Underneath are the everlastings arms,"
worthy of the artist who drew the pictures of
the Albrecht Paolter. We know, of course,
how often the Virgin bearing the Child in her
arms is depicted in the same picture with the
adult Christ; and it appeared no more in-
congruous to do this in the sixteenth than in
the tenth century. But that is a peculiar case,
and the Child had become, even at a far earlier
date than the tenth century, an almost in-
separable ideographic emblem of the Virgin.

If the pieces, however, can be loosened and
re-arranged in the order suggested by Mr.
Birch, then will the two Lazaruses rightly
become one again, and the disconnected hand
and arm re-unite with the head and body of
the attendant to which they belong. The
drapery of the skirts is here, as it was in the
former slab, unsatisfactorily joined together,
of the Lord especially; but it would require the
removal of the cement and mortar which have
been filled into the grooves, in a vain attempt
to hide the want of continuity in the folds and
lines, before the whole puzzle can be solved.

There can be no doubt that if the parts
which are manifestly wrong in position are
taken out, the whole can be re-arranged
without difficulty, and the result cannot fail to
satisfy every one who cares to compare the
present with the suggested arrangement of the
sculptures. Beautiful to the archaeologist as
these *alti-relievi* are even now, in their dis-
connected and, in so far, sadly marred
condition, they would unflinchingly become ten-
fold more beautiful and important in their new
arrangement; and those who now perceive the
misleading condition of these ancient
sculptures, may not only rejoice in seeing a
blemish removed, but in contemplating two
stone slabs sculptured by English hands with
elaborate representations of Christian antiquities
which may be sought for in vain in any other
ecclesiastical edifice in England.

Illustrations.

FAREHAM CHURCH, HANTS.

THE circumstances under which this
design has been made will be best
understood by the following report of
the architect, Mr. A. W. Blomfield, on the
existing church, the plan of which is appended
to the drawing, along with the plan of the new
church, incorporating a portion of the old:—

"November, 1885.
The parish church of Fareham, dedicated to SS. Peter
and Paul, consists of a huge square building forming the
nave or body, from the north-east corner of which extends
a long and narrow chancel.
The tower stands on the north side at the same angle,
and a vestry projects from the east side of the nave.
The records of the architectural history of the church
appear to be few and meagre.
All that now remains of the original structure is the
chancel, an interesting and characteristic relic well worthy
of careful preservation.
The tower, erected in 1745, although unattractive in
appearance, is solid and well built, and is not inconveniently
placed.
The nave or body of the church, put up about 1812-14,
has nothing whatever to recommend it except its great
size and the number of sittings (said to be 1,400), a large
proportion of which are placed in the enormous galleries
which surround three sides of the building.
Any attempt at mere alteration or improvement here
would be an absolute waste of money, and if anything is
done on the present site the entire demolition and rebuild-
ing of this part of the church must form an essential
feature of the completed plan.
There are several good reasons for rebuilding on the pre-
sent site rather than on a new one.
1. The associations surrounding the old church and the
old churchyard are worth preserving if possible.
2. The total necessary outlay to complete a satisfactory
church here would be considerably less than that required
to build an entirely new church elsewhere.
3. The work (as I shall presently show) may here be done
by instalments, so that a start may be made and an effective
enlargement and improvement may be carried out at a
moderate cost; while, on the other hand, if a new church
were built on a new site, the whole would have to be
finished before the congregation could be transferred from
the old to the new building, and a beginning could not well
be made until the greater part if not all the funds required
for completion were collected.
4. The most important part of the work could be done
without touching the present nave or interfering with the
services.

The only objection I know to rebuilding on the present
site is the interference with graves; but this would not be
as serious as might at first be supposed, and it is a thing
which has very often to be done.

I have prepared a sketch-plan (sent herewith) showing
in a general way the form which the new church ought to
take if such a scheme were adopted.

The tower would be retained, and the present chancel
would become the north side of a new chancel.
Although the church would not nominally hold so many
as at present owing to the absence of galleries, it would be
quite as large as it ought to be, and on special occasions a
considerable additional number might be accommodated
by the use of chairs without excessive crowding.

If some such plan as this were adopted, a beginning
might be made by the erection of a new chancel, with or
without the organ transept and vestry, according to the
available funds. This part of the work might (as I have
already said) be carried out without disturbing the body of
the church or stopping the services, and when complete
and opened out it would be a large addition and great im-
provement to the church. Some of the galleries might
then be removed and the nave might be refitted with new
open seats of such lengths as would suit the future nave
and aisles.

The reconstruction of this part of the church might thus
in case of need be indefinitely postponed without any
practical inconvenience.

The last work would be the raising of the tower and
casing it so as to bring it into harmony with the new
church. This, though not absolutely necessary, would
probably not long be left undone.

In carrying out a scheme of this kind every precaution
would, of course, be taken to secure respect for the remains
and memorials of the dead. The floor of the church would
be raised and concreted all over, and a proper scheme for
warming would be adopted.

Plans and estimates may be prepared for the whole
work, divided into as many sections as may be desired.

ARTHUR W. BLOMFIELD."

In regard to the new design Mr. Blomfield
adds the following comments:—"The drawings
have been made with a view of providing as
large an amount of accommodation as seems
compatible with the preservation of all portions
of the present building worthy or capable of
retention.

The simple Early English character of the
old chancel has suggested the adoption of that
style for the new nave, south aisle, chancel, and
organ-chamber.

The first north aisle is treated in the style of
the flowing Decorated Period, and the second
in that of the Perpendicular or latest develop-
ment of English Medieval architecture, which
has also been adopted for the Vestry.

This variety has been made partly because
these styles admit of flat roofs, which for many
reasons are desirable where I have indicated
them, and partly because the very large windows
which will be absolutely necessary to light this
part of the church properly are characteristic
of them.

The tower would be cased with flint and
stone, and the lower parts treated as very
simple Norman, the upper stages and spire
being Early English.

I think that in a work of this kind the
adoption of different styles in different parts is
not only admissible, but that it will add an
interest to the building.

The church thus treated will, in my opinion,
be effective and satisfactory, both externally
and internally.

I should propose to use flints or sea pebbles,
and Bath or Doulton stone outside, Bath stone
and Fareham brick inside. The roofs would
be of fir and covered with tiles.

I estimate the cost of the work at 10,000l.,
exclusive of the upper part of the tower and
spire."

ALL SAINTS' (R.C.) CHURCH, WARLEY.

This church is built upon a narrow piece of
land abutting upon the high road from
Brentwood to Great Warley, Essex. It is near
to the entrance to Warley Barracks, and is
intended mainly for the use of the Catholic
soldiers in garrison there.

The walls externally are faced with Kentish
rag stone, with hard Ancaster stone dressings.
Bath stone is used for the columns, arches,
vaulting, &c., inside. Gregory's wood-block
flooring is laid in the nave and aisles.

Messrs. Lathey Bros. carried out the work,
from the designs of the architect, Mr. F. W.
Tasker.

NEW RESIDENCE, S.J., FARM STREET.

We illustrate this week the original design
made by the architects for the new residence
of the Jesuit Fathers, at Farm-street, W.

The desire of the architects was to work up
to and embody the style of the church and the
beautiful side porch as far as possible, which
were already in existence, and to face the
building with stone, but with as little detail as

the elaborate existing work would admit of to
be consistent with it.

It was also proposed to make use of the
handsome side porch as the principal outer
entrance to the residence, as well as affording
private access to the church.

Subsequently, other plans were made and
realised, with a separate side porch or vesti-
bule, so curtailing the interior accommodation
on the ground-floor, as the site at disposal was
very limited indeed. These changes, together
with the necessity of meeting further special
requirements, have added considerably to the
height of the building, which has an elevation
in brick, very nearly as plain and as flat as it
could be designed. Messrs. Goldie, Child, &
Goldie are the architects.

HOLLOWAY COLLEGE.

We give two further views of this important
building, for description and remarks on which
see the *Builder* for June 26 and July 3. The
views now given, as well as those which we
published last week, are from photographs by
Mr. Vernon Heath.

CARMELITE MONASTERY, KENSINGTON.

This building, which is about to be erected,
will be situated on a site in the rear of the
well-known church of the Carmelite Fathers, in
Church-street, Kensington.

It is to be placed on the north of the site,
thus affording easy communication with the
existing church and old house, while securing
for the inmates as much privacy as possible,
and a garden to the south, with a direct entrance
from a side street to the west.

The rooms will all face the south. The build-
ing consists of five stories. The basement
contains extensive and well-lighted offices. The
ground-floor consists of two parlours, large
kitchen, servery, refectory, 20 ft. by 40 ft.;
common room, and principal staircase. There
is also another staircase at the west end of the
building for the part reserved to the noviciate.
First, second, and third floors afford accommo-
dation for the noviciate, and the cells of the
religions. All the bath-rooms, lavatories, &c.,
are to be outside of the building to the north
of the corridors.

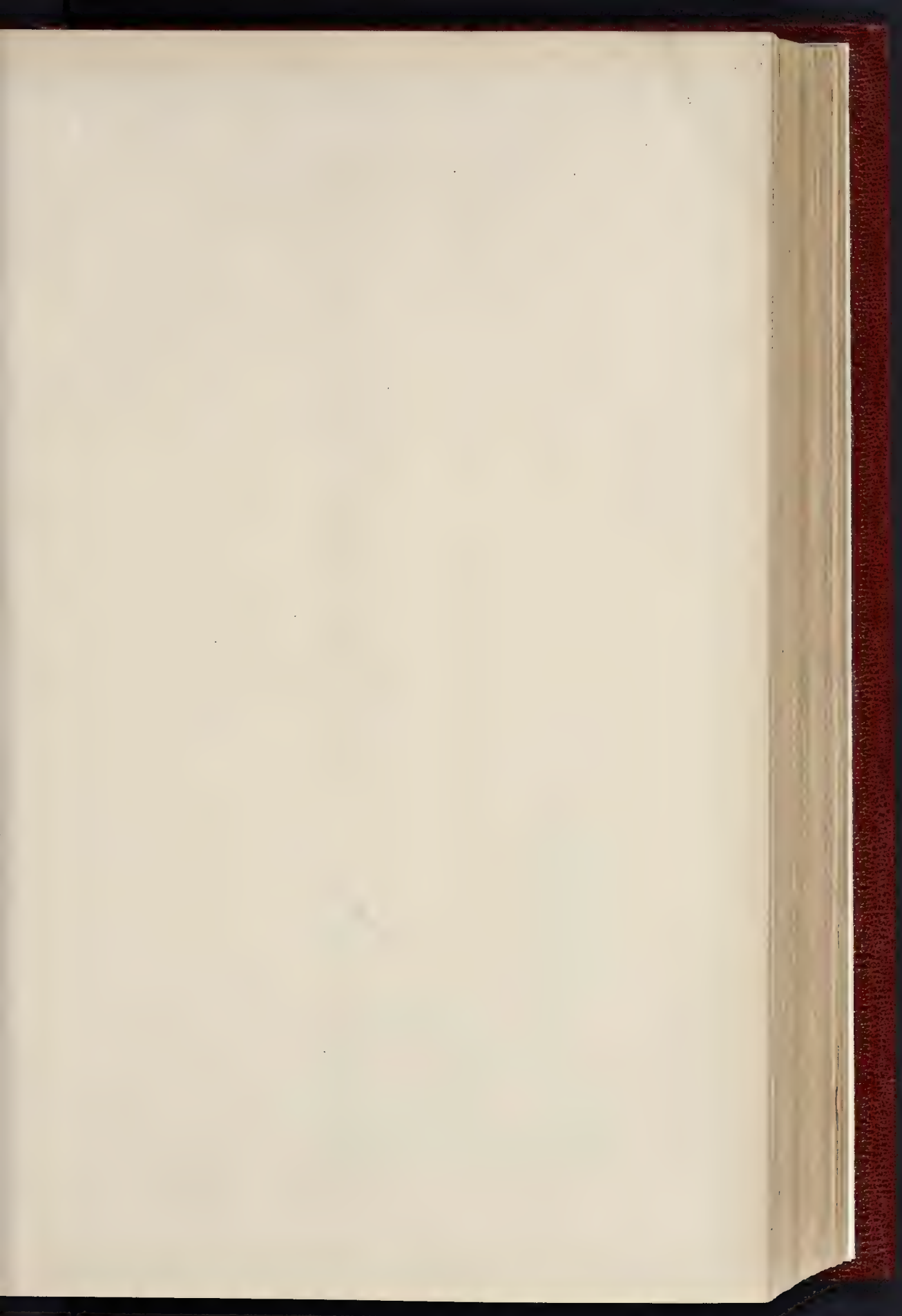
The materials to be used are, for general
facing, washed stocks, with Ancaster stone for
dressings, the roofs to be covered with green
slates. A great part of the basement and the
walls of the kitchen, servery, and lavatories on
all floors are to be lined with glazed bricks.
The ground-floor is to be fireproof, laid with
wood-block flooring, with the exception of the
kitchen, servery, and border to main corridor,
and the lavatories throughout, which are to be laid
with red tiles. All internal jambs to doors and
windows on ground-floor, and where necessary
elsewhere, as also all arches, are to be executed in
Beet stone. Wood panelling 5 ft. high is to be
carried round the refectory, common room, large
noviciate room, and oratory.

At a future time it is proposed to continue the
ground-floor corridor as a cloister round the
garden to the south, and also to build a wing
containing library, chapter-room, &c., and additional
cells.

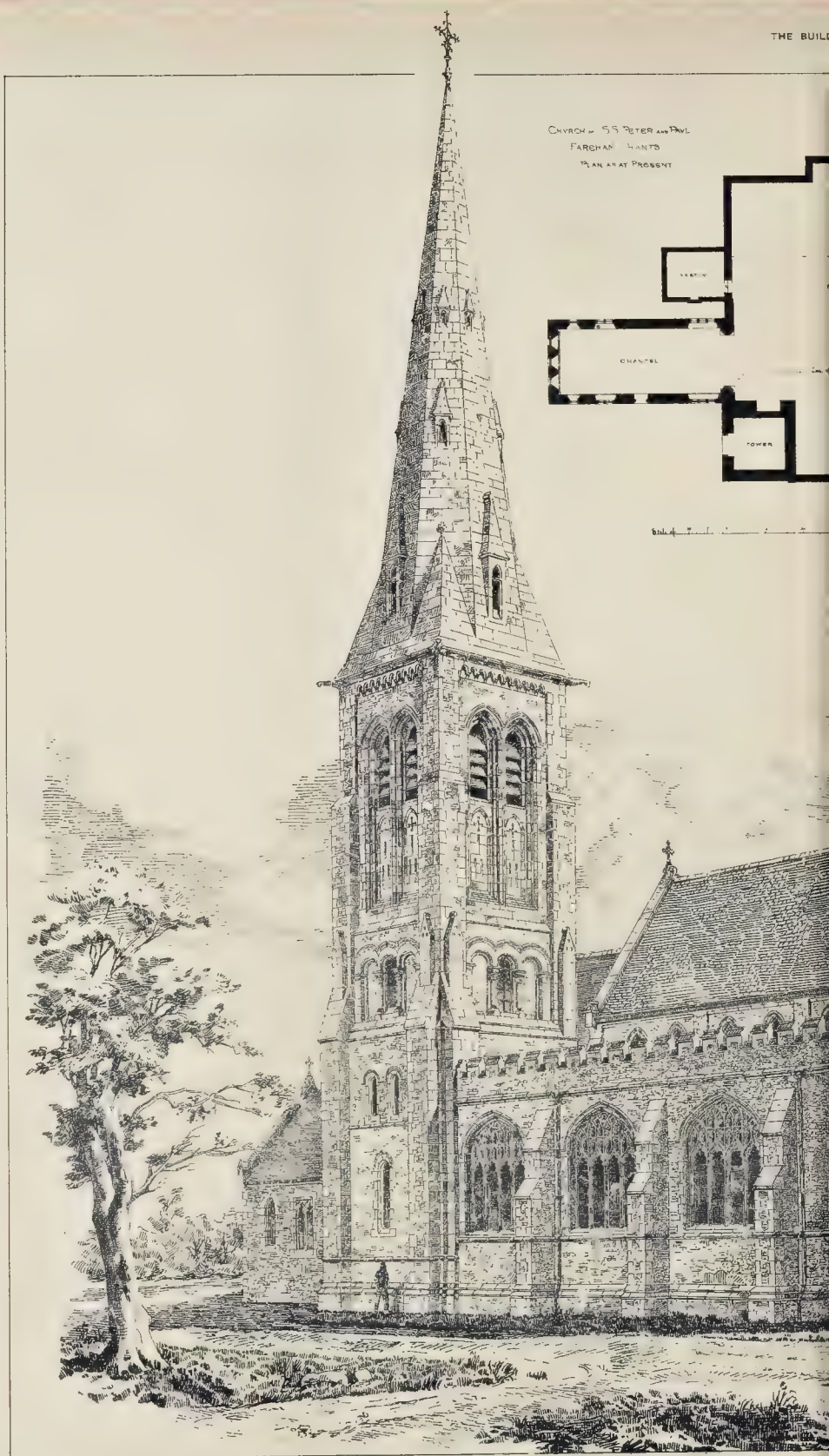
This new building will be in direct communi-
cation with the sacristy and church on the
ground-floor, and with the choir from the first
floor.

The drawing from which the illustration is
taken is hung in the Architectural Room at the
Royal Academy (No. 1,691). Messrs. Goldie,
Child, & Goldie are the architects.

Wolverhampton.—At the meeting of the
Wolverhampton School Board on the 2nd inst.
the General Purposes Committee recommended
that, subject to the consent of the Education
Department, the amended plans prepared by
Mr. T. H. Fleming, architect, for the enlarge-
ment and improvement of the Dudley-road
Board Schools, be adopted. The chairman
moved the adoption of this part of the reports,
and remarked that the proposed alteration
would afford increased accommodation for 352
children, and the schools would accommodate
altogether 930 children. The alterations would
cost about 1,500l., exclusive of furnishing and
fittings, which would amount to between 200l.
and 300l. The recommendation was adopted.



CHURCH OF SS. PETER AND PAUL
FARHAM, HANTS
PLAN AS AT PRESENT

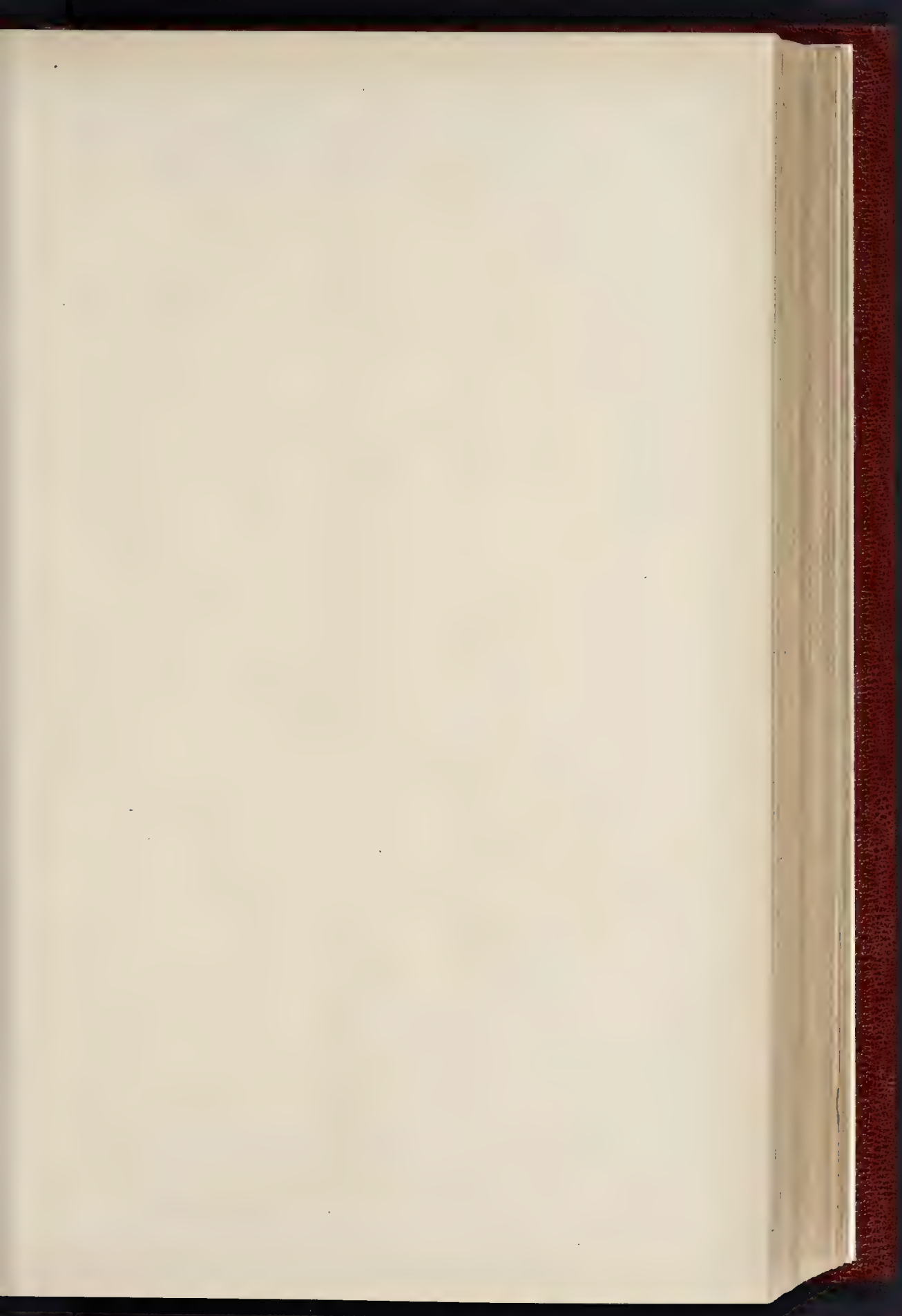


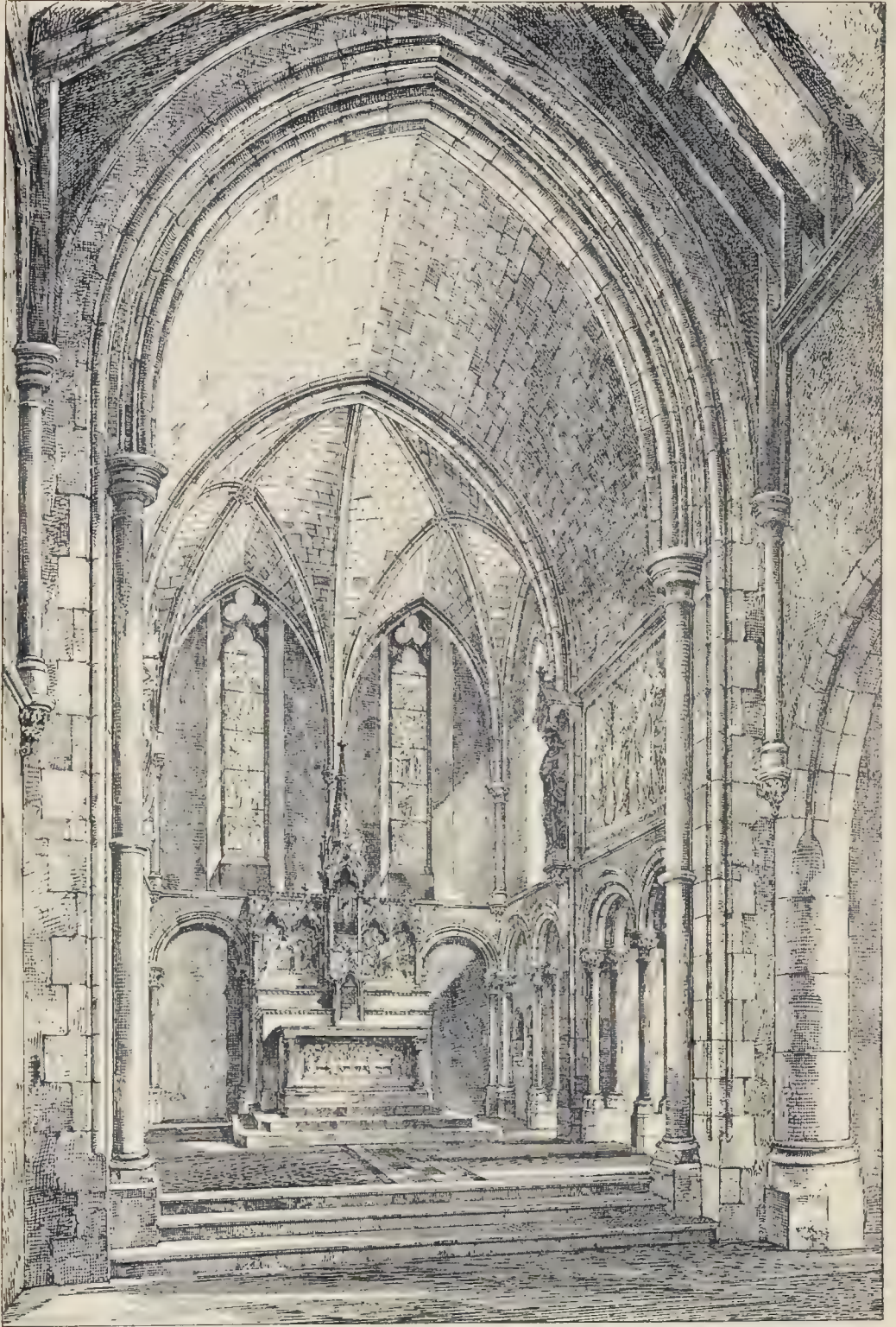
F. Ken. Photo Lith & Printer

CHURCH OF SS. PETER AND PAUL, FARHAM



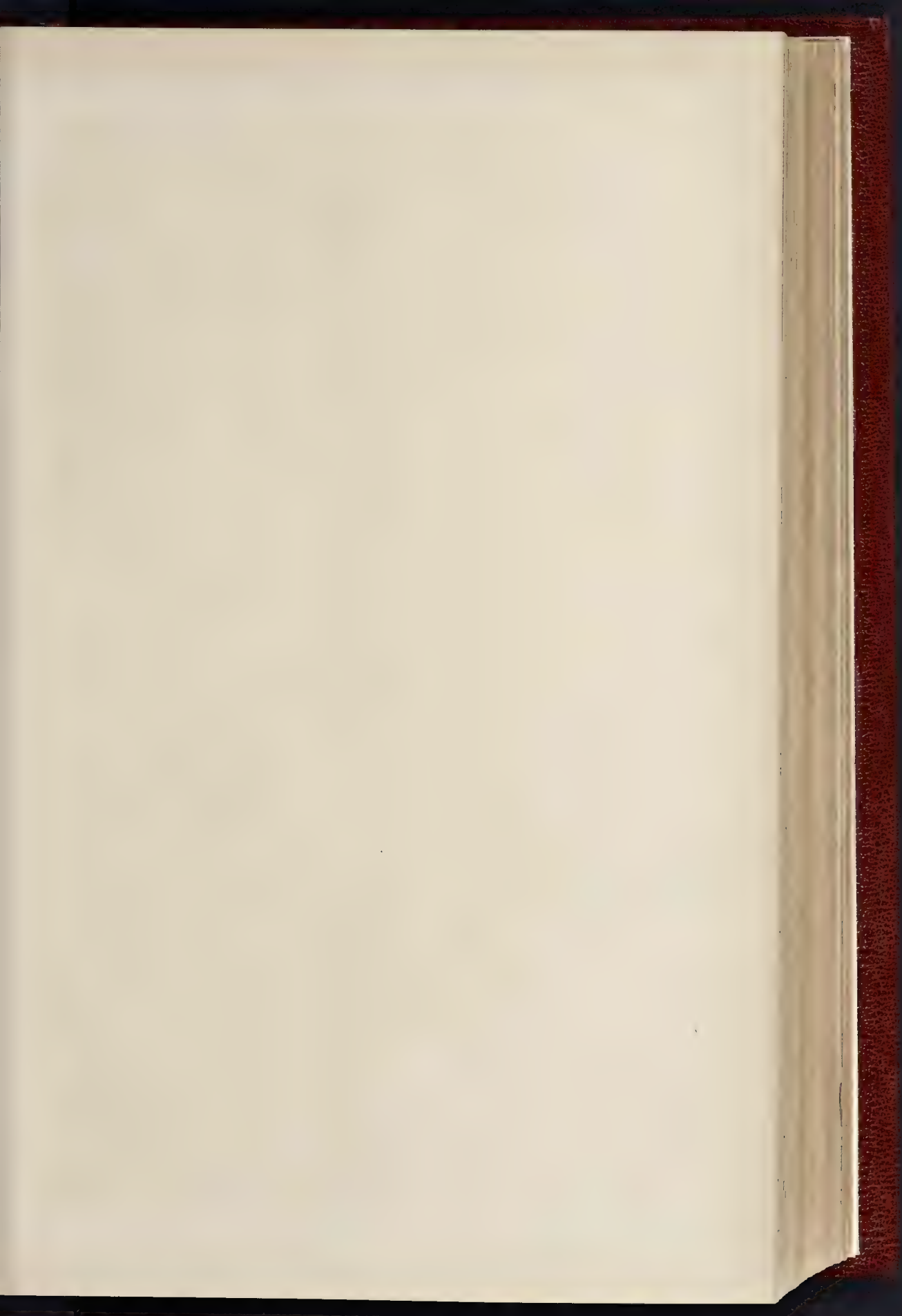
St. Martin's Church, Holborn, London, E.C.



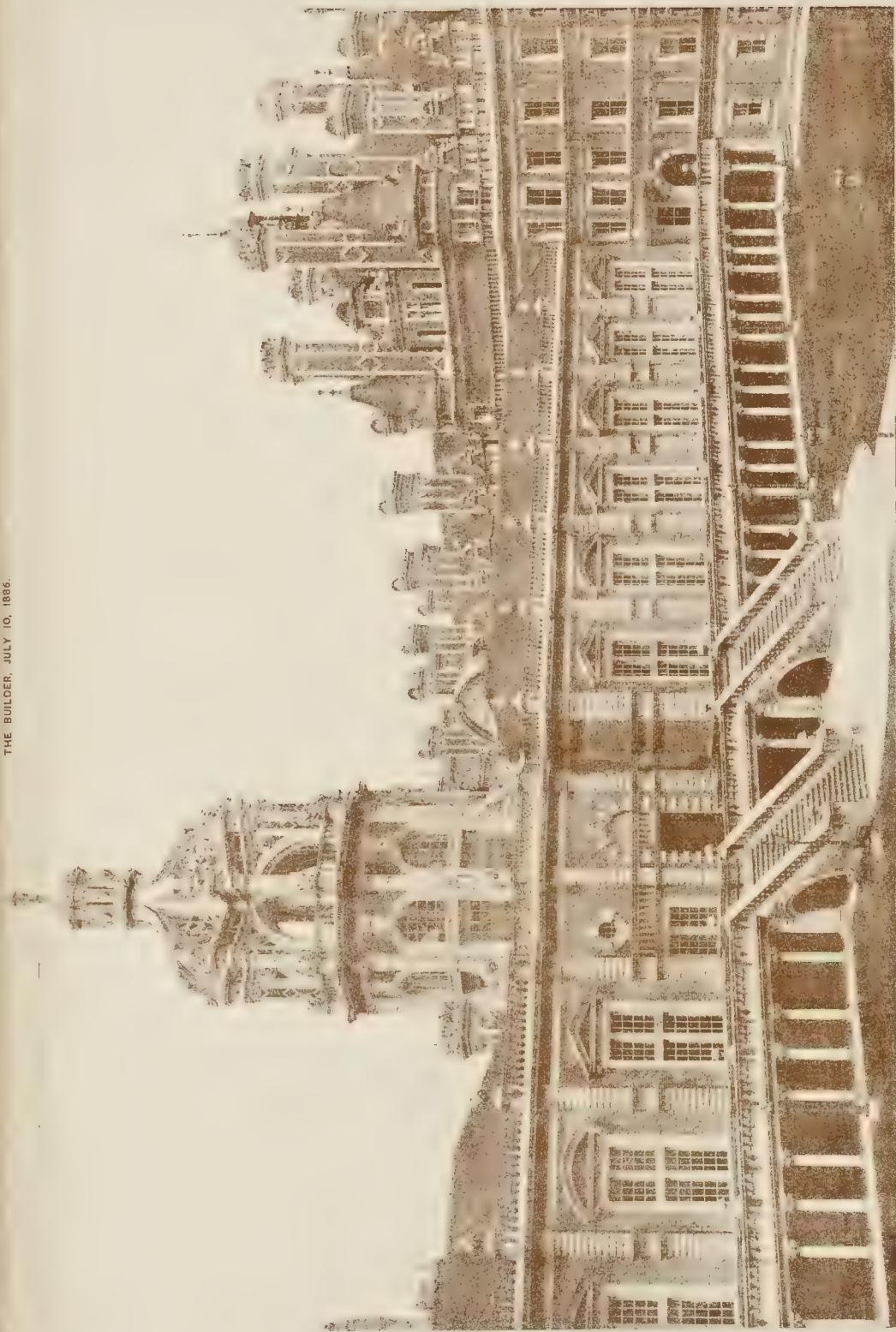


CHURCH OF ALL SAINTS, WARLEY, ESSEX.

MR. F. W. TASKER, A.R.I.B.A., ARCHITECT

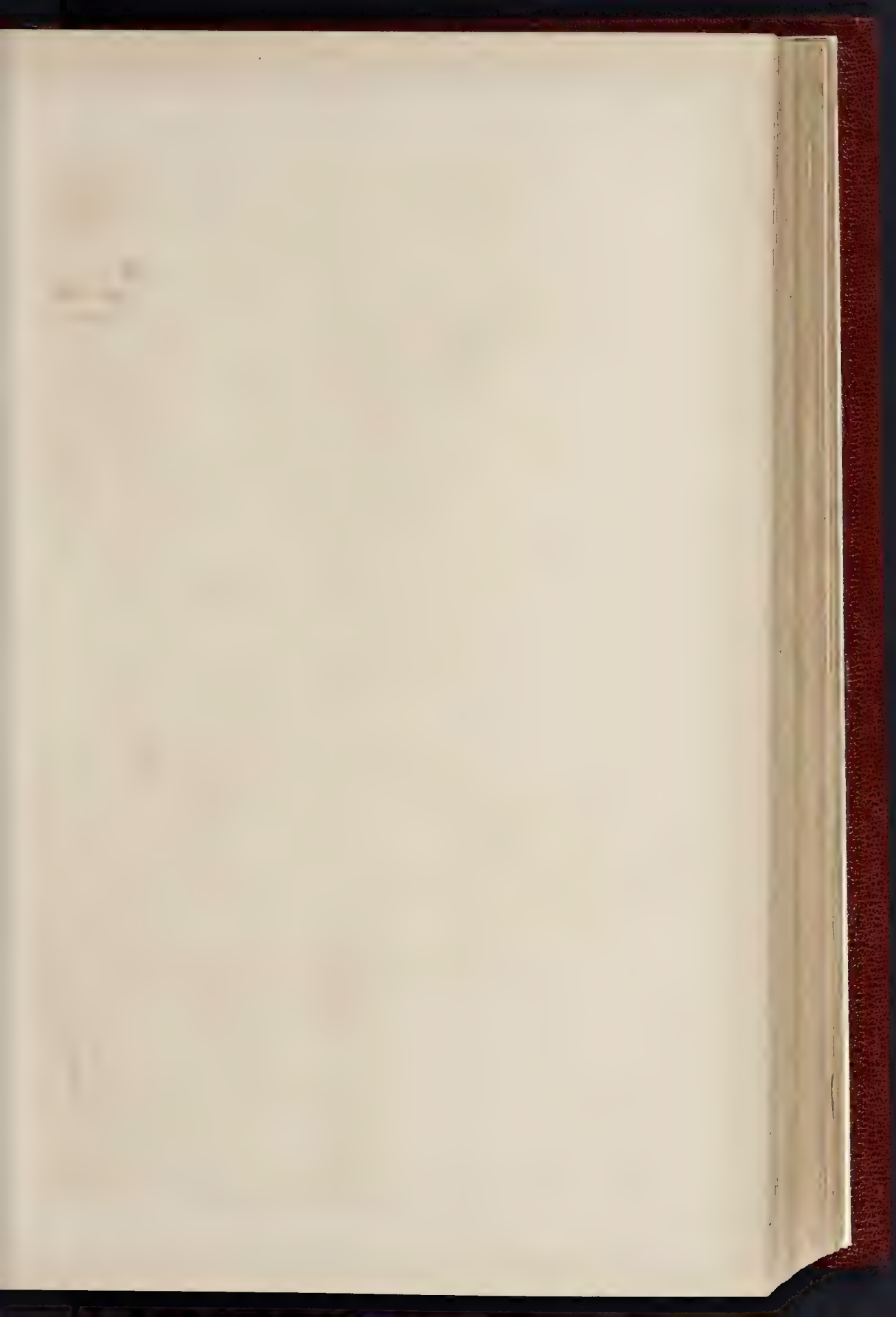


THE BUILDER, JULY 10, 1886.



HOLLOWAY COLLEGE, ECHAM — MR. W. H. CROSSLAND, F.R.I.B.A., ARCHITECT.

THE SOUTH EAST QUADRANGLE AND CENTRAL OCTAGON.

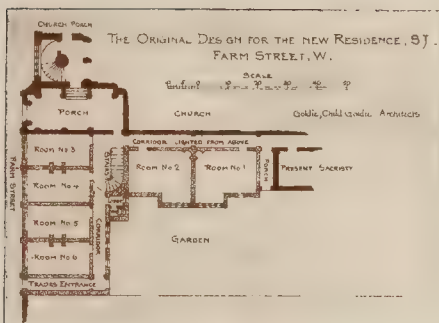


THE BUILDING, JULY 10, 1886.

THE BUILDING, JULY 10, 1886.



THE NEW CARMELOM MONASTERY, KENSINGTON.—MESSRS. GOLDIE, CHILD AND GOLDIE, ARCHITECTS.



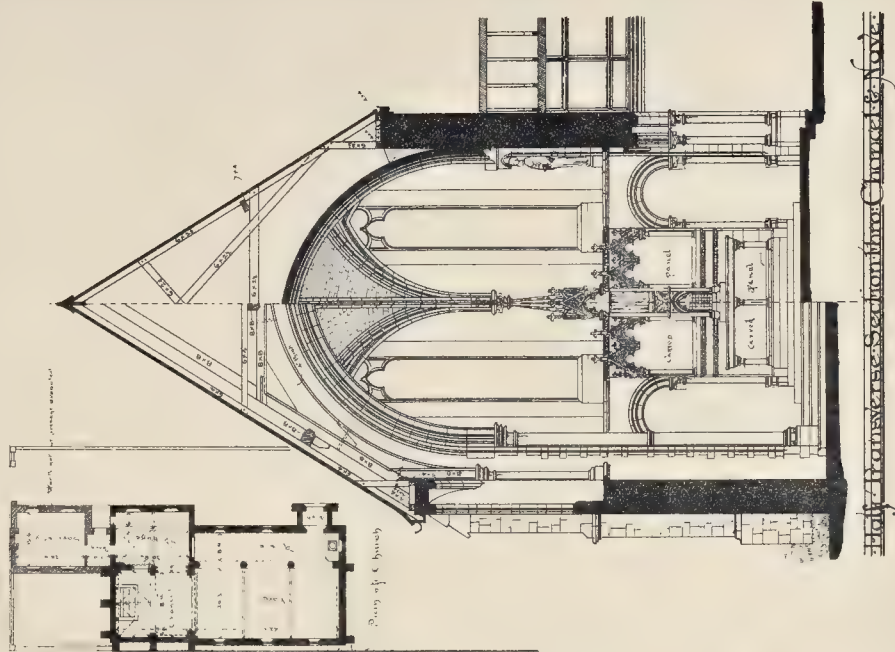
NEW PHOTO SPRAGUE & CO. LONDON

THE ORIGINAL DESIGN FOR THE NEW RESIDENCE 97, FARM STREET, W.
MESSRS. GOLDIE, CHILD AND GOLDIE, ARCHITECTS.

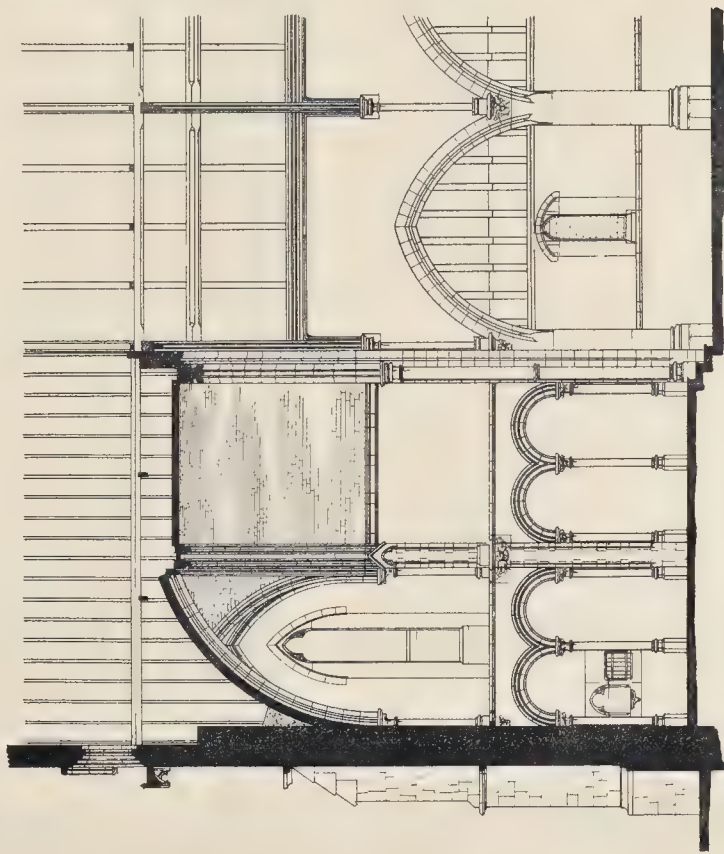


HOLLOWAY COLLEGE, EGHAM.—MR. W. H. CROSSLAND, F.R.I.B.A., ARCHITECT.

THE SOUTH WEST FRONT



Longitudinal Section through Chancel & Nave



Longitudinal Section through Chancel & Nave

67 Kent Place, N.Y., U.S.A.

CHURCH OF ALL SAINTS, WARLEY, ESSEX. MR. F. W. TASKER, A.R.I.B.A., ARCHITECT.



Tower, St. Nicholas Church, Ipswich: as Restored.

RESTORATION OF THE TOWER OF THE CHURCH OF ST. NICHOLAS, IPSWICH.

THE restoration of the tower of this interesting building was commenced in March last and is now satisfactorily proceeding. The condition of the structure had become so dilapidated that apprehensions were entertained for its safety, portions of the buttresses and masonry threatening to fall at any moment. Upon the work being commenced and the outer skin of the tower removed, these apprehensions were more than verified. The heart of the walls of the belfry stage were evidently badly built from the first, and it was found absolutely necessary to pull them down to the level of the belfry stage. It was further decided to grout the tower throughout and to insert iron rods each way across the tower at the level of the intermediate floor. The only new piece of design is the parapet, which replaces one in modern white brick. The rest of the work is being exactly reproduced from the old remains. The new facing is in cracked black flints set in stone lime, with weather bed Ancaster and Aubigny stone for the masonry.

The foundation-stone was laid by Lord Elcho, one of the Members of the borough, on the 6th of May last.

The work is under the supervision of Mr. E. F. Bishopp, architect and Diocesan Surveyor, Ipswich, with Mr. George Nevard, builder, Kayland. The cost will be about 6000.

THE ARCHITECTURAL ASSOCIATION'S EXCURSION TO HARROW.

THE Architectural Association made the second Saturday afternoon visit to Harrow-on-the-Hill on Saturday, the 3rd inst. The members met at Harrow Church, and examined the various objects of interest in the churchyard, under the guidance of Mr. Winkley, the Vestry Clerk; they then passed to the Vaughan Museum, built from the designs of Sir G. Scott; and thence proceeded to the School Chapel, by the same architect. The next building visited was the Speech-room, designed by Mr. Burges. This building, which is a semicircle on plan, and which is said to have cost 25,000*l.*, is still unfinished, and is disappointing in effect. The members then visited the old Fourth Form-room, the original school built by Old Sly for a little over 800*l.* This building, with its oak wainscot covered with names, and the old furniture, is a most picturesque place. The original house was enlarged, in 1829, by Prof. Cockerell, at a cost of 10,000*l.* The interior of the church was next visited, and Mr. Winkley pointed out the most interesting features. The best part of the church is, undoubtedly, the roof, which is a good specimen of carved fifteenth-century wood-work. The northern arcade, which terminates at the chancel arch with a quarter circle arch, was pointed out, and its origin discussed; it was thought that the arch was altered to allow access to the rood screen, the springer of the arch on the wall pier being perfectly visible. There are some interesting brasses, amongst others one of John Lyon, the founder of the school, and his wife. After leaving the church the members passed down the High-street, and examined the various school houses by Messrs. Lewis, F. Hayward, and others, and then returned to the Butler Museum, recently built from the design of Mr. Basil Champneys. The foundations of this building caused great trouble, the site being on two beds of running sand; the concrete is 23 ft. deep at the lowest corner, and has three tiers of iron bonding laid all round. The building is of red brick and terra cotta, and is a good specimen of English brickwork.

Sewerage and Drainage Works, Edenbridge, Kent.—Mr. S. J. Smith, one of the Inspectors from the Office of the Local Government Board, last week held an inquiry as to the application by the Rural Sanitary Authority to borrow the sum of 4,233*l.* for drainage works. Mr. Hall, C.E., of Canterbury, explained the scheme, which commences with a 6-in. main at the top of Marlpit Hill, and gradually gets down to the entrance of Church-street with a 12-in. pipe, to be carried thence to the tanks by a 15-in. pipe, where the sewage is to be treated upon 7 acres of ground, with a view of utilising it upon growing crops.



The Brixton Orphanage for Fatherless Girls. M. E. J. P. & Co. A. S. C.

THE BRIXTON ORPHANAGE FOR FATHERLESS GIRLS.

This is an institution that has grown from small beginnings. At first, the Honorary Superintendent, Mrs. Montague, gave No. 57, Barrington-road, a small freehold house, with a pleasant garden,—as a nucleus to start with; by degrees, No. 55 and No. 53, in the same road, were added, and connected by bridges on the first floor level. Another house in Millbrook-road was taken as an infirmary, being approached, at a safe distance, by the gardens, which adjoin each other.

A schoolroom, used also for dining, with a dormitory over, was thrown out behind No. 57, and, in 1882, spacious kitchen offices were added, with further dormitory and bath-room accommodation over, a laundry occupying the further side of the kitchen yard.

The works recently executed by Mr. Marsland, under Mr. Tarver, are shown in the accompanying view, and comprise a schoolroom, 57 ft. by 38 ft. by 18 ft. high, two class-rooms, a large dormitory over the schoolroom, and an attic over that, the class-rooms being surmounted by another dormitory. The former staircase has been carried up to the attic floor, giving access, *en route*, to an inspection-room, looking into the schoolroom, to admit of the busy bee being seen by visitors without disturbing the children.

A new staircase has been built at the far end, forming the exit to the playground through a spacious covered way (the two arches of which are shown in the view) from which the lower water-closets are entered; over the latter, and approached from the staircase, is a mezzanine lavatory, and over that, again, the night water-closets.

Both the staircase and the water-closets are covered in by flat roofs of cement concrete covered with asphalt, from which, as will be seen by the view, the buildings can be comfortably surveyed and repairs seen to, besides which external hooks are secured to the roof, and from the flats or from windows in the dormer-cheeks poles can be laid on the hooks, and the trouble of scaffolds or tall ladders avoided.

Returning to the ground level, a large drying-room has been added to the laundry; the playground has been laid with Hobman's tar-paving, and the far corner of it covered in with a large play-shed, while the gardens have been tastefully laid out.

Finally, the three small houses in Barrington-road have been "pulled together" by fixing along the eaves a name-board carried on bracketing and plastered continued from house to house, while a gateway of sufficient scale to overpower the three house-ports, and another gateway in the road-fence, have had the effect of converting three little tenements into one institution.

COUNTRY ROADS AND THEIR MAINTENANCE.*

The scope of this paper has been purposely limited to the maintenance of rural roadways. Urban districts, as a rule, maintain highways in a fairly satisfactory manner, and where this is not so it cannot be from the want of proper machinery to effect the object sought, but rather that the ratepayers do not demand a higher efficiency of maintenance, from supposed economical reasons, though it is highly probable that efficiency of maintenance and cost are in the inverse ratio, by which is meant that a road with a heavy vehicular traffic, if maintained so as to present as few traction obstacles as possible, will cost less than the same road, having the same burdens to carry, maintained so as to present and numerous obstacles to traction.

By the common law of England, the highways of the country have to be maintained by the inhabitants at large, except in a few isolated instances, which are so infrequent that they may be eliminated as unimportant and not affecting the general law of the land. It is true that up to within a brief period a large proportion of the principal roads coming within the scope of this paper were maintained by trustees as turnpike roads. The principle of maintaining roads by their users has, however, fallen into desuetude.

The theory, and to a great extent the practice, of the maintenance of roads by boroughs and local Boards does not leave much to be desired outside the metropolis. Committees for highways have under them professional men, and the roads are, as a rule, fairly maintained. Such, however, cannot be said of the single parishes having no Local Boards. In these places the surveyor is nominated by the Vestry, and is generally a farmer, whose knowledge of road-making extends to the mere spreading of stones, broken or unbroken, as suits his humour, on the surface of the road at periods, not at regular intervals, nor when the road most needs repair, nor when the weather is most favourable, nor using the most suitable materials. All these important considerations are pushed on one side for the convenience of employing local labour. When the farmer-surveyor, and also his fellow farmers, have no other work for their horses, or when they cannot get on their land, then work is provided for the teams on the parish highways. In Sussex, during the past year, roads were repaired during the driest months, and in one parish the highways were not only repaired during a long-continued period of dry weather, but were badly repaired, if such a term is applicable to the spreading of

large unbroken stones on a hard surface, some of the stones weighing 10 lb. each.

Of Highway Boards it may be said that, like Local Boards, they should provide the proper machinery of a qualified professional road surveyor, and if the roads in such a district are not efficiently maintained it is generally the fault of those who "rule the roost" and pander to a cry of false economy. The part played in the larger area of the counties by the justices in Quarter Sessions is to grant subsidies to local authorities for the maintenance of such roads as they deem main roads, forming continuous routes between considerable towns. These subsidies are granted on the certificate of the County Surveyor that the roads are in a state of efficient repair.* It is clear that this divided jurisdiction and intermingling of areas and local authorities with Imperial authorities and different forms of administering the law, is productive of bad results, and the condition of roads is largely left to individuals who are responsible only to themselves, or to those who are in sympathy with them.

From the accounts published by county justices it is difficult to form any opinion on the comparative cost of the upkeep of roads under different authorities. The cost being given at per mile, without further data on which to form an opinion, it is obvious that the maintenance of a wide, level road, open to the weather, with little traffic, must be much less than that of a narrow road of steep and numerous changes of gradient, with an equal traffic, so that, when we find a main road in one parish costs 40l. per mile to maintain and another costs 400l., there is little to be gained by discussing the figures given in county returns, and we must rely upon general observation.

When each parish maintains its roadways and the surveyor is his own master, being an unpaid official, it is not in human nature that he should give that attention to the work which its necessities demand, nor is he possessed of the technical skill to carry out successfully even so simple a duty as the repair of a road; and for these, as well as the reasons given previously, parish roads cost more for upkeep than roads under the supervision of Highway Boards, but here, in a lesser degree it must be admitted, the same objections apply. Farmers, forming a large majority of the members of such Boards, have much deference paid to them by surveyors, who, as a rule, are insufficiently paid and consequently do insufficient and inefficient work, and whose situations are held by so slight a thread that the least show of independence is

* From a paper entitled "The Present Aspect of the Rural Road Question, with some Remarks on the Maintenance of Macadamised Roads." By Mr. E. B. Ellice-Clark, M. Inst. C.E., County Surveyor for West Sussex, read at the Annual Conference of the Association of Municipal and Sanitary Engineers and Surveyors held at Hanley.

* Imperial taxation now contributes about one-fourth of the cost of the maintenance of such main roads by an annual grant of Parliament, which, however, not being regulated by Statute, may at any time be discontinued if the exigencies of the Chancellor of the Exchequer require the money for other purposes.—E. B. E.-C.

considered to be insubordination, and visited with penalties accordingly. So that most of the evils attendant upon the parochial system are inherent in the Highway Board system; in the former they are intensified to such an extent as to be a grave blot on the internal administration of the country.

The dissolution of road trustees has been taking place for many years; the universal outcry against tolls and the collection of the maintenance cost of the roads by road users led Parliament to abolish turnpikes; these roads consequently fell into the hands of the parishes, and it soon became evident that, where formerly the roads were maintained in a highly satisfactory condition, they now rapidly deteriorated, and in many cases had lapsed into as bad a condition as they were a century ago, before road trustees were initiated. The parochial system utterly broke down under the new state of things. As trusts were abolished the area of dissatisfaction spread, and grew to so large an extent, that without exaggeration it may be fairly said that the highways of rural England, which for a century had been the finest in the world, were fast becoming unusable. Parliament then stepped in with the Highways and Locomotives (Amendment) Act, by which roads disturnpiked since 1870, and main roads connecting together considerable towns, might be partly maintained at the expense of the county. Whether such a principle is sound from a political economist's view, is an open question; though, apart from securing more efficient maintenance,—which to a certain extent it does,—the measure recognises for the first time two important features: 1. The breakdown of the parochial system of repair. 2. The necessity of distributing the maintenance cost of rural roads amongst urban and rural ratepayers, the presumption being that the rural districts would be relieved at the expense of the towns. Seven years' working of the Act has proved the contrary. For many roads in urban districts, coming within the scope of the Act, are maintained at a higher cost to the county than the contribution to the county funds from such urban district. The inequalities of this Act, the cumbersome machinery it provides, and its limited scope, restricted to about one-tenth of the highways in the country, were soon amply demonstrated. The Legislature again interposed, and an annual grant is now contributed from Imperial taxation, to the extent of one-half of the sum contributed by the county, as a measure of relief to those rural communities whose grouping with the towns it had been confidently expected would have relieved them of the heavy burdens they succeeded to on the lapse of the road tolls. This branch of the subject is worth much discussion, as a remedy for the existing evils is more likely to be found in the adjustment of the law relating to maintenance cost than in the practice of road repair.

It will be observed, from what has been said, that no fewer than six authorities, extending from the Imperial Legislature to the parish vestry, are interested, and have a voice, in the repair of rural main roads. Instead of Parliament looking at this simple question in a simple manner, it would hardly be possible to devise a more complicated arrangement than has been set up by recent legislation. The Act of 1878 was hardly printed before difficulties arose. On the construction of the word "maintenance," every county has differed. In an able paper by Mr. Lobley, Borough Engineer of Hanley, he enunciates maintenance thus:—1. Ordinary repairs to the surfaces of paved and macadamised carriage-ways. 2. Extraordinary repairs, such as putting in a good foundation for the pavement or macadam, or using new setts. 3. Scavenging or street-sweeping. 4. Watering. 5. Ordinary repairs to kerbs and channels. 6. Extraordinary repairs to the same, such as the substitution of new material for old. 7. Ordinary repairs to side footpaths. 8. New pavements to side footpaths.

To the foregoing may be added:—9. Capital outlay for the substitution of paving for macadamising. 10. Proportions to be paid for the cost of scavenging and watering. 11. Cost of under-drainage works. 12. Cost of supervision and establishment charges.

It would be impracticable in this paper to enter into the detail of the various ways in which these difficulties have been dealt with. Within the writer's knowledge, independent divisions of the same county interpret the word maintenance in such totally different ways that

it would be difficult to recognise that the executives are working the same Act.

Not the least of the difficulties encountered in working the Act is that of accounts. A special form of account has to be kept under the provisions of the Act, by which every hour a man is employed on a main road must be entered, every load of materials, the quantity of water, and the team labour, all have to be separately entered and charged to the main road account. The writer is surveyor to a town having 28 miles of roads, and about 1½ mile of main roads. The work of maintaining the main road is inseparably mixed up with the maintenance of the other roads. Workmen pass without knowing it from ordinary roads to the main road. Machine sweepers and water-carts do the same thing, a load of water may be half distributed on a main road, and half on an ordinary road. In towns employing a large number of water-carts, say thirty, it is impracticable to sever the work. A main road requires a separate staff, separate carts, separate foremen, separate supervision, to keep the accounts with anything like accuracy, and, if a main road is of insufficient length to provide this separate administration economically, the cost of book-keeping and dividing the cost of maintenance will amount to a large percentage upon the cost of maintenance, and the writer ventures to express the opinion that such an accurate subdivision of accounts as the Act contemplates is nowhere kept. A great many of the items are arrived at but approximately. The same objections apply to the system in rural districts, where there is no clerical staff provided to do the work. The unpaid surveyors of parishes are frequently unable, from want of staff, to keep the complicated accounts, which require such minute division; and instances are not wanting where the unpaid surveyor of a parish has had to pay 30l. out of his own pocket during his year of office to have the accounts put into such a shape as would satisfy the Government auditor. It will be readily understood that these unpaid officials have not much zeal in having the roads properly maintained, as, the less work done on the roads, the less book-keeping, and this has no doubt had a good deal to do with the decadence of main roads.

Here, then, we have the existing principle of the maintenance of highways by parishes, clearly proved to be faulty, and inflicting great hardships upon rural communities, focussed into a positive injustice upon individual ratepayers,—as, for instance, upon mill-owners whose imports and exports are performed on railways; the maintenance cost of the transit way they pay in railway rates, while brewers and millers who use the highways very largely have the greater portion of the maintenance cost of the transit way paid for them by other people. These anomalies are based down to a limited extent by the main roads system, but the complications in administering the Act have now built up such a feeling against the law that a remedy must be found.

A simple, safe, and effective remedy can be obtained by grappling boldly with the subject. Sweep away all distinctions between disturnpiked roads, roads connecting large towns, and county or parish roads, and let all roads that are now repairable by the inhabitants at large be repaired by a single authority, adopting the county or division of a county as the unit of area. As an arbitrary line must be drawn somewhere between the rural and urban districts, fix a principle of demarcation, and exclude all towns of 10,000 inhabitants from the cost of a contribution to the county roads. There is a good reason for adopting this unit, inasmuch as the traffic in towns is a different class of traffic, and the upkeep of roads is performed in a different way. There is precedent for the principle, as the county police establishments are now maintained much on the lines of the above proposal for roads.

The present system of county government is, however, not calculated to give the impression that so great a change from complexity to simplicity could be brought about without representative county government. As a County Surveyor, it is necessary for the writer to speak with that moderation which caution suggests. It is doubtful if the justices who now govern counties by the cumbersome machinery of Quarter Sessions would have additional responsibility thrown upon them without a complete change in the administration of county affairs. Perhaps no body of men in England do their work at less cost than county justices. The

great complaint is that they do so little, being an unrepresentative body. Parliament has not hitherto invested them with great powers or entrusted to their management such important affairs as are administered by municipal corporations, and without doubt the fact that they are not subject to periodical election or rejection has serious conscientious effects upon many justices, who would be willing to deal with county funds in a more liberal spirit, and enter into increased responsibilities, were they an elected body, having the sanction and support of ratepayers. In a word, county, or, if the term is unsuitable, county, roads cannot be efficiently maintained without a complete change in county government. Presuming such a change, and an elected Board superseding the present justices, a scheme something on the lines of the following should be administered in the highways department.

There should be a Board for the whole or divisions of a county, having a chief engineer. The area of the county or divisions should be subdivided into districts, which might be determined by (a) watershed considerations, or (b) facilities for access by railway, or (c) density of population (i.e., proximity to large towns). Each district to have its surveyor or inspector, acting under the orders of his chief, who would be responsible to the Board, with the sewerage and other matters that do not touch the present discussion, and roads, under his immediate charge. District committees would be necessary, so as to meet not less than once a month, to whom the inspector would report, the County Board and district committees acting like town councils and other committees. All contracts for materials and labour, manual and team, all appointments and dismissal of officers, would rest with the County Board, who would have under its charge every road now maintained by the inhabitants at large. We should thus have (1) trained men, as paid officials, devoting their whole time to the duties of their office, directly responsible for the proper and economical upkeep of the roads; (2) a standard of efficient maintenance for the whole county would be set up, for which the Board would hold the chief engineer responsible; the divisional inspector would set up this standard of efficiency at comparative costs, for the books should show at a glance what a unit of roadway was costing in each division. This charge of the administration would do more to effect a reform in road maintenance than any attempt to patch up what is now considered to be an obsolete and effete system.

In the first part of the paper allusion has been made to those who have entrusted to them the repairs of roads; it is only necessary to emphasise the contention that the existing system is costly and inadequate, and that roads should be supervised by competent persons, who should be paid for their work and be responsible to a highway committee.

Excepting the main roads of this country, most of the existing country highways were never properly constructed. The routes they follow are the last routes taken by travellers to get on hard ground from the sloughs into which the tracks were made. Formerly no attempt was made to build a road. The traffic passed over a beaten track and in the winter diverged right and left, to get out of mud. This accounts for the singular way in which many existing roads turn and twist, in an apparently inexplicable manner. After the turnpike roads were constructed by engineers, parish surveyors gradually followed, by making an attempt to "make" the parish roads. This consisted of throwing broken stones on to the trackway, and in the course of the last century this process has been added to by surface draining and a little cleansing, so that the highways have assumed the semblance of formed and shaped-up roads. The bottoms are, however, composed of soft stuff, and if the coating of metal is not put on in time, the roads become a mud track. It is too late to preach for the reconstruction of these roads from their foundations. It is impracticable to do anything but maintain them in sufficient repair. In such cases as this, it is necessary to under-drain the roads with pipes with open joints, and the frequency of these will be necessary according to the saturation of the soil. If the subsoil is wet, it will be impossible to maintain a good surface to a road. Surface drainage is of equal importance. Snow, rain, and frost are "sore destroyers" of roads. Side ditches or long water channels are indispensable to the preservation of good surfaces.

Much diversity of opinion exists amongst surveyors as to the cross section or contour of roads. In some counties, roads are "hog-backed" to such an extent that vehicles cannot pass over them with safety, except in the centre; the converse of this is found in leaving a road with a level transverse section, so much out of repair, that it becomes concave instead of being convex. It is obvious that, if the versed sine of the section is too great, vehicles will follow the same track, viz., the crown of the road, which soon becomes worn out, while, if water is allowed to remain in the road, it will be destroyed by the weather. From long experience the author has come to the conclusion that the proper fall for roads repaired with flints or similar material is one in twenty-four from the centre, with broken granite one in thirty-six. The intermediate gradients between these two are those suitable for materials that are harder than flints and softer than granite, as, for instance, hard mountain limestone, which will take its place at about one in thirty. "Barrelling" a road is a mere excuse for not keeping the surface in proper repair.

In nearly every English county good materials for road-making may be found; but, where soft material like sandstone only is to be obtained locally, it will be found economical in most cases to obtain harder stone or granite from a distance than to repair the roads with unsuitable material.

Some difference of opinion exists as to the sizes to which stone should be reduced for metalling a road. There is a prevailing opinion that all stones should be broken to pass a gauge of $\frac{1}{2}$ in.; the writer ventures to express the opinion that this is an error. All the hardest stones, like granite, trap rock, basalt, the Devonshire dolerite, and similar rocks, should be broken to a smaller gauge than flints and the hardest limestone, which in their turn should be broken smaller than such materials as Kentish rag and stones of a similar character. The method of specifying the dimensions of stone should be abandoned for a weight test. Macadam says, "Every piece of stone put on to a road which exceeds an inch in any of its dimensions is mischievous," and in most of his specifications he insists on no stone weighing more than six ounces. Parnell adopts $2\frac{1}{2}$ in. for the largest dimensions. To within the past few years the latter size was very generally adopted, irrespective of the quality of the material. It has been the practice now for upwards of half a century, when repairing roads with granite and the harder rocks, to have the stones broken as uniformly as possible. The result of this is that, though the general surface may be in good repair, the road will be full of small rises and depressions, the surfaces of which are also rough, stones rising abruptly above the general surface of the road. It is this which causes granite macadam roads to be so unsuitable for light-sprung vehicles such as cyclists use. The author has recently been led to investigate the cause of complaints arising from cyclists when travelling over what was apparently a well-kept road, and he has come to the conclusion that it is of as much importance to have stones of different sizes as it is to have a maximum size. The proportion of different sizes requires yet to be determined. So far as his investigations have gone, he gives the following as closely approximating upon the proper proportions of sizes:—

	Maximum weight.	Minimum weight.
Granite and similar rocks.....	$3\frac{1}{2}$ oz.	$\frac{1}{2}$ oz.
Flints and similar stones.....	5 " "	1 " "
Limestones and similar stones.....	6 " "	1 " "

one-half of the total quantity to be of the maximum weight, the remaining three-eighths to be composed of stones varying between the maximum and minimum. This brings us to the question of binding materials; a road formed of different-sized stones will require no binding materials. In a former paper on this subject published ten years ago, the author stated his conviction that the "decadence of modern roads commenced with the using of binding material," the introduction of which was coincident with the use of stones broken to a uniform size. Longer experience has confirmed this, and, though in practice he is compelled to use materials to bind (?) roads, he does so very sparingly, and only because of the inability to obtain materials broken to various sizes, in sufficient quantity.

If the demand is, however, generally set up for proportions of different-sized stones, the necessary quantities will soon find their way into the market.

The introduction of stone-breaking machines has also greatly deteriorated road-mending materials in some parts of the country. No machine has hitherto been made which successfully gets over the cubing difficulty. The tendency of all machines is to deliver a great quantity of irregular pyramidal-formed stones. The extra cost of employing hand labour, about one shilling a ton on the average, is probably compensated for in the favourable form given to the stones when broken by manual labour.

There are a few other points to which brief allusion only will be made, as they are so well understood (though not practised) that it is unnecessary to prolong this paper to discuss them. They are the method of spreading materials; on suburban and rural roads the stones must be placed neither too thinly nor too thickly, but in sufficient quantities to enable the stones to form a complete surface over the old roads. As rolling cannot be attempted on roads coming within the scope of this paper, the author lays it down as a canon law for the repair of such roads that repairs should always be done in wet weather. A falling barometer in the winter will indicate to the surveyor the proper time to repair roads.

It is absolutely necessary for the preservation of road surfaces with economy to scavenge roads. Those places where there are trees, high fences, and cuttings will require most attention. Scraping by machine and rotary brushes drawn by horses will be found 33 per cent. cheaper than hand-scraping, and equally effectual.

It is of primary importance that a standard of comparative cost should be set up, so that road authorities may be able to ascertain whether their roads are being economically maintained. County authorities attempt a comparison by fixing the unit of cost at per mile; a few authorities reduce their calculations to the superficial yard. It is obvious that both of these methods are entirely misleading, as the chief factors of road destruction are eliminated. It is necessary to ascertain the number of vehicles and their weight, and that of their burdens, passing over the road in each year, and the width of the roadway.

We are then able to calculate what burden the road carries in proportion to its width, and a comparison can be obtained; though the results of these figures will be misleading if any attempt is made to compare paved roads with macadamised roads, or roads of very great traffic with roads of moderate traffic, as the conditions under which the materials are destroyed are quite different. An instance of this is observed in the cost of macadamised roads. In a paper read by Mr. Deacon before the Institution of Civil Engineers, the maintenance cost of a macadamised road is given at 2s. per every 100,000 tons per annum per yard of width, while set pavements are quoted as low as 0.25d. for the same unit of cost. It is well known that, when streets are repaired by macadamising, the cost increases in geometrical progression, or nearly so, as the traffic increases beyond a certain number. The author gives below the actual cost of the Western-road, Hove, Brighton, which has a traffic of 164,620 tons per annum per yard of width, and the cost is 5.22d. for the same unit, while the author ascertained that a portion of Piccadilly cost 3s. 6d. for the same unit.

Maintenance Cost of Macadam per 100,000 Tons per annum per Yard of Width.

Liverpool.....	s. d.
Liverpool.....	2 0
Liverpool.....	3 6
Brighton.....	0 5.22

This difference is so great that the explanation must be given: in the two former cases the streets were those of enormous traffic, the macadam in wet weather was churned up into mud, and after frosts would be "lickey," with the stones adhering to the wheels; the road would have to be repaired many times in the year, while in the Brighton case the macadam stones were always in their place.

This is cited to show that the costs of urban and suburban roads must not be compared with rural roads, but for comparison they should be divided into different classes, thus:—

Roads with a traffic of less than 10,000 tons per annum, per yard of width;
Roads with more than 10,000 ditto, and less

than 50,000 tons per annum per yard of width; and so on.

It is for the County Boards of the future to keep such accounts as will enable proper comparisons to be made.

In conclusion, the author believes that no change for the better is likely to be brought about in the maintenance of rural roads until the present system of road administration, and the incidence of cost, are radically reformed.

UNIVERSITY COLLEGE, LONDON.

DISTRIBUTION OF PRIZES.

Faculties of Arts and Laws and of Science.
Session 1885-86.

Gilchrist Engineering Scholarships.—Entrance Scholarship, 35l. per annum for two years: R. J. Durlay, of London, Senior Scholarship, 80l.; L. Martineau, of London.

Stade Fine Art Scholarship (50l. per annum for three years).—C. D. Hay Campbell, of Edinburgh.

Architecture (Prof. T. Roger Smith, F.R.I.B.A.).—*Fine Art*. Donaldson Silver Medal, T. L. Worthington, of Manchester. Second Prize, A. B. Yeates, of London. Certificates, 3rd. V. H. King, of London. 4th. Eleanor Rowe, of London. Second Class, R. L. Pearce, of Surbiton; F. B. Pemberton, of Victoria. Third Class, R. S. Maynard, of London.

Construction. Donaldson Silver Medal, R. L. Pearce, of Surbiton. Second Prize, F. B. Pemberton, of Victoria. Certificates, 3rd. E. H. Fry, of Bristol; James Simpson, of London.

Second Class, A. E. Habershon, of Walthamstow; E. W. Hands, of London; L. Scrutton, of London. Third Class, J. Hale, of Sevenoaks; G. S. Jones, of Sydney.

Modern Practice.—Prize, J. Muller, of London. Certificates, 2nd. C. F. Good, of London. Second Class, A. G. Chalmers, of Perth; W. B. Goodwin, of London; W. H. Raffles, of Liverpool; H. W. Wills, of London; T. L. Worthington, of Manchester. Third Class, W. A. Aickman, of London.

Engineering and Mechanical Technology (Prof. Alex. B. W. Kennedy, M.I.C.E.).—*Senior Engineering*. Prize, L. Scrutton, of London. Certificates, 2nd. W. Corin, of Forest Hill. 3rd. J. Goodman, of Royston. Second Class, L. Cust, of London; W. St. G. Elliott, of London. Third Class, A. Hayne, of London; R. G. Harding, of London.

Junior Engineering. Prize, L. Martineau, of London. Certificates, 2nd. equal, Henry Deaneley, of Wincanton; R. J. Durlay, of London. Second Class, H. Hutchinson, of London. Third Class, H. G. F. Barham, of Bridgewater; W. C. Kerr, of Blackheath; F. E. Nathan, of London; F. B. Pemberton, of Victoria; F. W. Smyth, of Blackheath; P. R. A. Willoughby, of Bristol.

Engineering Drawing. Senior Class. Prize, J. Goodman, of Royston. Certificates, 2nd. L. Cust, of London. 3rd. A. Forbes, of London. Second Class, L. Scrutton, of London. Third Class, W. St. G. Elliott, of London; R. G. Harding, of London; A. Hayne, of London.

Junior Class. Prize, Vito Montalto, of Mazzard. Certificates, 3rd. L. Martineau, of London. 2nd. G. Baker, of Oakham. 4th. R. J. Durlay, of London.

Prize. Henry Deaneley, of Wincanton. 6th. W. C. Kerr, of Blackheath. Second Class, H. G. F. Barham, of Bridgewater; P. R. A. Willoughby, of Bristol. Third Class, A. M. Brotherhood, of London; A. W. Carne, of St. Agnes; F. E. Nathan, of London; F. W. Smyth, of Blackheath.

Engineering and Surveying (Prof. J. F. Vernon-Harcourt, M.A., M.I.C.E.).—*Civil Engineering*. Prize, L. Martineau, of London. Certificate, 2nd. J. R. Wignall, of Liverpool. Second Class, W. C. Kerr, of Blackheath. Third Class, E. A. H. Child, of Bridgnorth; F. B. Pemberton, of Victoria.

Surveying. Prize, Y. J. Dawson, of London. Certificates, 2nd. J. R. Wignall, of Liverpool. 3rd. S. L. Whetham, of Bridport. Second Class, A. W. Carne, of St. Agnes; E. A. H. Child, of Bridgnorth; H. Hutchinson, of London; H. Lazareck, of Aldershot. Third Class, A. S. Allin, of Chiswick; G. C. H. Reed, of London.

A Cheap High-Pressure Water Valve.

A new and improved registered galvanised iron draw-off water-valve has been put into the market by that old-established firm of plumbers brass-work manufacturers, Messrs. Thos. Lambert & Sons, of Short-street, Lambeth. The construction of this valve seems particularly to suit it for exposed positions; as no water can remain in it after use, so it cannot be affected by frost. For neighbourhoods where a brass tap may be stolen, this galvanised iron valve would be passed unnoticed. It is screw-down high-pressure valve, and, although its exterior is of iron, its interior or working parts are entirely of brass, thus ensuring durability. It appears to be peculiarly adapted for use in artisans' and labourers' dwellings, in courts, stable yards, and in other situations where rough usage is to be expected.

* Obtained the number of marks qualifying for a prize.

THE PLUMBERS' COMPANY.

THE Master, Wardens, and the Court of this Company dined at Beutley Priory, Harrow, on Wednesday, June 30th. Mr. George Shaw, C.C., Master of the Company, presided, and amongst those present were Mr. Alderman Knill, Mr. Ewan Christian, Mr. E. L'Anson, President of the Royal Institute of British Architects, Mr. Ernest Hart, Mr. P. Magnus, Mr. F. C. Penrose, Dr. Corfield, Mr. J. Bosisto, M.P. (President of the Royal Commission, Victoria), Dr. Danford Thomas, Mr. F. W. Pennefather, Dr. Thorne-Thorne, Dr. Wynter Blyth, Mr. F. Machin, Mr. P. Wilkinson, Mr. R. A. Nurse (United Plumbers' Association), Mr. T. H. Court (Peckham), Mr. S. Cornwell (Hermondsey), and Mr. W. Firth (Kensington).

In proposing "The Standing Institutions of the Country," the Master said that he hoped that the important movement recently set in operation by the Plumbers' Company would meet with considerable aid from both sides of the new Parliament. It was a non-party question. Beyond this he knew that the Company had warm supporters in both Houses.

Mr. B. Stowe (Master of the 'Tyers' and Bricklayers' Company) having briefly replied:

The Master next gave the toast of "Our Colonial Friends," and in doing so observed that the sanitary work in which the Company was engaged must have a growing interest for the fast-increasing cities of the Colonies and India, and he hoped that the two gentlemen, Mr. Bosisto and Mr. Pennefather, whose names he would couple with the toast, would receive some information during their sojourn here which might be serviceable to them in dealing with matters concerning the public health of their respective colonies.

Mr. Bosisto and Mr. Pennefather, in acknowledging the compliment, reciprocated the good feeling expressed by the Master, and, at the same time, enlarged on the importance of the work the Plumbers' Company had taken in hand.

The next toast, "Architecture and Sanitary Science," submitted by the Chairman, was regarded as the toast of the evening. In proposing it, the Master said the aid of the members of the architectural profession was of the greatest moment to the Company at the present time. Without their co-operation, progress would be greatly retarded, if not altogether checked. The Court of the Company had felt from the very outset of the present movement that, in order to effect its objects and secure the efficiency of plumbing work in dwelling-houses, it was essential that architects, sanitarians, plumbers, and builders should unite in one common effort. The institutions of each were represented upon the General Council which was dealing with the matter, and the Plumbers' Company had done, was doing, and intended to do, all in its power to bring the movement to a successful issue. That was not a time for him to enter into details, and he would only say that the first and essential preliminary act, namely, the registration of plumbers, might now be looked upon as successfully accomplished. The plumbers of the United Kingdom (both masters and men) had given not only their general adhesion to the scheme, but hundreds had already applied to be enrolled on the Company's register for plumbers, every applicant having to give some evidence of ability, and every application coming before a thoroughly representative, qualified, and impartial committee. He ventured to say, when the movement was in its infancy, that he took the plumbers as a body were fully disposed to rise above the consideration of mere personal interests, and work heartily together to raise the general efficiency of the craft, and thus enhance its public usefulness. What he then expressed as an opinion had since been demonstrated as a fact, and throughout the whole course of the movement the most impressive token to him had been the general condemnation of inferior craftsmanship. Though it was proposed to establish the system of registration at first in London only, the Company had received very numerous applications from plumbers in all parts of the kingdom desiring to be registered on the same footing as those in London. He was convinced that, when they got their provincial organisations complete, the hundreds of applicants would become thousands, and the system and registration would become universal. Although the work of the Company was necessarily arduous, their programme was very simple, and their immediate objects might be classed under three heads:—(1) registration, so that the public and plumbers themselves might know who had and who had not given evidence of qualification; (2) the technical education of plumbers, to compensate, as far as possible, for the falling-off in the apprenticeship system; and (3) the recognition by architects and the authorities of the necessity for more closely supervising plumbers' work, especially in new houses. He coupled with the toast the names of Mr. E. L'Anson, President of the Royal Institute of British Architects, and Mr. Ernest Hart.

Mr. L'Anson, in the course of his remarks, said he was glad of an opportunity of expressing his appreciation of the efforts of the Plumbers' Company for the good of the public health. Their work was one of the utmost importance, and he wished them every success in the undertaking.

Mr. Hart observed that it must be apparent to all that the Company was doing a great work, and doing it in the best possible way, and the result of it must be of the most beneficial nature to the health of the people of the country.

In brief but appropriate terms, the Master next gave "the Health Institutions of the Kingdom," coupling with the toast the names of Dr. Thorne-Thorne, the distinguished Medical Inspector of the Local Government Board; Dr. Corfield, President of the Medical Officers of Health Association; Dr. Wynter Blyth, and Dr. Danford Thomas, Coroner for Central Middlesex.

Subsequently the Master proposed "Technical Education," associating with it the names of Mr. P. Magnus, Director of the City and Guilds of London Institute, and Mr. E. C. Robins. Mr. Magnus, in responding, pointed out that plumbing was one of the fifty subjects in which the City and Guilds of London Institute was organising classes, and he was happy to say that, owing to their connexion with the Plumbers' Company, those classes had greatly increased during the past year, as would be seen from the following figures: in 1885 there were 148 students learning the scientific principles of plumbing, while during the present year the number had gone up to 329; last year eighty-seven candidates presented themselves at the examination, but this year 210 came forward.

Mr. Robins having also responded, the Master very briefly proposed the toast of "the Plumbers' Company," and the proceedings ended.

ARCHITECTURAL ASSOCIATION
VACATION VISITS.

SIR,—We shall be much obliged if you will kindly allow us, through the medium of your valuable paper, to draw the attention of the Architectural Association members to the fine examples of old work that will be seen at the visit on the 17th inst. The examples of half-timber work at Chiddingstone are particularly fine, and those who go down in the morning will have plenty of time for sketching. We will arrange for one or two good sketchers to be there who will be happy to give a few hints to those who wish for them.

A. LOWTHER FORREST,
WALTER J. H. LEVERTON,
Hon. Secs. Vacation Visits
Sub-Committee.

PROVINCIAL NEWS.

Bucknall.—The new Infectious Diseases Hospital, erected jointly by the local authorities of Hanley, Stoke, and Fenton, at Eaves Lane, Bucknall, was opened on the 30th ult. by Alderman Boothroyd, Chairman of the Board of Management. The building was commenced on the 6th July of last year, and the contractor, after experiencing very bad weather, completed his contract two months ago, with the exceptions of the removal of the old hospital at Penkull, which is at present being taken down to be re-erected to serve the purpose of a convalescent pavilion. The hospital is built on an isolated plot of land at Bucknall, about 150 yards distant from Eaves-lane, the nearest thoroughfare. It is built on what is known as the pavilion system, and consists of five separate pavilions. The present hospital pavilions will accommodate twenty-eight beds, and, at a push, this number might be increased to forty, as the quantity of air-space, viz., 2,000 cubic feet, and floor space 144 square feet, is based on the extreme limit. The first, viz., the administrative pavilion, is a two-story building, and comprises on the ground floor a dispensary, waiting-room, living-room for attendant, kitchen, scullery, larder, and store closets; and on the upper story, six bedrooms, bath-room, and airing closet. Externally the walls are built with picked common bricks, with quoins and angles of pressed bricks. The gables are tiled and half-timbered, with plaster work between, and it has been the endeavour of the architect throughout to avoid that bare barrack and barn-like appearance so common in institutions of a similar type. Lightning conductors have been placed on each of the pavilions by Messrs. Blackburn, of Nottingham and Hanley. The architect for the building was Mr. G. W. Bradford, of Hanley; the principal contractor being Mr. J. Gallimore, Newcastle; and the clerk of the works, Mr. Leonard Price.

Buxton (Derbyshire).—Workmen have lately been engaged in fitting up a set of improved needle baths, at the Gentlemen's Hot Baths, in the Colonnade, and another at the Ladies' Hot

Baths. These important additions to the already extensive suites of medicinal baths at Buxton were last week inspected by Mr. E. C. Milligan (chairman of the Local Board) and several other gentlemen. The necessity of having such appliances had been urged upon the owner of the baths, the Duke of Devonshire, and such an addition will meet a great want. The combination needle bath consists of needle, shower, back rose, and ascending sitz bath, fitted with a hand hose, shower, douche, and a heavy douche overhead. Of course, the power can be varied in all these cases as may be prescribed by the medical men. There is a special mixer, of globe-like shape, which is made of gun-metal, and through this the pipes run. The object is to mix the hot and cold water in such proportions as may be needed. Immediately over this is fixed a thermometer, the glass of which penetrates the mixer, and thus the exact temperature of the water is discovered, and regulated and applied to the patient as may be necessary. The main pipes are connected with tanks above the boilers and engine-house, and the water conducted through 2-in. heavy lead pipes. Mr. John Smeaton, of Great Queen-street, London, received the commands of the Duke of Devonshire to erect the new baths, and the work of fitting-up has been done by Mr. McKay, the architect under whose superintendence the work has been done being Mr. Henry Currey, of London.

Derby.—On the 2nd inst., Mr. Melville and his architect (Mr. Oliver Essex, of Birmingham) waited on the Improvement and Construction Committee of the Derby Corporation with the plans for the reconstruction of the Grand Theatre, destroyed by fire a few months ago. After some consideration, the Committee decided, subject to some alterations which Mr. Melville promised to make, to recommend the plans to the Council for approval.

Tonbridge.—On the 28th ult. an inquiry was held by Mr. S. H. Terry, M. Inst. C.E., Local Government Board Inspector, as to the proposal of the Rural Sanitary Authority of Tonbridge to borrow 2,500l. for the erection of a hospital for their district. The inquiry was purely of a formal character, and at the close of it the inspector said that he should recommend the sanction of the Local Government Board to the proposed loan.

Woodbridge (Suffolk).—The new Sekforde Dispensary, Woodbridge, was opened on the 28th ult. The new building is of red brick, with stone dressings, with a half-timbered gable. It consists of two stories and a basement, the whole being covered in with a tiled roof. Entering the building one finds on the ground floor the dispensary proper, consisting of commodious waiting-room, consulting-room, and dispenser's room, all communicating with each other. Passing to the first floor, which is approached by a wide staircase, with oak rail, one comes to what is the distinctive feature of the new dispensary, a small hospital, which the Governors thought it desirable to erect for men and women to receive medical treatment in cases of accident or urgency. There are two wards, one for males and the other for females, named respectively Victoria (in commemoration of the fact that the opening took place on Coronation Day) and Dorothy, in memory of the founder's wife. For the present two beds will be provided in each ward, though there is ample room for more. Adjoining each ward is a nurse's room, that adjoining the female ward communicating by means of a hatchway window with the ward. There is also a bath-room and a convalescents' lounge on the landing. The architect is Mr. Ernest Carritt, of London, architect to the London estate of the Charity. The building work has been carried out by Mr. Wm. Sealey, of Woodbridge. The cost of the building is about 1,250l.

Manchester Architectural Association.

In the competition for prizes for the best sketches offered by the President, Mr. L. Booth, F.R.I.B.A. (a report of which was published in our last week's issue), the referee, Mr. A. Darbyshire, F.R.I.B.A., has awarded the first prize, of two guineas, to Mr. F. B. Smith for his water-colour sketch; and the second prize, of one guinea, to Mr. F. Ward for his pencil sketch. Mr. Darbyshire, in his report, speaks very highly of the two successful drawings, and favourably mentions the work of several other competitors. There were six water-colour and seven pencil sketches.

CHURCH-BUILDING NEWS.

Aymestrey (Herefordshire).—Aymestrey Church was re-opened on the 29th ult., after restoration. The condition of the building previous to its restoration is described as very deplorable. Upon examination, the timber roofs of the naves and aisles were found to be thoroughly rotten, the boarding upon them decayed, and the lead coverings perished and worn out. The roof of the chancel, from being high-pitched, was in a better state, but all the roofs were concealed by plaster ceilings. The floors were everywhere decayed, and in several places had fallen in, and were resting upon the natural ground; and the whole interior of the building, from being below the surface of the churchyard, and in the entire absence of drainage, had suffered severely from damp and mildew. The work of restoration has been carried out in two sections. The first, commenced in the summer of 1884, comprised new roofs over the naves, aisles, and chancel, which were in all respects reproductions of the original roofs. They are double-boarded, with oak underneath, and covered with lead. The chancel roof is more elaborate, being panelled in oak, with moulded ribs, ornamented with carved oak bosses at the intersections; and, being of a high pitch, is covered with Westmoreland slates. The copings of the gables and parapets are renewed, the Sanctus bell-cote is restored, together with all the masonry more intimately connected with the roofing work. The south side of the tower had been severely ruptured from the battlements downwards, but this has been restored, and the battlements rebuilt. A deep open drain has been constructed all round the external walls, thus preventing the passage of damp to the interior. The second section of the work now completed includes the general repair of the fabric inside and out, and the masonry of the several windows, together with the re-glazing of the windows in tinted glass. The flooring is new throughout, encaustic tiles have been placed in the alleys and chancel, and Lowe's patent wood blocks are used under the sittings. The body of the church has been re-seated with oak, in which is used up the whole of the old wainscot woodwork of the former pews. New oak stalls have also been provided, with new reading-desks and a carved lectern, and the original Jacobean pulpit has been mounted afresh and repaired. Perhaps the most difficult work of any was the repairing and restoration of the several screens, which were very rotten in places, and much mutilated. These screens being of great excellence, and forming one of the chief features of the church, their preservation became an object of the greatest care and solicitude. Mr. Hiles, of Hereford, was the contractor for the first section, and Mr. Edwards, of Leominster, for the second, and each has completed his undertaking well and thoroughly. The various works have been carried out from the designs and under the direction of Mr. Nicholson, F.R.I.B.A., of Hereford, the Diocesan Architect.

Edale.—The new Church of Holy Trinity, at Grindsbrook, Edale, which has been built to supersede the "old chapel" of that name, has been consecrated by the Bishop of Southwell. The new burial-ground attached to the edifice was also consecrated at the same time. The church is of stone, in the Early English Gothic style, and consists of nave, 54 ft. by 24 ft. 6 in. wide; and porch, 5 ft. by 11 ft.; chancel, 29 ft. 6 in. by 18 ft. 6 in.; vestry on the south side of the chancel, and room for a tower (not yet erected), the lower stage of the tower forming space for the organ-chamber. The nave is seated with open benches to accommodate 200 persons. It has an open-timbered roof of pitch-pine throughout, with overhanging eaves, and covered externally with briddled tiles. The total contract for the laying out of the grounds, &c., was about 2,600l. Mr. Thomas Beck, of Matlock Bridge, has been the contractor.

Holwell.—The Church of St. Lawrence, Holwell, near Sherborne, has just been re-opened, after restoration. The old church, dedicated to St. Lawrence, was built about the year 1480, and is a good example of Perpendicular work, well proportioned in all its parts and picturesque in outline. The church consists of a nave and north aisle, with transept and porch on the south side, and a fine tower at the west. The chancel, a comparatively modern production, built in a flimsy manner with brick-

work covered with stucco, and windows of wood, was in a very dilapidated condition. With regard to the rest of the church, the walls were cracked in various places, and showed signs of settlements having taken place, requiring careful attention and immediate repair. The dressed stonework was much decayed in places, the roofs required to be stripped, and the decayed timber removed. On the inside the stone-flagged floor of the church was very uneven, the old box-pews high and uncomfortable, and the west end was disfigured by a gallery of comparatively little use, only providing sixteen seats, and reached by cramped and creaky stairs. The work just completed consists of building a new chancel and chancel aisle, containing organ-chamber and vestry, reflooring the whole church to the old lines, providing new benches, removing the west gallery, and opening up the tower arch, re-covering the whole of the roofs with lead and stone tiles, constructing a cement concrete channel around the church to prevent damp rising up the inside of the walls, and restoring the decayed stone and other work necessary to preserve the fabric of the building. Many interesting features have been discovered during the carrying on of the work, such as the finding of a hagioscope between the chantry and the chancel, the opening up of the door and steps to a rood-loft, and the remains of a stone reredos with the original decoration on the same. The new benches are of pitch pine, the floors are formed of solid wood blocks laid to a herring-bone pattern, the chancel floor is of encaustic tiles, and the steps of blue Pennant stone. The chancel roof is boarded with pitch pine and panelled with moulded curved ribs. A new oak roof is in course of construction over the Yeatman chantry, with curved brackets brought down on to the old stone corbels which remained in the walls, showing what had been there at some former period. The old pulpit and sounding-board over, a very good specimen of Jacobean woodwork, is re-used on a new oak base. The heating of the church is by means of a Porritt's stove. The cost of the work has been over 1,300l., irrespective of the Yeatman chantry, which has been paid for by Mr. M. Yeatman. Mr. Kingman, of Lydlinch, has carried out the work, under the architects, Messrs. Crickmay, of Westminster and Weymouth.

Monkton Wyld (Dorset).—There has just been erected in the Church of St. Andrew a complete set of carved oak chancel-stalls and prayer-desks. They are very elaborately carved, and have been erected at the sole expense of the Rector, the Rev. J. B. M. Camm. Against the south pier of the chancel arch a brass, in the form of an angel bearing an engraved scroll, has been placed, with the following inscription:—"To the glory of God, and in loving memory of Anna Maria Camm, who fell asleep, March 30th, 1879. These stalls were dedicated by her son, John B. M. Camm, M.A., Rector of this Parish, June 29th, 1886. 'Be thou faithful unto death, and I will give thee a crown of life.'" The whole of the work has been done by Messrs. Luscombe & Son, carvers and art-workers, Exeter, from the designs of Messrs. Hayward & Son, Exeter. The Rev. J. B. M. Camm has now commissioned Messrs. Luscombe & Son to prepare a carved oak pulpit, with marble pedestal, to replace the present stone pulpit.

DISSENTING CHURCH-BUILDING NEWS

Scarborough.—A new Wesleyan Chapel was opened here on the 2nd inst. The building consists of nave, chancel, transepts, and tower and spire, and the style is Gothic in character. The building is estimated to accommodate 550 people. The cost has been about 5,000l. The building was designed by Messrs. Morley & Woodhouse, architects, Bradford, and the work has been carried out by the following contractors:—Masonry and plastering, Mr. W. Peacock; joiner's work, Mr. Scales; plumber, Mr. Stephenson; painter, Mr. Wrightson; upholsterers, Messrs. Tonks; heating, &c., Messrs. Waters & Woodhouse; and the whole work has been superintended by Mr. Robert Turner (all of Scarborough).

Swanage (Dorset).—A new Wesley Memorial Church was opened in this town on the 1st inst. Externally, the chief material used is the hard local stone, with Langton and Portland stone dressings, while the interior dressings are in Monk's Park Bath stone. The building is in

the style of Late French Gothic, and it has a tower and spire some 110 ft. high. A Caen stone rostrum, worked to the designs of the architects, has been executed and given by Mr. R. Webber, Clapham-road, London, and a three-light window over has been filled with stained glass, representing Faith, Hope, and Charity, the authors of this being Messrs. G. & A. Luxford, of Kentish-town. The whole of the visible woodwork is in oak and pitch-pine. Accommodation is provided for about 530, including the seats in the end gallery. The cost of the building, including value of work and materials given, will amount to some 4,250l. The building has been erected by Messrs. Wellstead & Griffin, of Swanage and Broadstone, and the architects are Messrs. Bucknall & Jennings, of Swanage.

Warkworth.—The new Free Methodist Chapel here has just been opened. The chapel, which is in St. John's-street, is capable of seating 300 persons, and is provided with spacious school-room, vestry, and requisite out-buildings. The plans and designs were furnished by Mr. A. C. Hill, architect, of Derby, and the building and site have cost upwards of 1,000l. It is stated in the local papers that the old chapel at Warkworth, where Mrs. Evans, the "Dinah Morris" of Adam Bede, preached so many years, has now been closed, but it is proposed to commemorate her ministrations by the erection of a memorial tablet in the new chapel. The builder was Mr. W. Asken, of Matlock, Mr. Alfred Shaw being the sub-contractor for the woodwork.

ROMAN CATHOLIC CHURCH BUILDING NEWS.

Glossop.—The memorial stone of the new R.C. Church of St. Mary, at Glossop, was laid on the 3rd inst., by the Right Rev. E. G. Bagshaw, D.D., Bishop of Nottingham. The new church, which is in the Early English style of architecture, and will accommodate about 1,000 worshippers, is being erected to the memory of the late Mr. Francis Sumner, of Park Hall, Glossop, by his heirs, on a site previously given by the Right Hon. Lord Howard, of Glossop. The work is being carried out from the drawings and under the superintendence of Mr. A. E. Dempster, of the firm of Messrs. Dempster & Heaton, architects, Birmingham, the builder being Mr. J. L. Ward, of Manchester. The total cost will be about 12,000l.

Newhall.—The new Roman Catholic chapel, which has been erected in this village at the sole expense of the Countess of Londonderry, Willesley Hall, was opened on the 1st inst. The chapel is in the Gothic style, and is built with pressed red bricks and Mansfield stone dressings. It consists of a large chapel, with open trussed ceiling, porch, sanctuary, organ-chamber, sacristy, class-room, &c., the whole of which are well heated with hot-water apparatus. The front gable contains a piece of sculpture representing St. Edward the Confessor, from whom the chapel takes its name. The roof is covered with Broseley tiles. The whole of the work has been carried out from the designs and under the supervision of Mr. W. T. Hampton, architect, Loughborough. The contractor was Mr. William Earp, builder of Newhall. The building, which is about 90 ft. long by 30 ft. wide, will seat about 500 persons and has been erected at a cost of about 1,500l.

STAINED GLASS.

Cranborne.—The Tregonwell family have just erected a four-light Munich window on the south side of Cranborne Church, in memory of the late Mr. John Tregonwell, of Cranborne and Bournemouth. The subject illustrates the text "Come unto me all ye that labour," and the artists to whom the work was entrusted were Messrs. Mayer & Co.

Kew.—A stained-glass window has been fixed in the apse of Kew parish church by Messrs. Clayton & Bell, of Regent-street, as a memorial to the late vicar, the Rev. P. W. Nott. The glass is described as designed in conformity with the style of the Renaissance. The window contains large figures of Moses and Isaiah, with Predella pictures beneath representing respectively the Sermon on the Mount and the Annunciation. In the opening above the lights is a representation of St. Anne in the

act of teaching a child (St. Anne is the patron saint of the church).

Wellingborough.—A memorial window has just been unveiled in the Wesleyan Chapel, Wellingborough. The window has been presented to the trustees of the chapel by the widow and family of the late Mr. Thomas Norman, as a memorial of the deceased gentleman, and it has been supplied by Messrs. W. James & Co., of Kentish Town, London. It is in three parts. In the centre portion is the figure of Christ surrounded by children, while on each side are representations of angels, in a kneeling posture, bearing inscribed scrolls.

The Student's Column.

STONE QUARRIES.—II.

THE CLASSIFICATION OF ROCKS (continued).

AS the aqueous rocks are pre-eminently the building stones of our country, it will be well to enlarge on their classification, and to give a short account of their distribution. It is occasionally found that similar kinds of stone come from widely-different areas, and we shall now endeavour to connect these areas with one another, showing that certain laws and phenomena govern their appearance. The approximate positions of quarries yielding stones of similar nature will then be better understood, whilst the causes of absence of the quarries from other districts will become apparent.

The aqueous rocks of the British islands are enormously thick, and contain a large suite of organic remains or fossils, by means of which they are capable of being divided into many epochs, and it can easily be demonstrated that there is a regular order of succession amongst them, some being older than others. In some parts, certain of the epochs are more or less extensively developed than in our own country; but the general order of succession holds good for strata all over the world, and does not admit of the slightest dispute.

The epochs are characterised by certain fossils,—that is to say, certain fossils are found in the strata comprising each epoch, and nowhere else. The value of this fact is very obvious, not only in regard to its scientific significance, but to its economic importance. When we look at a collection of fossils in a museum, at first sight there does not appear to be anything which would be at all likely to bring about this result. Most people merely regard them as curiosities, pretty to look at, with long unpronounceable names. It is true that this nomenclature deters many people from understanding their full value; but it is absolutely necessary, however, that each fossil shall bear a distinctive name, and their great abundance and variety preclude the possibility of simple English being used. Moreover, even an elementary student of geology is able to distinguish the principal type fossils, and an outline being established, the details are filled in quite naturally after a little experience.

Let us now proceed to see how they help us. In the first place, they assist in establishing the following broad divisions of the aqueous rocks:

Tertiary.	Pliocene.
	Miocene (absent in England).
	Eocene.
Secondary.	Cretaceous.
	Oolitic.
	Liassic.
	Triassic.
Primary.	Permian.
	Carboniferous.
	Devonian.
	Silurian.
	Cambrian.

The oldest rocks are placed at the bottom of this list, and the newest at the top.

The principal coal seams worked in this country are found in the beds of Carboniferous age, and it will be seen that beds known as Devonian lie underneath them. Now, inasmuch as certain groups of fossils characterise each of these divisions, it will be clear that, if we meet with those which at a certain locality establish the existence of the Devonian rocks, and if these rocks are in their normal position (a fact that can usually be easily ascertained), we need not trouble to look for the coal measures by boring in them, or otherwise.

A great deal of money would have been saved had this been generally known, say, sixty years

ago, when people were accustomed to bore for coal and products of similar great economic value, in rocks where we now know there was not the slightest chance of their being found.

But this is not all. The Carboniferous epoch contains most excellent building materials, and the sandstone quarries in rocks of this age yield stones the quality of which is second to none in the kingdom. How useful, then, are the fossils that can definitely fix such a horizon.

If we calculate the maximum thickness of each of the divisions of strata, as defined by the organic remains which they entomb, and add the whole together, we shall find that the total thickness of the aqueous rocks in the British islands is about twenty miles. Of this, the Primary rocks alone are about 16½ miles thick, the Secondary and Tertiary sharing the remainder.

It must not, however, be supposed that this enormous thickness is met with in any one place or region; neither are all the divisions necessarily complete in any section, no matter how many miles long we make it. Although deep wells frequently aid us in determining the thickness of the Secondary and Tertiary rocks, yet it is rather from measurements taken at places where they "crop out," or come to the surface, that the results are obtained, and the thickness of the Primary rocks is, to a large extent, estimated. If the aqueous rocks were always found horizontally stratified, we should be quite unable to study any but the uppermost three or four of the divisions; but, fortunately, they do not so occur. Generally speaking, they "dip," or are inclined at different angles to the horizon, and the prevalent inclination of the rocks in England is towards the east and south-east. The "strike" (i.e., the direction of the beds at right angles to the dip) will, therefore, be approximately north-east and south-west. And, inasmuch as each of the divisions (except, of course, the Cambrian) is seen lying on its subjacent one, in a regular order of succession, it will be observed that the divisions on plan will run roughly parallel to each other in a north-east and south-west direction. In other words, if the positions of the outcrops of either of the divisions be plotted on a map, it will be seen that they come to the surface only along bands running in that direction. This remark applies rather more correctly to the Secondary and Tertiary than to the Primary rocks, for, as might be supposed, these latter, by reason of their greater antiquity, are more complicated in structure and stratification, and do not, therefore, crop out so regularly. Nevertheless, even the Primary rocks have a general tendency to conform to this rule.

The knowledge of the foregoing facts enables us to see at a glance the approximate position of quarries in stones of similar age and sometimes of a kindred structure. For example, suppose we take the oolitic freestones, we shall find that the principal quarries are situated on a band running from Dorset through Somerset to Gloucestershire, thence to Oxfordshire, Northamptonshire, Rutland, and Lincolnshire, into the north-east part of Yorkshire. The general trend of this band is then north-east and south-west, as we pointed out would be the case, and no quarries in oolitic freestones are found far away from either side of that band.

These observations lead us to the conclusion that, as a rule, the oldest rocks are situated in the western part of England, and the newest in the eastern, so that, if we start in a south-easterly direction from North Wales in the oldest of the divisions (Cambrian), we might pass in upward succession all the divisions, until, having reached the eastern end of Essex, we find ourselves in the newest beds,—the Pliocene, at the top of the list. We shall encounter *en route* gravels, sands, and clays of more recent age than the Pliocene, resting on the various divisions; but these are merely superficial deposits, and for our purposes need not be taken into account.

We have hitherto spoken of the aqueous rocks of England as though they were persistent in thickness and distribution. If this were so, the work of the stratigraphical geologist would soon come to an end; but it is remarkable that, although the Secondary and Tertiary rocks at their outcrops are inclined to be so regular, yet there are considerable variations in thickness, and the minor divisions, both at their outcrops and underneath (as shown by borings), thin out, or become thicker,

as the case may be, in different parts of the country.

To illustrate this, we might mention that under London, Devonian rocks were met with at about 1,060 ft., in a boring at Messrs. Mex & Co.'s brewery, Tottenham Court-road. This boring begins in the lower part of the Eocene. The lower Secondary rocks are very attenuated, some of the minor divisions being quite absent, and the uppermost Primary rocks are missing.

The work of the stratigraphical geologist is thus extremely complicated, and he who knows the extension and development of the different beds, both at the surface and below, is best able to decide on matters connected with coal-finding, water-supply, &c.

As the chemical composition and minute lithological character of building stones vary even in the same quarry and along the same horizon, it is not to be wondered at if, when that horizon is traced over a considerable area, it should gradually undergo a complete change, say, from a limestone into a loose sand. Although many beds are persistent in character,—some of the subdivisions of the oolite and the upper cretaceous (chalk) for example, yet we must not conclude that, because a certain stone of good quality is found in a certain formation in one district, that the formation is made of that kind of stone in another, or, indeed that in the latter district it is stone at all; it may be clay or sand. It must be remembered that the divisions are based on the organic remains found in them, and not on their lithological character.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

9,942, Doors and Door-Fastenings. G. Beadon.

The improvement consists in connecting the movable batten sometimes affixed to the bottom rails with the lock gear, so that by turning the handle the fastening bolt is withdrawn from the striking plate and the movable batten simultaneously raised from the floor before the door is moved on its hinges, and when the door is open the batten is kept elevated from the floor and the bolt kept withdrawn within the lock frame until the door is closed, when the fastening bolt is again moved into its socket in the striking plate and the movable batten closed on the floor by its own weight without the use of springs or rising hinges.

10,082, Roofing. J. Storer.

A paper or millboard is treated on the surfaces or is saturated with an insoluble silicate. First, the paper is saturated with a solution of silicate of soda or silicate of potash, and afterwards a solution of a soluble salt is applied, such as a chloride or sulphate of calcium, magnesium, strontium, barium, or zinc; or the oxides of these metals are applied in powder or made up as a milk or wash. By this means an insoluble silicate is formed as required in or on the paper or millboard, and the soda or potash or salt is removed by washing. The advantage of this material is that when used in certain situations rain water cannot dissolve anything from it, and can be stored for domestic use in a very pure state.

2,833, Spring Balances for Window-Sashes. A. J. Boulton.

This balance, which answers for sashes, gives forth a power substantially of the same strength in all parts of its stroke, and consists in an arrangement of levers placed between the spring and the weight or body to be balanced, so that increased power is secured by increased leverage as the tension of the spring is increased, whilst decreased power results from decreased leverage as the tension is lessened. The arrangement of levers resembles that of the "lazy tongs."

5,994, Preserving Timber. G. Mancion.

This invention consists in saturating the wood with an arsenical preparation in two or three different solutions. These mixtures are applied to the timber after it has been placed in a suitable closed receptacle, and subjected to the action of low-pressure steam to swell the wood and to create a vacuum for the reception of the antiseptic solutions afterwards employed. The process is particularly applicable to railway sleepers, piles, telegraph posts, wood pavement, &c.

NEW APPLICATIONS FOR LETTERS PATENT.

June 25.—8,373, H. Whitaker, Fireproof Construction.—8,380, J. Rothwell, Hoisting Engines.

June 26.—8,417, L. Dondy, Wall Decoration.—8,418, W. Wodson and R. Skeoch, Manufacturing Bricks, Ridge Tiles, &c.—8,425, J. Sawney and C. D. Quick, Sizing loose-coloured Wall-paper and Distemper Decoration.—8,427, T. Roberts, Stove.

June 28.—8,452, R. Thompson, Automatic Window Sash Fastener.—8,456, E. Bailey and C. Mackey, Casement Fasteners, &c.—8,463, W. Horn, Latches for Doors and Gates.

June 29.—8,504, S. Bott and C. Homer, Fastenings for Shutters.—8,529, J. Radford, Springless Door-latch.

June 30.—8,558, T. Twyford, Water-closet Basins.—8,560, G. Barlow, Louvre Brick Ventilators.—8,565, G. Oulton, Flushing Water-closets.—8,564, F. Botting, Flushing Water-closets.—8,563, J. Luke, Paper Floor-coverings.
July 1.—8,523, J. Royle, Self-locking Clamp.—8,524, J. Benjamin, Chimney-pots.—8,537, C. Gumpel, Holding Sliding-asbes at any desired height.—8,543, H. Heine, Fireplaces or Stoves.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,124, G. Frith, Drain Trap.—6,155, J. Shidder, Lavatories.—6,222, G. Sharp, ren., Chimney Top or Ventilator.—6,441, N. Rosekily, Centre Boring Bits.—6,452, H. Haddon, Tonguing Wood or Stone.—6,926, A. Clark, Sawing Machines.—7,079, H. Bridgen, Sash Fasteners.—7,100, J. Rollison, Hedge for Securing Doors and Windows.—7,184, F. Hochul, Saw Sets.—7,250, H. Johnson, Ventilator.—7,333, E. Picard, Mann- and T. Wilson, Ventilator.—7,383, T. Norman and S. Major, Outlets for Ventilators, &c.—8,086, J. Haswell and J. Bosworth, Chimney Tops or Ventilating Cows.—6,086, J. Martin, Draught-preventing Appliances.—6,121, J. and W. Matthews, Brick-making Machinery.—6,182, R. Little, Sash Windows.—6,344, J. Kudjias and J. Vackavet, Gullies and Traps.—6,475, T. and W. Garforth, Tiling Brick or Stones together.—6,563, G. Hardingham, Wood Screws.—8,083, R. Bowman, Electrical Thief-proof Lock.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to operation for two months.

6,579, J. Donny, Tiles.—7,968, G. and R. Dawes, Looks and Latches.—10,384, A. Dalziel, Automatic Electric Fire Alarm.—10,468, C. Perrot and A. Habershon, Sliding Canopy Stoves.—11,110, H. Lake, Pavements, Flags, or Slabs.—12,322, F. Smith, Chimney Top.—9,529, C. Winn, Water-closet Apparatus.—9,617, J. Morrell, Dustbins.—9,664, F. Hea, Sewer or Drain-traps.—10,865, T. Glover, Stench Traps or Gullies.—10,960, D. Law and Others, Fastening for Rain-water Pipes, &c.—14,559, R. Lee and J. Hodgson, Fireproof Pillars and Columns.—5,079, C. Schmidt, Apparatus for Ascertaining the Escape of Gas from Gas-pipes under Ground.—6,688, A. Dalmas, Wood Paving.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JUNE 23.	
By BRUCKLAND & SONS.	
Colebrook, near—Colne Villa, and a cottage, freehold	£515
A plot of market garden land, 1a, 2r, 13p.	215
JUNE 24.	
By BRUCKLAND & SONS.	
Datchet—5 and 6, The Avenue, freehold	1,625
House and shops, schoolroom, and two cottages, part freehold and part copyhold	2,350
JUNE 26.	
By MESSES. SPELMAN.	
Brundell, Norfolk—Two houses and 7a, 3r, 13p.	940
A plot of land, 2a, 2r, 37p., freehold	205
Four cottages with gardens	330
Three enclosures of freehold land 2a, 3r, 39p.	1,076
Two cottages, and 4a, 1r, 0p., freehold	506
Home Close, and 7a, 3r, 14p.	831
Enclosures of marsh land, 62a, 1r, 10p., freehold ..	1,700
JUNE 26.	
By S. WALKER & RUNTS.	
Regent's Park—27 and 35, Avenue-road, 19 years, no ground-rent	1,600
By Gao. GOULDING, & Co.	
Belgravia—17 and 18, Wilton-street, 38 years, ground-rent 10s.	4,220
20, 21, and 22, Wilton-street, 38 years, ground-rent 10s.	6,363
By ELLIOTT, SON & BORTON.	
Edgware-road—No. 63, term 33 years, ground-rent 12s. 12s.	1,210
By T. TURNER.	
Edgware-road—60, Queen-street, 17 years, ground-rent 6s.	340
By GARDEN, BRADON, & Co.	
Upper Tooting—1, Victoria-villas, 78 years, ground-rent 8s. 10s.	690
Upper Holloway—39 and 41, Cromwell-road, 75 years, ground-rent 8s. 10s.	295
By J. P. HOPKINS.	
Acton—29 and 31, Antrobus-road, 65 years, ground-rent 10s.	335
JUNE 29.	
By WESTO & SON.	
Brixton—22, Loughborough Park, 35 years, ground-rent 5s.	381
13, Burton-road, 49 years, ground-rent 8s. 10s.	365
Blackfriars—7 and 8, Hatfield-street, 14 years, ground-rent 11s. 1s.	805
By DAVENHAM, TRENCH, & Co.	
Enfield—Chase Hill House, and 7a, 2r, 33p., freehold	3,500
Brixton—61 and 65, Brixton-rise, 84 years, ground-rent 4s.	3,010
Norbiton—8, Richmond-villas, and plot of land, 83 years, ground rent 1s. 1s.	276
Gipsy-hill—7 and 8, Falcke-villas, 64 years, ground-rent 10s. 6s.	300
By W. WHITELEY.	
Highbury—Whitley House, 77 years, ground-rent 32s. 10s.	1,600
By HAMMAY BROS.	
Wapping—1 and 2, Hilliers-court, copyhold	170
Regent's Park—Ground-rent of 261, term 23 years	360

By BEAL, HURNETT, & ELDRIDGE.
Mile-end—23 to 33 odd, Coborn-road, 16 years, ground-rent 27s. £475 |

Rahing, Haen Green—Howorth Cottage, copyhold
West Kensington—4, and 5, Gladbury-road, 50 years, ground-rent 17s. 2,900 |

By GARROD, TURNER, & HALL.
Suffolk, Stutton—The residence Clipping Hall, and 24a, v. 2p., freehold 7,000 |

Enclosures of land, 26a, 0r, 22p., freehold 1,110 |

Three freehold cottages 450 |

By MESSES. SPELMAN.
Norwich, Sprowston-road—Freehold house and 1a, 1r, 4p. 570 |

St. Giles-street—Freehold house and shop, and the Haven Stores Tavern; two houses in Lower Goat-lane; and three warehouses in Upper Goat-lane 6,080 |

By H. RUTLEY.
Balham—84, Balham-grove, freehold 235 |

Hornsey—42 and 54, Nicholay-road, freehold 360 |

81 and 83, Duncombe-road, freehold 380 |

Freehold coach-house and stabling 400 |

Regent's Park—108, Gloucester-road, 55 years, ground-rent 8s. 250 |

Kilburn—2, Chichester-road, 71 years, ground-rent 8s. 310 |

83, Pembroke-st., 70 years, ground-rent 8s. 10s. 200 |

Holloway—53 and 54, Whistler-street, 94 years, ground-rent 10s. 385 |

Richmond—7 to 19, Rosedale-cottages, freehold .. 1,400 |

Kilburn—65, Princess-road, 70 years, ground-rent 8s. 10s. 385 |

Peckham—39, Avondale-road, freehold 385 |

By MOSS & JAMESON.
Stoke Newington—Fairview Cottage, 63 years, no ground-rent 465 |

June 30.
By D. SMITH, SON, & OAKLEY.
Stockwell—Ground-rents of 140, per year, reversion in about 54 years 3,700 |

By CHADWICK & SONS.
Chiswick—The residence The Cedars, 10 years, and 1a, 1r, 0p., freehold 3,000 |

By E. ROBINS & HINX.
Chelsea—The Vale, 22 years, no ground-rent 1,260 |

By DALE & SON.
St. George's-in-East—Ground-rent of 18s. 18s., term 13 years 110 |

By CROMBIE.
Kennington—Ground-rent of 121, reversion in 24 years 380 |

By G. O. TAYLOR & SON.
Mile-end—29, Beaumont-square, 42 years, ground-rent 4s. 16s. 300 |

By H. S. WOODCOCK.
Kensington—55, Ebury-street, 51 years, ground-rent 6s. 420 |

By BRAY, WEBB, & CO.
Peckham—135 to 153 odd, Kimberley-road, 57 years, ground-rent 50s. 1,110 |

East Dulwich—118 to 122 even, Upland-road, freehold 980 |

180 and 182, Friar-road, 93 years, ground-rent 13s. 400 |

By C. & H. WHITE.
Kennington—No. 265, term for lives, ground-rent 4s. 6s. 1,220 |

Stockwell—47, Stockwell-road, freehold 385 |

Ground-rents of 301s. 3s., reversion in about 66 years 5,630 |

JULY 1.
By WAGSTAFF & WARMAN.
Highbury—15, Highbury Quadrant, 63 years, ground-rent 18s. 18s. 1,300 |

By RILEY & SON.
Berley Heath—Freehold house and shop 900 |

Woolwich—11, High-street, freehold 685 |

By OWEN & CO.
Berley—The freehold residence Easdale 790 |

Bow—8 and 10, Elizabeth-terrace, and factory, freehold 770 |

By G. J. EVERARD & CO.
Anerley—34, Anerley Park, 236 years, ground-rent 15s. 820 |

By NORRIS, THIST, WATNEY, & CO.
St. Martin's-lane—1, 2, 3, and 6, West-street, freehold 5,080 |

Mile-end—33 to 147 odd, Sydney-street, freehold .. 2,640 |

Ground-rents of 77s., reversion in 7 years 905 |

Ground-rents of 31s. 11s., reversion in 10 years .. 610 |

131, Sydney-street, with stabling, &c. 255 |

28, 29, 32, 34, and 36, Raven-row, and extensive premises, freehold, area about 61,000 ft. 1,580 |

4, and 42, Raven-road, freehold 4,800 |

By FOSTER & CARVELL.
Highgate—Ground-rent of 24s. 8s., reversion in 98 years 905 |

Lower Clapton—63, Almack-road, 56 years, ground-rent 5s. 690 |

Willesden-lane—Ground-rent of 21s., reversion in 96 years 285 |

Hampstead—Ground-rents of 16s., reversion in 93 years 495 |

JULY 2.
By F. J. BUCKLEY.
Southwark—21 to 28, Bath-street, 84 years, ground-rent 27s. 380 |

Bernoldsey—131, Alcott-road, 40 years, ground-rent 4s. 7s. 1,650 |

112, Grange-road, freehold 630 |

By TOLME & HARDING.
Fulham-road—276, 278, and 280, term 76 years, ground-rent 4s. 4,383 |

49, 51, and 55, Hollywood-road, 76 years, ground-rent 3s. 3,010 |

Improved ground-rents of 41s., term 76 years .. 860 |

Horton Grove-road—The Oaks House, and 63, Hyde-road, 41 years, ground-rent 13s. 1,600 |

Hackney-road—60 and 62, Weymouth-terrace, freehold 860 |

Peckham—24 and 26, Downe-street, freehold 380 |

Thornton Heath—Ground-rent of 52s., reversion in 37 years 1,200 |

Epping, near—Freehold house and shop 270 |

By GARDEN & SON.
Harold Wood—Five freehold houses on the terrace 41,000 The Post-office, and shop adjoining, in Station-road, 24 1/2 p.m. 610 |

The King Harold Hotel, freehold 1,400 |

Enclosure of land, 33a, 3r, 7p., freehold 9,720 |

Six freehold residences 1,176 |

MEETINGS.

SATURDAY, JULY 10.

Architectural Association.—Visit to the Junior Carlton Club, 2 1/2 p.m.

St. Paul's Ecclesiastical Society.—Visit to St. Mary Cray and Paul's Cray. Train from St. Paul's Station at 3 15 p.m.

Association of Municipal and Sanitary Engineers.—Annual Meeting at Hanley, 10 a.m.

WEDNESDAY, JULY 14.

Parkes Museum.—Extraordinary General Meeting of Members, to consider desirability of amalgamating with the Sanitary Institute and of applying for a Royal Charter, 5 p.m.

SATURDAY, JULY 17.

Architectural Association.—Visit to Fenchurch Place and Chudington. (See advertisement on front page.)

Miscellaneous.

The Dutch Church, Norwich.—At the meeting of the Norwich Town Council last week, the Town Clerk read a letter from Mr. Fred. Oddin Taylor, hon. secretary to a committee of gentlemen who have purchased the lease of the building known as the Dutch Church, St. Andrew's, for the purpose of presenting it to the city, upon condition that the building is for ever hereafter used as an adjunct or accessory to St. Andrew's Hall, subject to the right of the Dutch congregation to use the same two days, a Sunday and a Monday, in each year, for so long as they may desire to do so. Mr. Wild moved—"That this Council warmly appreciates the philanthropic motives which have induced Mr. Frederic Oddin Taylor and the gentlemen named in his letter to purchase the Dutch Church for the purpose of its being for ever hereafter used as an adjunct or accessory to St. Andrew's Hall, subject to the right of the Dutch congregation to use the same two days per annum, on Sunday and Monday, for so long as they may desire to do so, and that the gentlemen of the committee in attendance be at once invited to make the presentation." This, he said, was one of the most graceful things done in this generation. It has rescued a historical building from other uses to public purposes. It was undesirable that St. Andrew's Hall and the Dutch Church should be divorced from each other. No doubt their thanks were primarily due to Mr. F. Taylor for the public spirit with which he had taken up this matter. He took the whole responsibility upon himself, and might have had to bear the entire cost, though he did not suppose Norwich would have allowed him to bear that burden. Mr. Taylor had, however, been to a large extent backed up by his fellow-citizens, and he sincerely trusted that the 200l. still wanted would be shortly forthcoming, so that the committee might be relieved from their responsibility. The motion was agreed to.

The Egypt Exploration Fund.—On Tuesday a special general meeting of the supporters of the Egypt Exploration Fund was held in the Theatre of the Royal Institution, Mr. C. T. Newton in the chair. Mr. Ernest Gardner read a report of the season's work at Naukratis, the earliest Greek city in Egypt, and the chairman laid on the table the first part of the society's forthcoming publication on the excavations and researches now in progress at Naukratis. He pointed out that of five great temples, mentioned by the Greek literary authorities, four had now been discovered, two this season and two in Mr. Petrie's previous explorations. In the *temenos* or shrine of the Dioscuri the plan of a temple built of unbaked mud brick, faced with plaster, had been recovered. In front of it were pillars of the same materials. The temple of Aphrodite consisted only of mud-brick walls, enclosing one, or in the earlier temple two chambers. In front of it was a great altar, built of ashes, held together with a mud-brick casing. The yard of the temple was covered with a layer of fragments which had yielded a great number of vases and statuettes, more or less perfect. These were all of early period, and many were inscribed in the characters of the sixth century B.C. The *temenos* of the Samian Hera had also been found, but had not been rich in results. Some smaller articles had been found in the town, including a beautiful portrait head of the period of Berenike II. in blue porcelain.

The Indo-Colonial Exhibition and Emigration.—The opening of an Emigration Inquiry Office in the Exhibition at South Kensington will for several reasons be regarded as an important step in the right direction. As to its economic significance there is little need for us to speak, though its salutary influence in helping to deplete an over-charged labour-market is obvious. Another aspect of emigration should not be forgotten. There are many in humble life who are and may long continue to be physically sound, but who are constitutionally unsuited to our uncertain climate. Every one is familiar with the lymphatic type so common in Teutonic races. Capable of much muscular exertion, but dependent in a marked degree upon wholesome conditions, it suffers unduly by the crowded and laborious life of great cities. Emigration to the Southern Colonies offers, to any who inherit this predisposition, the opportunity of labour out of doors in an equable climate, and in that the best assurance of healthy development with a maximum of usefulness in time to come. For working men generally, indeed, if they be healthy, active, and sober, the chances, both vital and social, are often more favourable in wider Britain than at home, more favourable in point of daily bread, and, for the enterprising, of advancement. At the same time, all will admit that an emigrant rush is by no means desirable either for the emigrants or the country they leave behind. Fortunately it is not likely to occur. Of our unemployed but able population, particularly in the towns, we may still say there is enough and to spare.—*Lancet.*

A New Application of Electrical Power.—We have before had occasion to place on record the useful work done by means of electricity at Hatfield, both at the Marquis of Salisbury's house itself, and on the estate. In addition to the various operations of lighting, pumping, pile-driving, weed-cutting in the river, &c., another application of the power has just been perfected by Mr. Shillito, the resident electrician on the estate,—one which, as far as our experience goes, is quite novel. Ensilage is being stored on a large scale for the use of stock at one of the farms, where for this purpose some of the old farm buildings have been converted into silos. This year it has been decided to chaff the green food before placing in the silo, and this arrangement has necessitated the placing of the chaff-cutter used in cutting up the rough grass some 20 ft. above the ground. The electrical power is used not only for driving the cutting-machine, but also for elevating the grass to the level of the cutter. Some four tons of rough grass are raised and cut per hour by this means. The generator, a sixteen-light "Brush" machine, driven by a water-wheel, is situated a mile and a half distant, on the banks of the river Lea; the electrical power being transmitted to one of Siemens Bros. D 2 type, specially wound to work as a motor with the "Brush" machine. The same source of power is also brought into use in working the elevators at the various hayricks on the estate.

Improved Folding Lattice Shutter.—This folding lattice shutter, patented and made by Messrs. Rowson, Drew, & Co., has for its object the better guarding of windows and doors of private houses, offices, warehouses, and shops, where space, security, and ventilation is a great object. It consists of two wings of equal size, each of which is composed of a number of perpendicular flat iron bars crossed by a number of short horizontal bars strongly riveted together. The perpendicular bars are regulated in length to the height of the door or window, and are placed at equal distances from each other; the principal perpendicular bars run upon wooden rollers upon the window board or door sill. The lattice is fastened in a suitable manner to the brickwork or panels right and left of the door or window to be protected. The lattice is locked in the centre, also near the top and bottom. The advantages claimed for this folding lattice shutter over ordinary revolving and other shutters are that it is much cheaper, and can easily be fixed anywhere without any alteration to existing brickwork or panels; the windows can be left wide open, thereby admitting light and air, at the same time protecting the room against burglars; it is likewise adapted for nurseries in upper stories.

Pulpit, Ogley Hay Church.—Messrs. Jones & Willis, of Birmingham, have just erected in Ogley Hay Church a Caen stone pulpit.

Building Sites at West Kensington.—Last week, Messrs. Fox & Bousfield offered for sale, at the Auction Mart, the freehold building land in West Kensington forming part of the Mornington Estate, and comprising six acres. It was described as the only uncovered ground now available for building upon in the district, and well adapted for the erection of villa and terrace houses. The property was submitted in six lots, the first lot offered containing nearly three acres, situated close to the proposed continuation of Cromwell-road, southwards, and affording sites for the erection of about sixty houses, or for a large public building or works. The biddings commenced by an offer of 6,000l., and 9,000l. having been reached without any further advance, the auctioneer observed that the sum offered was scarcely one-half its value, in proof of which he said that only a short time since 18,000l. was paid for it, and 12,000l. readily advanced on mortgage. It was ultimately withdrawn at 9,950l. The second lot offered comprised another building site, having a frontage of 500 ft. to the intended continuation of Cromwell-road, for the erection of thirteen houses, but 1,700l. being the highest offer, it was likewise withdrawn, as were also the four other lots, containing together sites for the erection of eighty houses.

Great Depreciation in the Value of Landed Estates in Cornwall.—A notable instance of the decreased value of landed estates in various parts of the country was shown last week at the Auction Mart, when Messrs. Fox & Bousfield offered for sale the Boscastle Estate, situated on the north coast of Cornwall, about seventeen miles from the towns of Lanneston and Bodmin. The estate, which is about 1,000 acres in extent, was described as containing the greater part of the town of Boscastle, with its harbour and quays, upwards of fifty houses, and warehouses and commercial premises, a large number of farms, together with several building sites on various parts of the estate, suitable for the erection of all classes of houses, shops, and trade premises, the whole producing a rental of nearly 2,000l. a year. The first offer for the property was 20,000l., and by advances of 1,000l. each it was brought up to 30,000l. when the biddings slackened, on which Mr. Bousfield, the auctioneer, observed that only two years ago, in 1884, the estate could have been sold for 65,000l., that sum having been offered for it and refused. He announced, however, that it would now be sold at the price offered if there was no advance, serious as the loss would be. It was eventually sold for 35,000l., the auctioneer remarking that never, in the course of a lengthened experience, had he known of such a ruinous sacrifice of landed property.

Society of Arts.—The hundred and thirty-second annual meeting of the Society of Arts was held on Wednesday, June 30th, at the Society's House, in the Adelphi. The annual report was read by the Secretary, and contained the usual summary of the proceedings of the session of the society just concluded. Seventy-six meetings were held, at which papers had been read and discussed, or lectures delivered. The total number of members of the society is now 3,657; the financial condition of the society is prosperous, the revenue of the past year having amounted to 13,450l., against an expenditure of 12,000l., with an excess of assets over liabilities of 13,000l. A ballot was taken for the new Council, and resulted in the re-election of H.R.H. the Prince of Wales as President, and the following, amongst others, as Vice-Presidents:—H.R.H. the Duke of Edinburgh, K.G.; H.R.H. Prince Albert Victor of Wales, K.G.; the Duke of Abercorn, C.B.; the Duke of Manchester, K.P.; Lord Alfred S. Churchill, and Lord Sudeley. Twelve ordinary members of council and two treasurers were also elected, and Mr. H. Trueman Wood as secretary.

Roman Remains at Cologne.—Although Cologne (or rather Deutz across the Rhine) is acknowledged to have been a Roman settlement there is no positive trace of this fact in the works of any Roman author. The first records to this effect are those of the chroniclers of Charlemagne's period. Later writers attribute the erection of the camp to Constantine; while others assign to it the date of Julius Cæsar; there being, however, no historical evidence in support of this latter conjecture. Although remains of a tower and relics of the twenty-second legion were found in 1827, the first organised scheme of excavation was inaugurated by Herr Wolff in 1879. According to

the data he established the camp was almost exactly a square, the length of the sides being respectively 505 ft. and 499 ft. On the east side were four round towers, which jutted out from the walls; the latter being about 12 ft. in thickness. Inscriptions discovered would seem to point to the year A.D. 160 as the period of the foundation of the camp, which was probably strengthened at the time of Constantine. Eumenius assigns to him the construction of the bridge at Cologne, while Karthoff's chronicle of 1499 attributes its erection to Popin the Great. Bishop Bruno, on account of the misdeeds perpetrated by night on the bridge, is said to have destroyed it in 930, the stones being used for the building of the Church of St. Pantaleon. It is, however, considered by Herr Schachert (who lately read a paper on the subject before the Westphalian Architects' Society) that the real reason of its destruction was its shaky condition and the hindrance it formed to the navigation of the Rhine.

PRICES CURRENT OF MATERIALS.

TIMBER.		s. d.		s. d.	
Greenheart, B.G.	ton	6	5	0	7
Teak, E.I.	load	11	0	15	0
Sequoia, U.S.	foot cube	3	2	0	2
Ash, Canada	load	3	0	0	10
Birch	"	2	10	4	0
Elm	"	3	10	4	10
Fr. Dantalo, &c.	"	1	10	0	0
Oak	"	2	10	8	0
Canada	"	4	0	6	10
Pine, Canada red	"	2	10	4	0
" yellow	"	3	0	0	0
Lath, Dantalo	fatton	3	10	5	0
St. Petersburg	"	4	0	6	0
Wainscot, Riga	log	2	15	0	4
3rd, Odessa, crown	"	3	7	6	0
Deals, Finland, 2nd and 1st. 100	"	7	0	8	0
" 4th and 3rd	"	6	0	7	0
Riga	"	6	0	7	0
St. Petersburg, 1st yellow	"	8	0	14	0
2nd "	"	7	0	8	0
white	"	7	0	10	0
Deals, Swedish	"	8	0	15	0
White Sea	"	7	0	17	10
Canada Pine, 1st	"	17	0	30	0
2nd	"	13	0	17	0
3rd, &c.	"	6	0	10	0
Spruce 1st	"	8	0	11	0
3rd and 2nd	"	5	0	7	10
New Brunswick, &c.	"	5	0	7	0
Battens, all kinds	"	4	0	12	0
Flooring Boards, sq. ft. in, prepared, first	"	0	9	0	13
Second	"	0	7	6	0
Other qualities	"	0	5	0	7
Cedar, Cuba, foot	"	0	0	3	4
Honduras, &c.	"	0	0	2	0
Australian	"	0	0	2	0
Madagasy, Cuba	"	0	0	5	0
St. Domingo, cargo average	"	0	0	5	0
Mexican	"	0	0	3	0
Tobacco	"	0	0	4	0
Honduras	"	0	0	4	0
Maple, Bird's-eye	"	0	0	6	8
Rose, Rio	ton	7	0	10	0
Bahia	"	6	0	10	0
Box, Turkey	"	5	0	17	0
Satin, St. Domingo	foot	0	0	7	0
Porto Rico	"	0	0	8	0
Walnut, Italian	"	0	0	4	0
METALS.		s. d.		s. d.	
Iron—Fig. in Scotland	ton	0	0	0	0
Bar, Welsh, in London	"	4	10	0	17
" " in Wales	"	5	0	4	0
Staffordshire, London	"	5	0	6	10
Sheets, single, in London	"	6	15	0	10
Hoops	"	6	9	7	0
Nail-roads	"	5	10	0	10
COFFEE.		s. d.		s. d.	
British, cake and ingot	ton	43	0	0	43
Best selected	"	43	0	0	44
Sheets, strong	"	49	0	0	50
India	"	46	0	0	47
Australian	"	0	0	0	0
Chili, bars	"	39	10	0	39
YELLOW METALS.		s. d.		s. d.	
Lead—Fig. Spanish	lb.	13	2	6	13
English, common brands	"	13	2	6	0
Sheet, English	"	14	2	6	14
SILVER.		s. d.		s. d.	
Silesian, special	ton	14	3	14	5
Ordinary brands	"	14	0	0	0
TIN.		s. d.		s. d.	
Banca	ton	0	0	0	0
Biliton	"	0	0	0	0
Straits	"	100	0	0	0
Australian	"	200	10	0	0
English ingots	"	104	0	0	0
ZINC.		s. d.		s. d.	
English sheet	ton	18	0	0	18
OILS.		s. d.		s. d.	
Linsed	ton	21	5	0	21
Cocconut, Cochín	"	32	10	0	32
Ceylon	"	28	5	0	0
Copra	"	0	0	0	0
Palm, Lucas	"	24	0	0	0
Palm-nut Kernel	"	0	0	0	0
Rapeseed, English pale	"	22	10	0	0
" brown	"	21	0	0	0
Cottonseed, refined	"	18	0	0	18
Tallow and Oleine	"	25	0	0	0
Lubricating, U.S.	"	6	0	10	0
" Refined	"	8	0	13	0
TURPENTINE.		s. d.		s. d.	
American, in casks	cwt.	1	4	0	0
Tab—Stockholm	barrel	0	17	0	17
Archangel	"	0	10	0	11

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Exposés of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Rebuilding Workhouse	Elham Union	211.	August 30th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Enlargement of Schools	School Bld for London	Official	July 13th	ii.
Keelung, Tar-paving, Metalting, &c., Works	Lewisham Board of Wks	do.	do.	ii.
Repairing and Painting Schools	Lambeth Guardians	do.	July 14th	ii.
Cast-Iron Lamp Posts	Hackney Board of Wks	J. Lovegrove	do.	xiii.
Broken and Unbroken Stone	Hull Corporation	J. Fox Sharpe	July 15th	ii.
Paving	St. George-in-the-East Vestry	Official	do.	ii.
Painting and Repairing	Poplar Poor Law Union	Hills & Fletcher	do.	ii.
Erection of House, Hampstead	Midland Railway Co.	A. A. Langley	do.	ii.
Erection of Business Premises, Cardiff	D. Duncan & Sons	S. Rooney	do.	xiii.
Repairing, Cleaning, and Painting Schools	School Bld for London	Official	July 16th	ii.
Timber Supply	Lincolnshire Co. Asylum	Official	do.	ii.
Construction of Sewers	Dir. of Army Contracts	G. F. Deacon	July 19th	ii.
Iron Hurdle Fencing	Arton Local Board	C. N. Layley	July 19th	ii.
Tar Paving	Epsom Local Board	F. H. Goddard	do.	ii.
Raising Portion of River Wall	Greenwich Bd. of Wks.	Official	do.	xiii.
Pipe-Sewers, &c.	War Department	do.	July 21st	ii.
Well Sinking	Newport Pagnell R.S.A.	G. W. Branson	do.	xiii.
Brick Sewers, &c.	St. Marylebone Vestry	Official	July 22nd	ii.
Erection of Shed, &c.	Roche, & Gaigst C	do.	do.	xiii.
Stone (Flags, Kerb, and Edging)	Malton U. S. A.	T. L. Webster	July 24th	xiii.
Drainage, &c., Darent Asylum	Met. Asylum Board	A. & C. Harston	July 26th	ii.
New Post-Office, Allershot	Com. of H.M. Works	H. Hutton	July 27th	ii.
Town-hall, Municipal Offices, &c.	Dewsbury Corporation	T. Hallam	do.	ii.
Erection of Infirmary	Barnet Union	do.	July 28th	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Superintending Architect	Met. Board of Works	1,500l.	July 14th	xvi.
Surveyor and Sanitary Inspector	Hewley-on-Thames Cor.	130l.	July 19th	xvi.

TENDERS.

BETHNAL-GREEN.—For alterations at the Cambridge Arms, Bethnal-green, for Mr. F. Ormer. Mr. Edward Brown, surveyor, 18, Hanbury-street, Spitalfields.—
 Matt 270 0 0
 Hawkins 211 0 0
 Buckle 200 0 0

BRISTOL.—For building party-wall at 69, Victoria-street, Bristol, for Messrs. Price & Titley. Messrs. J. W. Trew & Sons, architects, Broad-street, Bristol. Quantities not supplied—
 Thos. Penny (masonry only) £114 0 0
 Wm. Norris 81 17 8
 E. C. Howell & Son 78 0 0
 Enoch Gay (accepted) 68 0 0
 [All of Bristol.]

CARDIFF.—For the erection of Calvinistic Methodist Mission Hall, Cardiff. Mr. J. H. Phillips, architect, Cardiff.—
 C. Gray £1,137 0 0
 D. Thomas (accepted) 924 0 0

CREWKERNE (Somerset).—For factory at Crewkerne, Somerset, for Mr. John Henry Walter. Mr. Henry Hall, architect, Doughty-street.—

Wheeler & Gregory, Radstock £2,180 0 0
 Draper, Crewkerne 1,821 5 5
 Howell & Son, Bristol 1,875 0 0
 Trevena, Plymouth 1,829 0 0
 Paull, Merriott 1,825 1 11
 Cox, Yeovil 1,824 6 0
 Poole, Ilminster 1,829 0 0
 Davis & Son, Dorchester 1,775 7 11
 Gibson, Exeter 1,760 0 0
 S. & J. Staple, Stoke-under-Ham 1,730 0 0
 Symes, Combe St. Nicholas 1,718 0 0
 Hann, Stoke Abbott 1,635 0 0
 Pitman & Rowell, Stoke-under-Ham 1,525 10 0
 Lye & Son, Crewkerne 1,490 0 0
 Mumford, Crewkerne 1,460 0 0

HOLLINGBOURNE (Kent).—For hospital for infectious diseases, for Hollingbourne Union. Mr. Hubert Benoit, F.R.I.B.A., architect:—

Wallis & Clements, Maidstone £2,127 0 0
 Reeves, Staplehurst 2,097 0 0
 Marley, Delling 2,083 0 0
 Barden, Maidstone 1,973 0 0
 Aard, Maidstone (accepted) 1,830 0 0

ISLINGTON.—For proposed alterations, &c., to the Pied Bull public-house, No. 1, Liverpool-road, for Messrs. Tomalin & Anstias. Quantities supplied. Messrs. Bird & Walters, architects:—

Patman & Fotheringham £735 0 0
 Langridge & Son 721 0 0
 Goad 670 0 0
 Burch & Co. 659 0 0
 Jackson & Todd 610 0 0
 John Anley 607 0 0

KENSINGTON.—For additions to 1, Redcliffe-square, for Miss Armitage. Mr. Henry W. Braddock, architect:—

Lidstone, Finsbury Park (accepted) £275 0 0

LODDON (Norfolk).—For additions and alterations to Police Station, Loddon, for the Magistrates of the county of Norfolk. Mr. T. H. B. Heslop, A.M. Inst. C.E., County Surveyor, Norwich:—
 G. E. Hawes, Norwich £240 0 0
 Horsace Lacey, Norwich (accepted) 173 0 0

LONDON.—For new staircase at Congregational Memorial Hall, Farringdon-street. Mr. W. D. Church, architect, South-place, Finsbury. Quantities by Mr. C. Stanger, Finsbury-pavement.—
 Jas. Holloway, Marmion Works, Laven-der-hill, S.W. £969 0 0

LONDON.—For fitting up premises, Tottenham-court-road, as a Branch Bank for the Central Bank of London (Limited). Messrs. Hammack & Lambert, architects:—
 Jones & Hoppers £1,741 0 0
 Colls & Sons 1,663 0 0
 J. H. Johnson 1,615 0 0
 Brass & Son 1,597 0 0
 T. L. Green 1,585 0 0
 G. Colls 1,335 0 0

Heating.

Stanhish £70 10 0

LONDON.—General repairs, &c., to Norfolk House, Albert-road, Regent's Park, for Mr. G. Heigham. Mr. James Lawes, architect:—

Years & Co. £102 15 8
 Allard 79 0 0
 Allard 75 0 0

LONDON.—For rebuilding the New Inn, Tottenham-court-road, for Messrs. Cakebread. Mr. W. T. Farthing, architect:—

E. Pickersgill & Co. £2,893 0 0
 E. Lavrance & Sons 2,875 0 0
 J. & J. Greenwood 2,769 0 0
 B. Cook (too late) 2,769 0 0
 T. L. Green 2,769 0 0
 S. R. Lambie 2,765 0 0
 W. Scrivener & Co. 2,714 0 0
 R. Mart 2,714 0 0
 Spencer & Co. 2,640 0 0
 Jackson & Todd 2,493 0 0
 Leslie & Knight (accepted) 2,418 0 0

LONDON.—For the erection of new granaries and loft at the premises of the London Road Car Company, No. 9, Grosvenor-road, Pimlico. Mr. H. J. Newton, architect, Queen Anne's gate:—

Barnes & Sons £1,197 0 0
 Godden 1,195 0 0
 Walker 1,170 0 0
 Chasen 1,167 0 0
 London 1,119 0 0
 Smith, Post-street (accepted) 845 0 0

LONDON.—For painting, cleaning, and repairing schools, Minn-road, Old Kent-road, for the School Board for London:—

Howell & Son £560 0 0
 Knight & Walden 486 0 0
 C. A. Mackrell & Co., East Dulwich 399 0 0
 Holloway 335 0 0

LIDDESDEN.—For two houses, outbuildings, and boundary-walls, Liddesden. Wall-stones and ashlar found by proprietor. Mr. T. L. Patchett, architect, Halifax:—

Accepted Contractors.

Excavator, Mason, and Bricklayer's Work.—J. & W. H. Fletcher, Liddesden.
 Carpenter and Joiner's Work.—Edwin Marland, Liddesden.
 Plumber and Glazier's Work.—James Alderson, Liddesden.
 Plasterer and Slater's Work.—J. & T. Alderson, Liddesden.

[Total cost, 376l.]

LYMINGTON (Hants).—For the erection of an infants' school to accommodate 250 children. Mr. Horne, Town Surveyor, architect:—

J. Pearce £1,245 0 0
 F. Beale & Son 813 0 0
 Rushley Bros. (accepted) 795 0 0
 [All of Lymington.]

PECKHAM.—For painting, cleaning, and repairing schools in Cater-street, Peckham, for the School Board for London:—

D. McNeil £728 0 0
 E. C. Howell & Son 650 0 0
 C. A. Mackrell & Co., East Dulwich 494 0 0
 Johnson 443 0 0
 Parker 402 0 0
 Knight & Walden 366 0 0
 Holloway 366 0 0

PLUMSTEAD (Kent).—For three houses in Herbert-road, and two houses in Ripon-road, Plumstead, Kent, for Mr. J. Glock. Mr. Henry H. Church, architect, Wokingham:—

Johnson £2,750 0 0
 Combs 2,635 0 0
 Fen 2,470 0 0
 Loneragan Bros. 2,465 0 0
 Covil 2,370 0 0

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.

IRON CISTERNIS.

F. BRABY & CO.

LONDON, LIVERPOOL, GLASGOW.

VERY PROMPT SUPPLY.

LARGE STOCK READY.

CYLINDERS FOR HOT-WATER CIRCULATION

Particulars on application.

Chief Office: 360, EUSTON ROAD, LONDON.

ILLUSTRATIONS.

St. Peter's Church, Streatham: Original Design for the Completion of the West End.—Mr. Geo. H. Fellowes Prynn, Architect.....	92.93
Adopted Design for the Completion of the West End of St. Peter's Church, Streatham.—Mr. Geo. H. Fellowes Prynn, Architect.....	96
Tulior of the West End of St. Peter's Church, Streatham.....	97
Sunderland Municipal Buildings Competition: Third Premiated Design.—Messrs. Doubleday & Caws, Architects.....	100-101
Screens in the Bombay Court of the Colonial and Indian Exhibition.....	104, 105

CONTENTS.

Architectural Sketching for Students.....	81	St. Peter's Church, Streatham.....	90	The Student's Column: Stone Quarries.—III.....	109
Disputes between Building Societies and their Members.....	82	Screens from the Indian Exhibition.....	90	Books: Die alten Kyprien in Kunst und Cultur; Adolf Beck-	109
Notes.....	83	Sunderland Municipal Buildings: Third Premiated Design.....	90	ticher; Conder's Iron Process (Billing); Merriam's Me-	
Machinery at the Colonial and Indian Exhibition.....	84	Sanitary Institute of Great Britain: Annual Dinner.....	107	chanics of Materials, &c. (Trübner); Goodie's Manual of	
The Topographical Society of London and Vischer's View of 1816	85	Improvements in Ship Ventilators.....	107	Mechanics (Longmans); Templeton's Practical Mechanic's	
Indian Craftsmen.....	86	Building Land at Baguot.....	107	Workshop Companion (Lockwood); Thurston's Treatise on	
Architectural Association: Visit to the Junior Carlton Club.....	87	Royal Academy: Admissions to the Architectural School.....	107	Friction (Trübner); Calvert's Mechanic's Reference Book	
The Brent Memorial.....	88	Light and Air Case: Large Clauses, but Small Damages.....	107	(Heywood).....	111
The Natural History Museum at Hamburg.....	88	Screen v. Clements, Jackson, & Co.....	107	Recent Patents.....	111
The Ancient Boat at Brigg (Illustrated).....	88	Sunderland Municipal Buildings.....	107	Recent Sales of Property.....	111
Association of Municipal and Sanitary Engineers and Surveyors	89	Provincial News.....	108	Meetings.....	112
Architectural Societies.....	90	Church Building News.....	108	Miscellaneous.....	112
A Cerebral Trowel (Illustrated).....	90	Disentangling Church Building News.....	109	Prices Current of Building Materials.....	112

Architectural Sketching for Students.



T this time of year, when all the world is thinking of holidays, almost every earnest student of architecture, young or old, is hunting up materials and turning over maps and "Murrays" in preparation for that most delightful and now universal form of study, a sketching trip.

Sketching trips as holidays have this immense advantage to all constitutionally industrious individuals (and constitutional industry is still a failing with many Englishmen), that while they are recreation from routine office work, and involve the taking of a great deal of healthy exercise and many changes of air and scene, they yet involve also a great deal of hard work of a substantially useful and even, in the end, remunerative kind. It is no exaggeration to say that any architectural student who has any real enthusiasm or love of his art is quite certain to work longer hours and to keep closer to his work, when taking such a journey as we are speaking of, than he does in his ordinary course at home. He usually starts with a programme far more comprehensive than he can properly carry out,—probably one or two good-sized towns are to be "done" in a week, not to speak of expeditions to outlying places of interest. This, it is true, is certain to be gradually thrown over, and would be so sooner, but that at each point he promises himself he will return next year or the year after; but even then he is very unfortunate, or very dense, if he does not find so much to study that, get up as early as he will and slip into his work as briskly as he may, and leave all he can in the way of titles and dates and notes to be written in the evenings, still he will leave each place with a sigh, and very likely run the risk of losing his train by stopping on his way to the station to note something he has missed before.

And this leads us to recommend to the inexperienced that, if their work lies in a town, they should not be in too much hurry to sit down to it, but should leave sufficient time to thoroughly inspect the place first, and decide upon what is of most interest and to be first tackled. Of course it is possible to overdo the sight-seeing and neglect the sketching, but the first should have its place too.

We may, perhaps, be allowed to doubt, not the value of real sketching to the real student (that cannot well be exaggerated), but whether its advantages have not been so often and so

strongly insisted upon that many a youngster in the profession has got a notion that all he must do to become an "artistic" architect is to sketch; how or what, it matters very little, if at all,—only he must sketch; and some such beginners have gone abroad on long and expensive journeys with insufficient knowledge either of sketching or of what is worth sketching, to come home again with a great many sheets of laboured drawings, chiefly of architectural curiosities, but with a minimum of benefit to their professional knowledge.

Some study and preparation is necessary for sketching, as for most other things, and, if a man is to reap the full benefit of his labour, it is also necessary for him, in this as in other matters, to consider the end for which he is working. Sir Gilbert Scott was a great sketcher, and he and the other church-restorers of his time had very definite aims and ideas upon the subject; they wanted "precedents," they wanted to master the details of styles which had not previously been studied, and a knowledge of which it was impossible to obtain, even superficially, except by a close study of buildings of the period; therefore, they did what Sir Gilbert Scott recommended in one of his Royal Academy Lectures, they sketched everything,—that is, everything Gothic, anything that was not Gothic was not "anything" to them,—and they measured most things, and succeeded in obtaining a knowledge of the details of the Gothic periods which was very remarkable; whether they succeeded in being good architects in all respects we need not discuss. Now, we cannot, even if we would, all of us be church-restorers, but we shall nevertheless not go far wrong if we do what we may to follow the same course, only remembering that "everything" should for us mean everything beautiful or profitable for instruction, and that we must not regard these qualities as special to any one style. To 'prentice hands we would say, "Avoid curiosities and grotesques." 'Prentice hands are uncommonly fond of curiosities, but of all things they are least profitable; what is most profitable and most likely to "come in useful," is what is unpretentious, or sometimes even what is in a certain sense, common-place.

William Burges used to say that the object of architectural sketching is to find out how certain effects that we admire have been produced, not that we may reproduce them, but that we may know how to proceed generally to produce effects that we want; and he argued that to get this knowledge the only way to proceed is to carefully draw and measure every detail of a subject down to the mouldings and ornaments, and even the jointing of the materials. We think that students may have other

objects in sketching than this, and that, however useful it may be to make thorough and complete studies from time to time, yet perspective sketching and the noting of details with, at most, only a few general dimensions, have many great and distinct uses, and have the advantage of occupying very much less time; time being, as we have pointed out, generally of paramount importance. We do strongly recommend that every sketch should have a few general dimensions noted upon it, but we think that the making of regular measured drawings is a separate, and in some ways more serious, branch of study altogether, and that it should not be ranked as "sketching" at all; and if this classification were observed, a good deal of confusion and controversy on the subject might be avoided.

Taking all things into consideration, the best kind of sketch is a perspective view in outline, or with a minimum of shading, and, on the back, or round it, or on the opposite page of the book, copious written and graphic notes of whatever is worth noting,—plans and details, dimensions, colour, materials, date, position, and construction,—as well as notes of any ideas which the subject may, at the moment, suggest, whether with regard to restoration or to improvements which might have been introduced or defects in the design or the object of the sketch, and in what way it may be useful; all of which may seem very obvious and easily remembered at the time, but are as likely as not to have escaped the memory a few months, or even a few weeks, afterwards. We do not say, "Make notes on all occasions on all these points," but only upon such of them as may seem worthy of record. It may often happen, in fact more often than not, that one or two of the points mentioned are alone worthy of record, and that the perspective view in particular may well be omitted. If colour is one of the things to be noted, good coloured crayons may sometimes be found useful to give memoranda, and are more expeditious and less troublesome to the inexperienced than water-colours; but the ability to make a rapid water-colour sketch, be it remembered, will be found something more than an ornamental accomplishment. The making of finished water-colour drawings, or of highly finished drawings of any sort, on sketching tours, is a thing to be discouraged as a waste of time, unless, indeed it be done with the laudable object of raising money for another trip by having results to show to unprofessional friends which they can appreciate.

For the sake of avoiding the waste of precious opportunities, it is very desirable that students should have some facility in sketching before going far afield for study, as well as a sufficient knowledge of architecture

to know good from bad, or at least to be able to judge a little what is likely to be worth study and what is worthless. For the latter kind of knowledge, general study and mixing with one's fellow students must be trusted to; for the former, a special effort ought to be made by practising at every opportunity upon buildings within easy reach, or the objects in an art museum, remembering that subjects simple in outline, without much detail, should be chosen for first efforts. We knew a young man who took the flying buttresses round the apse of Cologne Cathedral for his first subject. He was not very successful.

Every expert sketcher has his own method of working, and his own style. The old receipt for learning to throw a fly, and for so many other things, "Watch an expert," is the best to recommend to a tyro. Architectural sketchers are good-natured people as a rule, and no young man ought to have any difficulty in finding an experienced friend to give him a lesson. If, however, he cannot do so, he must do his best to draw what he sees, and as nearly as possible as he sees it. Let him begin by drawing the leading lines in a series of light dots, marking their terminations and intersections, and keeping the perspective of straight lines and arches clearly in his mind,—a knowledge of perspective being, of course, absolutely essential to the architectural sketcher. These lines must then be drawn in firmly and freely, in single strokes, with as little hesitation and as few breaks as can be accomplished, "painting up" especially being avoided. Before putting any decisive line on paper, we recommend the young sketcher to take a careful survey with his eye of the main proportions of the whole structure he is about to draw, regarding it for the moment *en bloc*, as a mass of a certain size and proportion, and noting carefully the proportions of height to width of the principal parts as they will have to go on the paper. Horizontal or vertical architectural lines may strongly influence the apparent height and width of the stages of a tower, for instance, and convey a deceptive impression at first glance; and if the sketcher puts in the main outlines and string-courses from first impressions, he will often find, when he begins to fill in details, that the whole compartment is wider and lower in proportion than it appeared to the eye. Similarly, a side of a building that is seen in rather sharp perspective is often very deceptive to the inexperienced sketcher; it contains all the detail of the other side, though in a crowded-up aspect, and the beginner is often surprised to find how much he has over-estimated its perspective width, and into how narrow a strip of his paper it has to be compressed. The leading lines are really the difficulty, and the beginner should not be discouraged by any number of failures at first, nor should he fear up his early efforts: they will serve later on to encourage him by showing his progress. This first difficulty overcome, filling in the detail will be all plain-sailing enough. It is a good plan to sketch habitually on a large scale; nothing so much conduces to freedom of style, and it gives the opportunity when occasion arises of showing bits of detail with extra precision and clearness; constant sketching in small note-books cramps the hand and leads to a scrappy and untidy manner.

So long as a sketch shows all that is required of it, and is clear and accurate, much shading and finish are unnecessary,—in fact, the more white paper there is, and the less lead pencil, the better, as a rule. An effort should be made to give every stroke of the pencil a distinct and appreciable value; a few brick or tile lines on the shadow side, if skilfully placed, may be made to express shade and surface for the whole sketch; the lines of a string drawn at the ends, or of an arch drawn at the spring and apex, will readily indicate to the eye their existence throughout, and their omission, at least, where high light would naturally fall, gives an air of brightness and sunshine to the picture of incalculable value to its effect. Carving, if sketched in line, is best expressed almost entirely by shading, the lines of which follow its contours.

Similar principles hold in water-colour

sketching; clearness and brightness are the things to be aimed at; the effect should be obtained with a few washes and as little work as may be, and detail indicated by little bits, carefully and accurately drawn, at the points where they will best tell their tale.

It is almost unnecessary to say that, in sketching, the effects of reflected light should be kept in mind, and, without attempting picture-making, there is no harm in an effort to produce pleasant grouping and to give objects their legitimate value with respect to their distance from the picture plane. It should be recollected that a cast shadow is darker than the shadow side (the shadow side getting reflected light from the parts beyond the cast shadow), that the edges of a shadow are darkest to the eye (by contrast with the adjoining light portion), that all dark objects look darker against light ones, that all objects look dark against the sky, that horizontal surfaces are usually lighter than vertical ones, that figures of men and animals generally look dark against buildings, and that light and shade are both strongest and most contrasted in the foreground, and both fade into grey as distance increases. Grouping is too wide a subject to say much about here; the easiest group to manage is a pyramid with something high and marked, such as a tower or gable for a centre, and the other objects grouped round it; this central object should not, however, occupy the middle of the paper, but be a little on one side or the other. In drawing a long building it will often be found that all the main lines of the sketch run down towards one side. This is always unpleasant, and if there is no existing object at the end to restore the balance, it may sometimes be done by indicating a few clouds running in the opposite direction or by putting in an imaginary tree (if it is not out of place) or some other object.

The subject of materials is an important one, especially to beginners, who, above all others, should use the best, in order to give themselves the best chance of producing good work. Old hands may be able to do well, though even they will not do their best, under disadvantageous circumstances of all sorts; but for the inexperienced to be careless in the matter of paper, pencils, or colours, is to court unnecessary difficulties and to lay themselves open to irritating if not disheartening failures. For pencil sketching the paper (for architectural subjects, which alone we are here discussing) can hardly have too fine or smooth a surface, provided it is not greasy or "glazy"; the best surface that could be found is really that of the note-books prepared for "metallic" pencils; firmness to resist the pencil-point and thickness sufficient to resist any tendency to buckling or warping from being worked on are also essential. Most expert architectural sketchers now use thin millboard for pencil sketches as best combining all these qualities, but the sheets are sold separately, and a block of good paper is often more convenient. It is false economy to buy cheap pencils: they constantly vary in hardness and the lead often breaks at critical moments, and from the number of faults in it involves a loss of time (and temper) and a cutting to waste of the pencil, which soon balances the saving in first cost. Pencils for general purposes should be of medium softness: if too hard it is impossible to make an effective line with them, if too soft the point is worn away with the first few touches, and fine drawing becomes impossible. An F or HB may be recommended, but it must depend a little upon the heaviness of the sketcher's hand. We have found a good HB the best in most cases.

The sketcher of buildings should not despise the occasional aid of a small T-square or straight-edge, and he will often find it useful to be armed with a pair of Napier compasses. A two-foot rule and pair of five-foot rods are, of course, essential, as is also a small sketching stool; but cyrnographs and cameras are best left at home. We strongly recommend the use of tube water-colours rather than pans. They sometimes involve a little waste, but that is more than compensated by their remaining always moist. Small hand-palettes

are now made for taking squeezes from the tubes for a day's use, as may be required. With regard to colours and brushes we would say again "use the best." Some few very clever people sketch in brown or black ink; it is excellent practice, leads to great clearness and precision, and (as rubbing out is impossible) it obliges the sketcher to consider carefully every line before drawing it; but, to avoid smudging, it is necessary to work from one corner of the paper to another, instead of bringing every part forward together, and it lacks the freedom of pencil.

Much has been said, and much remains that might be said, about the pains and pleasures of sketching. We believe that few who have experienced them will regard the former as in any sense equal to the latter, and we strongly recommend those who have no experience to gain it at once.

In conclusion, let us give the tyro one piece of advice. Do not let the crowd, which is sure to gather round every sketcher, annoy you. It is seldom ill behaved, and generally too much interested to be so; if, in their eagerness to see, some persons are rude enough to get in front of you, a shout from the rest is the common result, and always effectual; if it does not come, a good-humoured protest is the best remedy. We have only known it fail twice, and on each occasion the indignation of the other bystanders was sufficient to make the offender humble at once. It is, of course, not pleasant to be overlooked by a crowd, but it is, after all, very complimentary, and the sketcher should lay that flattering unction to his soul, and try to enjoy his popularity.

DISPUTES BETWEEN BUILDING SOCIETIES AND THEIR MEMBERS.



WE are supposed to be a practical people, but in many respects this cannot truly be said of us. Certainly, in regard to our legislation, it would be difficult to be less so. The legislation as to building societies well exemplifies this. A subject cannot be named on which it is more advisable that legislation should be clear and uninvolved; but, in the course of the present reign, there have been four Acts of Parliament passed on this subject, all of which are more or less still in force. The latest was passed in 1884, and it might not have been unreasonable to suppose that, instead of adding another amending Act to those already in the statute book, the occasion would have been seized to pass a single Act amended up to date. But nothing of the kind was done; on the contrary, the first section informs the reader that the Act in question is to "be construed as one with the Building Societies Act, 1874, the Building Societies Act, 1875, and the Building Societies Act, 1877." Such legislation as this on a subject of importance to large numbers of persons should not be continued for a day longer than is possible. These Acts should all be repealed, and the law relating to Building Societies should be compressed into one statute clearly drawn up. The subject is one which may reasonably be commended to the notice of the new House of Commons. It is in no sense a party question, and there can be little doubt that if a few large Building Societies were to urge the necessity of a clearing up of the law upon a few members of Parliament the subject might be treated of in a single clear and explicit Act of Parliament. The Act of 1884 contains but a single operative section, and its intention was to put an end to the continual litigation as to the meaning of the word "disputes" in previous Building Societies Acts, so that there might be no question as to what differences were or were not to be submitted to arbitration. It says, "the word disputes in the Building Societies Acts, or in the rules of any society thereunder, shall be deemed to refer only to disputes between the society and a member, or any representative of a member in his capacity of a member of the society . . . and in the

* When sketching with ink it is well to first lightly dot the principal points, as a guide to the eye in filling in the lines.

NOTES.



THE result of the late General Election is clear. The reform of the Government of London is relegated to the dim and distant future. The immense preponderance of Conservative members returned by London will clearly be a complete barrier to any large scheme. We are inclined also to think that the division of London into a number of Parliamentary divisions is calculated to foster local feeling, and will thus be an influence working against the establishment of a single municipality for London. It is curious to contrast the grumbling which goes on against the local bodies of London with the apparent absence of any enthusiasm among the electors at Parliamentary elections for a municipality for London.

THE Richmond Vestry have at last taken the decisive step, so far as their powers extend, towards the purchase of the estate of the Duke of Buccleuch at Richmond. They have applied to the Local Government Board for sanction to borrow 30,000*l.*, the sum asked by the agents of the Duke. A provisional agreement has already been entered into between the agents and the Vestry, by which the latter authority agrees to pay the above sum on condition that the borrowing of the money is sanctioned by the Local Government Board. The Vestry have resolved to apply to the Corporation of London for a grant in aid of the purchase; but it is understood that several members of the Common Council have expressed themselves unfavourably regarding the proposed grant; falling evidently to see the transaction in the lights of the Richmond Vestry, that it is one of Metropolitan, if not national interest. The principal argument adduced in favour of the purchase is, of course, to preserve this beautiful estate from the "inroads of the ruthless builder." There seems to be, however, judging from the expressions of opinion at the meetings, a considerable section of the inhabitants who object to the purchase, not only because of the sufficiency of recreation grounds already in the vicinity of Richmond, and the existence of high rates, but because it is the very kind of estate which they think should be built upon with properties of a high rateable value, which would add a considerable quota to the rate fund of the town. The Richmond Vestry has just applied for sanction to borrow 96,000*l.* for a drainage scheme, and it is natural that some of the ratepayers should regard with anxiety this proposed further increase of their financial burdens. It is, however, a matter of real interest, not only to Richmond, but to Londoners and visitors to London generally, that one of the most beautiful scenes on the Thames should not be spoiled; and we hope this view of the scheme will not be overlooked by the public bodies who are asked to contribute to so desirable an object.

THE interest which is riveted on the electoral returns has prevented that attention being given to the railway returns for the half-year which they certainly deserve. On twenty principal lines of the United Kingdom 540,000*l.* less has been received in the first half of 1886 than in the corresponding period in 1885, which had shown a reduction on 1884. It does not follow that the net earnings of the shareholders will be decreased by this amount, which is equal to about 2 per cent. of gross revenue. Economies in working, no doubt, will be shown on the *per contra* side. But then a larger capital will be entitled to interest than was the case in 1885. A few weeks will tell how each of the great lines is affected by this twofold change. But it is evident that dividends cannot increase, and that, in many cases, they may decline.

ABOUT six months ago a public meeting was held at the Mansion House, under the presidency of the Lord Mayor, Alderman Staples, F.S.A., to consider certain suggested improvements eastwards of St. Paul's Cathedral, consequent upon the removal of St. Paul's

School to Hammersmith. An influential committee was nominated at the meeting with instructions to examine into and report upon the possibility of arresting any further progress with the buildings that were already in course of construction upon the site under debate. We do not know whether any report has been presented by the committee, or to what extent they found themselves able to pursue the inquiry which was entrusted to them. This, though, is certain,—the new buildings are rapidly approaching completion, so that the question of clearing the ground at the Cathedral's eastern end is, for some time to come, entirely closed.

IT is satisfactory to find, from what Professor Fream stated at a recent conference at South Kensington, that our Colonies have arrived at a very practical understanding as to the absolute necessity for preservative laws for their forests, one of the most valuable of all colonial resources. In Australia, especially, where trees used to be cut down in the most reckless and wasteful fashion, a strict and wise system of conservancy has taken place, with the happiest financial results to each colony. In New South Wales 5,390,513 acres are set apart as timber reserves, and the balance of gain between 1877 and 1884 was over 10,000*l.* In Victoria the revenue for 1883 from woods and forests was 8,580*l.*, while the expenditure was only 2,538*l.* In South Australia the forest revenue balances expenditure, with 150,000 trees added to the colony. In 1884 the Commissioners distributed 200,000 young trees at the cost of a halfpenny each. Queensland maintains twenty forest rangers, who have to look after 1,572,752 acres of timber reserves, while New Zealand, last but not least, has just established a Forestry Department. The Cape shows equally satisfactory results, a million of young trees being annually distributed gratis, and it is calculated that the forest revenue will soon mount up to 250,000*l.*—the sum which leaves the colony every year for imported wood. Most noteworthy is the rapidity with which the State investments for forest conservation become of a paying character.

THE historic properties which depressed times have driven into the market within the last few years, have been unusually numerous and important; but none have been of such interest and magnitude as that of Houghton, one of those great mansions that one occasionally meets with in England, too large to be inhabited, except by the possessors of a colossal fortune,—and these, now-a-days, are few and far between. Such a man, however, was Sir Robert Walpole, the famous Earl of Orford, who, like the late King of Bavaria, spared no money, whether his own or that of other people, to gratify his building tastes. He certainly got a huge edifice for his outlay, massive and incongruous, according to the heavy taste of the age,—an enormous square, with four cupolas flanking the roof at each corner, and a façade surmounted by a statue of Demosthenes, while the wings on each side were connected with the main body by semi-circular colonnades. A good deal of dignity was given to the east and west fronts by fine flights of steps, but this ornament was not allowed to remain very long, proving too tempting a bait for the gambling propensities of the great Earl's grandson. Having played away everything else, he tossed for his steps and lost, having also to pay for their removal to the mansion of his antagonist, a neighbouring Norfolk squire. The interior is remarkable for the profusion of carved woodwork and gilding, the vast expense of which may be estimated by the fact that a single mahogany gilded door in the drawing-room cost 1,000*l.*, and that this was only one out of a hundred or more. Everything is in keeping with this lavish outlay, even the stables being sufficient for a hundred horses. From Kent we hear the announcement of the intended sale of Saltwood Castle, near Hythe, which, as far as antiquity goes, has far higher claims than Houghton, for it was granted to Canterbury in 1026, for the support of the monks, and

absence of such express provision such express provision shall not apply to any dispute between any such society and any member thereof or other person whatever as to the construction or effect of any mortgage deed or any contract contained in any document other than the rules of the society, and shall not prevent any society or any member thereof . . . from obtaining in the ordinary course of law any remedy in respect of any such mortgage or other contract to which he or the society would otherwise be by law entitled." To discover what are disputes between a society and "a member in his capacity of a member," it is necessary to consider the legal decisions previous to the Act, because it must be pretty apparent that this definition is no real definition. Again, it is evident that the latter part of the section is not clear; for, as Mr. Justice Stephen observes in the case of the Western Suburban and Notting-hill Permanent Benefit Building Society v. Martin (why, by the way, should these societies take to themselves such absurdly long names?), which has been lately decided, "such" is certainly not correctly used. It is odd, indeed, that an Act so short as this could not be properly worded. That action was one by a society for instalments due under a mortgage deed, and the only question in dispute was whether the society had given credit for certain payments which it was alleged had been made in respect of the principal sum advanced. The question then arose whether this was not a dispute which should have been referred to arbitration. We do not propose to go into the elaborate judgment of the Court: it is sufficient to state that it was held first of all that a dispute between the society and a member in regard to a mortgage was one between it and him in his capacity of member, unless it was in regard to the effect and construction of the deed itself. This was not a dispute either as to the construction or effect. Next it was held that the word "such," in the latter part of the section, did not, as was urged by the society, refer to any mortgage made between the society and a member, but only to one in regard to which there was a dispute as to its construction or effect. This decision as to the action for moneys under a mortgage deed not being maintainable is in accordance with the decision of the House of Lords in 1884 in The Municipal Building Society v. Kent, a decision on rules under the Act of 1874. Thus we may take it that it is quite clear that only disputes strictly speaking in regard to the construction and consequent effect of a mortgage deed will be allowed to form the subject of a legal action by or against a Building Society. The policy of the Legislature has been to make societies and members refer their disputes to arbitration, and the desire of the judges has been to carry out this intention, and not in any way to obtain for themselves a jurisdiction which it was not intended that they should possess. Thus it has been held that an action by a member against a society and its directors, alleging misconduct on the part of the directors with the object of obtaining a decree that he was not bound by the rules, is one which should be referred to arbitration. Indeed, the whole current of legal decisions, of which there are many, shows that litigants will receive no encouragement from the judges, but that their disputes will be sent to arbitration. This is as it should be; nothing can be worse for a Building Society, both generally and pecuniarily, than to go or be dragged into the Law Courts. We are by no means sure that even the construction and effect of a mortgage deed might not well be referred to an arbitrator when a dispute arises on it, subject to an appeal by way of special case to the High Court. This would not often be necessary if a competent lawyer were selected as arbitrator, and if an appeal did become necessary the machinery of a special case is as satisfactory a kind as can be found.

The National Association of Master Builders.—The half-yearly meeting of this Association will be held on Tuesday the 27th instant.

was the rendezvous of the conspirator knights who planned the assassination of Thomas à Becket. The principal features of the fortress, which has been carefully restored of late years,* are the round towers and entrance-gate, a beautiful example of fourteenth century work. As comparatively little land is attached to Saltwood, it will probably be much more likely to meet with a purchaser than Houghton, which has over 17,000 acres. The experiences of auctioneers in selling landed property are very unfortunate just now, as witnessed in the recent Cornish sale at Boscastle, and the more fruitless one of the Jervaulx Abbey estates in Yorkshire.

THE discovery has been made at the Peirens of a subterranean vaulted building, which apparently served the purpose of a reservoir. Its area is stated to be 14.30 square metres, and the depth, so far as at present excavated, 16 metres. The reservoir is approached by eight steps, which are hewn out of the rock; the vault of the building is supported by four columns, of which three are hewn out of the rock and the fourth is built up of excavated blocks of stone. A short account appears in the *Archiv* (No. 493).

THE Yaldham estate, near Sevenoaks, is advertised to be sold by auction by Messrs. Farebrother, Ellis, Clark, & Co. on the 22nd of July. The manor of Yaldham, formerly called Ealdham, was the property of a family of the name of De' Aldham in the twelfth century. Sir Richard De' Aldham was with Richard I. at the siege of Acre in Palestine. In the reign of Richard II. Martin Peckham married the heiress of Sir Thomas De' Aldham, and acquired the manor by right of his wife. He resided at Yaldham, where also his successors resided for several generations, until about 1733, when the estate was sold to William Evelyn Glanville, in whose family it at present remains. The house has been recently restored and repaired: the hall, which is 32 ft. long and 24 ft. wide, retains its original open-timber roof of the thirteenth century in perfect preservation, and an oriel window with the arms of the Aldham and Peckham families in stained glass of the fifteenth century.

THE City of Venice having resolved to erect a colossal statue of King Victor Emanuel, the sculptor Ferrari was commissioned to prepare a design for that purpose. Great difference of opinion existed as to the site most suitable for the purpose, and it was ultimately resolved to erect a model of the statue in the Piazzetta Leoncini, near the Piazza of St. Mark. This was done, the ancient well, with its group of lions, from which the piazza takes its name, being removed for the purpose, not without some protest on the part of the more artistic portion of the population, who asserted that the removal of the well was unnecessary. The site being found unsuitable the model was removed, but the ancient well has not been restored to its place, and it is now stated that a fountain of modern design will replace the characteristic well, which is familiar to most tourists. This seems a gratuitous piece of folly and extravagance at a time when Venice is suffering from deep commercial depression consequent on the recent outbreak of cholera, and it is to be hoped that the proposition will not be carried out.

A CORRESPONDENT writes:—"Whilst smallpox is ominously and insidiously moving about Windsor, and has at last reached the outskirts of the Castle, there is still no sanatorium. Sooner or later the Royal Borough will suffer for this oversight by being overtaken by some irretrievable disaster. The improvements that were to mark the year of jubilee, that were to give human homes to the poor, are making no sign at all. In a word nothing is being done to rescue Windsor from the reproach of its slums. Bier-lane, which is in close proximity to the Castle, which was condemned by your special Commissioner in 1871,

is still a cause of sanitary and moral danger and a national as well as local offence. The Windsor slums have been denounced by all competent authority, but even in this age of progress they are likely to outlast the fiftieth year of Queen Victoria's reign." We very much regret to hear of this discreditable stagnation of sanitary reform in Windsor.

THE ways of contractors and of Local Boards are past understanding. A case of Pickthall and Others v. The Merthyr Tydvil Local Board came before a Divisional Court of the Queen's Bench Division on July 12. The dispute arose out of a contract by the plaintiffs to make a reservoir for the defendants. It was agreed by the contract that if a dispute arose it was to be referred to the Clerk of the Local Board! That is to say, to the very person who strictly would be the advocate of the Board or would be instructing counsel on their behalf. A more preposterous piece of folly on the part of the contractors it would be difficult to imagine. Disputes did arise, and the contractors desired to refer them. The Board refused. The contractors then brought an action. Then the Board applied for an order to refer the dispute to their Clerk. Here, again, was a piece of folly, this time on the part of the Local Board, first in refusing arbitration and then in pressing for it,—of course necessitating expensive legal proceedings. The Court would have nothing to say to the proposition that the dispute should be referred to an officer of the Board. They suggested it should be referred to an impartial third party, and the case stood adjourned for such a person to be selected. We have over and over again pointed out the stupid way in which contractors bind themselves in contracts. But we could hardly have expected to find an instance of such folly as this case discloses.

ANOTHER indignant correspondent, justly observing that we "are always ready to expose the system of bribes and commissions," sends us a circular just received from one Mr. Hood (we will not further advertise him by giving his trade address), who calls attention to the fact that he has taken new premises as a builder and decorator, and obligingly affixes a special memorandum to this effect:—

"Dear Sir,—Should I be successful in securing any contracts through your introductions I will allow the usual liberal discount."

This document, be it observed, has been addressed among others to an architect who holds an important official position in the neighbourhood in which the ingenious Mr. Hood flourishes (or wishes to flourish), and who naturally wants to know what is this "usual liberal discount" of which he is supposed to be cognisant, and suggests that "the sooner these insulting circulars can be put a stop to the better for all parties." We have done what we can to put a stop to them,—a fact which is recognised, we observe, by the Editor of *Truth*, who recently made a very uncalculated attack upon the members of the architectural profession on this head, as if they were the culprits, and who seems to think the Institute of Architects are indifferent on the matter. Mr. Labouchere is quite mistaken there, as he would find on inquiry. However, we are glad, at least, that he recognises our position in regard to this practice, and we will, on that score, even condone his benevolent reference to us as a "trade journal."

It is true that we did receive a letter one day from a contractor, objecting that the *Builder* did not bear out its title, inasmuch as it contained many matters that were not of interest to "builders." But Mr. Labouchere, as a "man of culture," might have been expected to appreciate a little better the extent of the ground covered by the comprehensive Saxon word "builder."*

Streatham.—Mr. Frederick Arnold is about to publish, through Mr. Elliot Stock, an illustrated "History of Streatham." The volume will also give an account of the parish of Streatham and the manors of Tooting Bec, Leigham, and Balham.

MACHINERY AT THE COLONIAL AND INDIAN EXHIBITION.

CONSIDERING the splendid array of raw materials to be seen at South Kensington, the exhibits of machinery used in their conversion are small,—in point of fact they are confined to Canada. Enough is, however, to be seen to convince the visitor that that country is now almost entirely independent of the mother country for the supply of all ordinary engineering plant. Some of the machines shown,—notably amongst those for wood-working,—exhibit very considerable excellence both in design and workmanship, and would do credit to this or any other country.

The electric lighting of the gardens and buildings is more elaborate than last year; the former is undertaken by Messrs. Galloway, of Manchester; and the latter by Messrs. Davy, Faxman, & Co., of Colchester. The engines employed by Messrs. Davy, Faxman, & Co., are chiefly those used at the last exhibition. Messrs. Galloway, however, have erected a number of horizontal compound engines of a somewhat new type, in which the cranks are placed opposite to each other, or, in other words, the engines balance each other, consequently that *sine qua non* of effective electric lighting, viz., great steadiness in running, is secured. The expansion gear with which the engines are fitted is now automatic, but is regulated as occasion may require by means of a hand wheel. The governor gear is of the parabolic type. The engines are generally of very massive construction, and the bed-plates are cast in one piece. The fly-wheels are fitted with barring gear for starting, worked by means of a hand winch, but when the engines are set in motion by the steam this gear is automatically thrown out of action. The dynamos employed are of the Elwell-Parker and Brush type. Altogether it is, we believe, generally admitted that the engines,—indeed the installation generally,—is decidedly in advance of anything yet carried out in electric lighting.

A small but very satisfactory collection of wood-working machinery is shown by Messrs. McGregor, Gourlay, & Co., of Galt, Ontario, Canada. Amongst these is a flanged pattern band-sawing machine, carrying 36 in. saw-wheels, which presents in its construction several features of interest. The top and bottom saw-wheels run in double bearings; the top bearing passes through the main frame of the machine, and is raised and lowered by a hand wheel and screw, with a lever-and-weight arrangement to allow for the expansion and contraction of the saw. The table is made to cant for bevel sawing by means of a very neat arrangement, consisting of a hand wheel and worm, working into a toothed quadrant attached to the under surface of the table. This is an improvement over the ordinary plan in vogue in this country, as no bolt has to be slackened, neither has the table to be held by hand till re-fixed. The saw-blade runs in an adjustable guide, fitted with a counter-weight for rapid manipulation. The saw guides which receive the back thrust of the saw consist of adjustable steel rollers running in self-lubricating brass centres, which is a better plan than that usually employed. The machine is fitted with a fence for straight sawing, pulley brake, striking gear, brush for keeping wheels clean, &c. The main frame appears to us rather light, and we certainly do not admire the decoration of it, consisting of paintings of a stork, bear, &c., which, to say the least, are incongruous; but, taken altogether, this machine is decidedly worthy of praise, the details having been well thought out, and the workmanship being all that is required.

A steam mortising machine, suitable for joinery work, is also to be seen here. In this machine the driving pulleys are placed on the top of the main column, and the table carrying the wood is brought up to the chisel by means of a foot lever. When the table is lowered to its lowest point, the chisel makes a complete half revolution, so there is no danger of striking the wood crosswise as the chisel is reversing. The motion for reversing the chisel is simple and automatic in its action. The table is arranged with compound movements, and can be set to mortise at any angle. The driving pulleys are fitted with an outside bearing. For light mortising this is not at all a bad machine. A very neatly-designed surface planer and wood-worker, with one or two fresh features about it, is also shown here. It is mounted on a solid

* Views and plans of the restoration will be found in the *Builder* for August 22 last year.

* Vide our bi-annual title-page.

box frame; the tables are arranged with simultaneous or independent adjustments, and fitted with angling fence and pressure springs. The cutter-block spindle is of steel, running in long self-lubricating bearings. One of the bearings and the pedestal are made adjustable laterally by means of a hand wheel. By this arrangement the workman is able to have an assortment of cutter-blocks, and put them on or remove them from the spindle without pulling the machine to pieces. This is a distinct improvement, and one which our manufacturers would do well to note. The cutter-block, too, is adjustable laterally. The operator is thus enabled readily to bring it to the exact line of his work. The only other machine exhibited by this firm is a panel planer of substantial design. The cutter-block and spindle is of forged steel running in extra long bearings,—a very good feature for high-speeded machines. The pressure bar is mounted on a trunnion, and is arranged to swing in a circle round the cutter-block. All the feed rollers are geared, and there is an especially slow-feed for rough or knotty wood. Taken altogether, the exhibits of this firm are worthy of high commendation.

Messrs. McKeechie & Bertram, of Dundas, Ontario, exhibit a four-cutter moulding machine of the outside type, but the top cutter-block is supported by an outside bearing. We noticed the cutter-blocks on this machine were made of gun-metal, with T-shaped slots for fastening on the cutters. The use of gun metal is certainly better than cast iron, and there is less liability to fracture, but we should imagine the cutter-bolts would much sooner work loose. A good feature in this machine, as in most of the others exhibited, is the extra long bearings used. We are at a loss to understand, however, how it is that the cutter-block for finishing the under side of the wood is placed at the extreme end of the machine, and comes into play after the side-cutters have operated. This is quite contrary to English practice, the cutter-block for dressing the under side of the wood being invariably placed at the other end of the machine, so that it can operate first on the wood, and thus give it a smooth and steady base for the other cutters to work on. This firm show also a panel-planing and thicknessing machine, also a band-sawing machine, but they do not possess any particular feature of novelty.

The Hamilton Manufacturing Company, of Peterborough, Ontario, have in motion one of Covel's Patent Automatic Saw-sharpening Machines for circulars and mill webs. The sharpening is done by an emery wheel in the usual way, but when the saw is once fixed it requires no further attention till completed, an automatic catch motion bringing forward one tooth after another, till all are completed. An additional advantage in this machine is that the depth of gullet and sharpening of each tooth is absolutely the same,—a result quite unattainable in machines guided by hand. Any desired depth of gullet or rake on tooth can be obtained at will. This machine can be used for sharpening large band-saw blades, and, taken altogether, it must be pronounced one of the most interesting machines in the Exhibition.

A very useful saw-hammerer's table, fitted with anvil, swage, hammer, and other necessary equipments, is also to be seen here, together with a powerful saw swage for "up-setting" or spreading the points of saw-teeth,—a method of saw-setting largely pursued in Canada and the States, it being claimed that the action of the swage strengthens the points of the teeth; the swaging being done from the face of the teeth, they are given a wide spread, thereby supporting the corners.

Messrs. Cowan & Co., Galt, Ontario, exhibit a double tanning machine, which has one or two interesting features about it, although it is not very striking either as regards design or workmanship. The cutter-block spindles are driven by an in-and-out belt, the tension being regulated by an automatically adjustable idler pulley, which is mounted on a vertical slide fitted with rack-and-pinion movement, with wheel and rope and counterweight to take up the slack in the belt. The main cutter-blocks carry four cutters, which are arranged to come into action spirally. The outer-spindle bearings are long, and lined with Babbitt metal, after the American fashion; there is little to be said, however, in favour of this practice, which is rarely, if ever, seen in Europe. A fret-saw driven from below, and fitted with suspended tension springs, is to be seen here,

also a very tall steam mortising machine driven from above. The wood is brought up to the chisel by the foot, after the fashion of the machine already described.

The James Smart Manufacturing Co. have a selection of small labour-saving tools, including lifting jacks, tire-benders, horizontal and vertical wood-boring machines, paint-mills, &c. They are fairly well made.

Messrs. Inglis & Hunter, of Toronto, show a well-finished 100 h.p. horizontal engine, of the trunk type, fitted with Corliss valve gear; also a Westinghouse patent three-cylinder engine. The main frame of the Corliss engine is of massive design, and the details generally are simply and well arranged.

There is a large selection of threshing, reaping, mowing, and other agricultural machinery; but, as far as we could make out, only one portable engine, which was exhibited by Messrs. A. D. Sawyer & Co., of Hamilton. To English eyes this appears a very uncouth specimen indeed, but it probably meets the necessities of the country, or it would not be manufactured after the fashion it is. The boiler is of the return tubular type, short in length, but of large diameter, and the fire-box is entirely surrounded by water. A steam dome is attached to the boiler, a feature never seen in this country in portable engines.

The Hart Emery Wheel Co., of Hamilton, show a selection of Emery wheels and grinding machines, including a neat little tool known as Rogers's patent circular saw filer. In this machine the saw to be sharpened is mounted horizontally on an adjustable bevelling chuck, which can be set to angle so as to present cross-cut and other saws at the right bevel to the Emery wheel. The Emery wheel is mounted vertically on a horizontal spindle; a stop fitting into a gullet of the saw teeth is provided to keep the saw steady when under the action of the Emery wheel. The saw is advanced to the ordinary Hart grinding machines for metal-working and other purposes are fitted with cone pulleys, so that as the wheels wear down in diameter their speed can be increased. This is an improvement, as it is found in practice that, unless the speed of the wheels at the periphery is kept up to a certain standard, the wheels wear out more rapidly as they decrease in size, and their cutting powers decrease in ratio. A novelty in the construction of the Hart Emery wheels consists in the insertion into the wheel of a brass wire web,—the object of this is to prevent accidents to the wheel as far as possible by preventing breakage and by holding the cracked or damaged parts together. Several wheels were in motion at this stand, and their cutting was all that could be desired.

The Dodge Wood Pulley Company, of Toronto, exhibit a novelty, or perhaps we should say a new application of a very old idea, in the shape of a wooden split driving pulley. These are made of poplar, built up in segments, and are fastened to driving shafts by compression of the boss. When used as loose pulleys they are fitted with metallic bushes. There is no doubt whatever that wooden pulleys afford a much better grip to the driving belt than iron, and are less than one-half the weight, an important consideration where large numbers of pulleys are fixed on one shaft, running at a high speed, as in saw-mills or joinery works. One reason why wooden pulleys have not been much used in this country hitherto has probably arisen from the fact that none built on what may be called scientific principles have been placed on the market. The pulley under notice has several features of interest in its construction; the rim is built up in segments, glued, nailed, and dowelled. The rim, after being turned, is cut in halves transversely; the arms are secured to the rim by means of dovetailed joints; the parts of the arms are so placed in the ring segments that they will not touch each other, and when the boss or hub of the wheel is bolted on to the shaft a very strong adhesion is secured by compression. The inventor claims that it has been proved by absolutely public trials made by the Franklin Institute, Philadelphia, and others, that the "grip" of a well-made wooden pulley is enormously in excess of an iron one. Comparing the grip at 100 lb. slack tension with that of the same side of the same belt on a turned cast-iron pulley the figures given are as 20 to 424, or, practically, as 100 to 17, or about six to one in favour of the wooden pulley. Even if we take these figures *cum grano salis*, the manufacturers appear to

have made out a case for a full and fair trial of their invention by machinery users, and we shall expect to hear further about it.

The Commissioners of Railways for New South Wales exhibit in the grounds specimens of Cowdery & Thomas' Patent Rails, and the trucks fitted with their automatic couplings. These rails are formed of two separate rails of the same transverse section fitted together at their heads, making together one rail of neat appearance. The chairs which support the rail are of somewhat novel shape, and support the rails immediately beneath the heads. The fastenings to keep the rail and chair in position are few and simple. In place of the ordinary wooden sleepers, steel sleepers of hollow section are used. Without seeing these hydra-headed rails in absolute service under the severe and varying conditions found on a railway, we cannot well pronounce an opinion as to their increased utility over the rails in ordinary use; on a casual inspection, however, we must confess we were favourably impressed by their simplicity and apparent practicability. The automatic couplings are ingenious, and consist briefly of a shackle on the one truck, the end of which, when the buffers of the trucks are brought together, acts on a revolving catch, shaped after the fashion of a cam; after ascending the cam, and passing the point of it, it becomes locked. So long as the trucks are of the same size, and both loaded or unloaded, it would probably act all right, but given one truck loaded,—the one with the catch,—the other empty, or one truck lower than the other, we think it would run a very great risk of becoming uncoupled when in actual work; at any rate, with revolving catches, as here shown, for the loaded truck would be much lower than the empty one, and the shackle would easily "lift" over the point of the catch, even if it coupled at all; we think counterweights on the side levers would be an additional protection against uncoupling, especially after the apparatus had been in use some time. Altogether, we much prefer the inventors' patent rails to their couplings.

A gold quartz crushing mill has been erected on the south promenade for the Queensland Commission by Messrs. John Walker & Co., Limited, of Maryborough, Queensland. It can be seen in daily operation, and consists of a five-headed battery with stamps of the usual gravitation type arranged with a drop of 9 in., and striking eighty blows per minute. The operation of crushing and washing is sufficiently interesting, and is briefly described by the exhibitors as follows:—"The gold ore intended to be crushed is first broken into small pieces, and then fed into the battery through a hopper, whence it passes under the stamps, and being crushed is carried by a stream of water through gratings of 240 holes to the square inch over a series of mercurialised copper plates, and through the centre-board wells over four ripples. From the tables it is carried by the water over a concentrator of the percussion pattern. The concentrated pyrites are fed into a "boss" grinding pan, and delivered thence into the Berdan grinding and amalgamating pans, the pulp from which enters a 7 ft. settler pan, which is the finishing part of the operation." Five hundred gallons of water are used per hour, and mercury is used throughout the whole process as the amalgamating agent, sodium being employed at regular intervals for quickening the action of the mercury and preventing its "flouring." The mill and its surroundings are well designed, and well and substantially made, and reflect much credit on the manufacturers. The foundations are made of Queensland ironbark timber.

The Ontario Pump Company, of Toronto, show in motion a selection of Halliday's windmills and pumps, especially designed for supplying villages and farms, &c., with water, and for drainage and irrigation purposes. The windmill is of the sectional wheel type, and is self-regulating, by means of weights acting on the centrifugal principle, or after the fashion of the governor-balls of a steam engine. The action of these weights causes the sails of the mill to present less surface to the wind, as its velocity increases. Should a gale arise, the sails are immediately furlled, and the wind is allowed to pass through the mill with very little surface resistance. The speed of the mill may be increased or decreased by changing the size of the regulating weights; thus light weights, having less power to furl the sails, will allow the wheel to run faster, and *vice versa*. The regulating gear has direct connexion with each

sail, and, in point of fact, is both ingenious and practical; it is, without doubt, the best and most important feature in the mill. It is arranged, by means of a back fan sail, always to lead directly towards the wind.

These mills can be placed on a tower or the roof of a barn, and the pump or other machinery is placed immediately beneath them, connexion being made by means of a vertical shaft, sleeve-box, swivel-box, sliding box, and connecting rod arranged in such a way that the mill can turn and head to the wind without throwing the pump out of gear. For irrigation and for supplying farms and villages with water, steam power is, as a rule, much too expensive, and it has been a matter of some wonder to us why wind power has not been much more largely used than it is for these and similar purposes. It is, of course, an extremely economical power, but has the disadvantage of being intermittent; this, however, may be got over by having horse or hand gear for working should the wind fail for several days together. The mills under notice when pumping into a tank can be arranged to shut themselves off when the tank is full, and set themselves going again when water has been used from the tank; in point of fact, they appear complete and practical in all their details, and reflect much credit on their manufacturers. They are not surpassed by anything we have seen in this country.

In concluding our notice of the machinery, we would call the attention of the Canadian Commissioners to the almost entire absence of printed matter, which renders the description of the exhibits much more tedious, and at the same time destroys to a considerable extent the chances of doing business.

THE TOPOGRAPHICAL SOCIETY OF LONDON, AND VISSCHER'S VIEW OF 1616.

TATSWELL. MARRY, your friends do wonder, sir, the Thames being so near, wherein you may drown so handsomely; or London Bridge, at a low fall, with a fine leap, to hurry you down the stream; or such a delicate steep in the town as Bow, to vault from; or a braver height, as Paul's.—*Ben Jonson, "The Silent Woman,"* ii. 1.

WROUGHT with skilful hand, the London of our dramatists should form one of the good books which still remain to be written in illustration of the town's non-political history. Let us take, for example, three authors at least of a period precedent to the Restoration. Many a familiar episode in Shakespeare's historical dramas has London for its scene. In London, Massinger lays the entire plot of his "City Madam." Not a few of Ben Jonson's principal plays, such as, "Every Man in his Humour," "The Silent Woman," "The Alchemist," "Bartholomew Fair," "The Magnificent Lady," "A Tale of a Tub," "The Staple of News," "The Devil is an Ass,"—all have London as the place of their enactment, and contain countless references to the buildings and localities of their day. Nor, indeed, does our parallel end here. Each of the authors we name, the resources of his early manhood having been either dissipated or withheld, turned to the London stage for a means of livelihood; and this at a time, be it noticed, when the popularity of histrionic performances had at length become so assured that houses were specially erected and reserved for their representation. In London one of them held property, and acquired an easy fortune; his two less successful fellows found burial within its limits.

The map, then, before us shows what London was as known to such men as these, who did so much to keep alive its pristine traditions and memories. The Topographical Society have just issued to their subscribers a copy of C. J. Visscher's panoramic view of 1616. The drawing is reproduced, in four sections, by the Typographic Etching Company. The original covers less ground than does the Wynegaarde view of some sixty years before; and is set out to a smaller scale. But it presents considerably more detail, whilst the perspective elevations are much more carefully and closely executed.* J. Hondius published this view, as also another issue thereof in 1620. We are informed, too, that Mr. Halliwell-Phillips possesses another copy of a date perhaps even later. There is also an etching of it, in facsimile, of 1818, by J. Pullam. Nevertheless, it is

* We except, of course, from this comparison Whittock's suppression of several particulars anachronistic amplification of Wynegaarde's drawing.

a mistake to believe that to Visscher we owe the last delineation of the city before its destruction by the Great Fire. For in the interval Hollar made his (first) view of 1647; whilst of others may be instanced one in Norden's "Speculum Britannie," edit. 1653; J. Moor's, of 1640; J. Porter's, 1654; and Faithorne's engraving of Newcourt's Survey, 1658. The Dutch maps are, for the most part, of dates posterior to the Fire; yet the first edition of Augustus Ryther's was engraved and sold at Amsterdam by Cornelius Dankerts in 1604.

Our readers will remember with what complacent pride Sir Roger de Coverley regarded Wren's handiwork as he took boat at Temple stairs for the new Spring Gardens, Vauxhall. In our artist's time the City churches were less conspicuous as a body for the height and proportions of their steeples and towers. But the once lofty tapering spires of the Exchange, "the Dutch Church" (Austin Friars), "St. Helen," "St. Dunston-in-the-East," "Alhallowes Berking," and "St. Laurence Pountney," that came before Visscher's pencil, have not their equals now. The crown-like cupola of Bow Church (whence some would derive its name), together with the two turrets of, as we take it, St. Andrew, should not be overlooked. Above all stands pre-eminent "St. Pauls Church,"—"that sacred pile so vast, so high," as sung by Denham in his "Cooper's Hill." For this "aspiring mountain or descending cloud" the poet had pressed immortality:—

"Now shalt thou stand, though sword, or time, or fire,
Or zeal more fierce than they, thy fall conspire."

He lived to see the ruin of his theme completed, and shortly before his death was engaged as the King's Surveyor-General at the building of the new cathedral. We here see it, as yet undisfigured by Inigo Jones's fine but incongruous Classic portico, albeit bereaved (by lightning) of the spire which, together with its former pinnacles, the Fleming, Van den Wynegaarde, portrayed in, say, 1550. The "Eell schipes," with their water-baskets, moored in mid-stream over against the Three Cranes (that is, accepting the perspectives as shown), must now be looked for below bridge, off Billingsgate, or at Thames Haven. The Banksia theatres are represented by the Swan, the "Beare Gardine," and the Globe. This last should be the second erected on that site, for the Globe of Shakespeare and Burbage was destroyed by fire on the 29th of June, 1613; and, as the story goes, through the thatch becoming ignited at the discharge of ordnance during the performance of the former's "King Henry VIII." Opposite to the Stilliarde (Steel Yard) lies the Gallifuste, a four-masted ship, gaily trimmed with pendants, the standard, and our then national flag, or "Jack," the cross of St. George. The delineation of the Bridewell Dock and the Fleet's mouth should be compared with that of the same locality by Samuel Scott (1770) in the newly-opened Art Gallery at Guildhall. Scott's painting shows Dr. Sacheverel's house by the Riverside; a reconstruction, doubtless; for *teste* John Overton's map, 1666-7, this particular quarter did not escape from the Fire.

Since their foundation in 1880 this society have given nothing to the world beyond three old maps. These comprise the one under review, Antony Van den Wynegaarde's, and the Londinum Fœracissimi Angliæ Regni Metropolis (to quote its full title) from George Braun and Francis Hogenburg's *Civitates Orbis Terrarum*, which was dedicated to Maximilian II. in the year 1572.

The maps unquestionably are valuable in themselves, though they scarcely seem to be an adequate return to the comprehensive address with which the society proclaimed themselves to the public. For not by the leisurely perusal of a pretty map unfolded upon the library table can the topographical history of London be profitably studied. To our mind, the society have begun where, in fact, they should have left off. Whilst they are occupied in reproducing documents that are already accessible, many important changes have passed over a town of whose topography they are the professed exponents and registrars. These constant alterations ought to be speedily recorded, or it will prove difficult to retrace them by-and-by. It is to be hoped, therefore, that they will spare no pains to maintain the annual "Record" in illustration of passing events, whereof we are promised a first instalment in September next. In one direction, at any rate, the society may,

to some extent, be congratulated upon a display of practical wisdom. We believe they have never actively interposed on behalf of any particular structure marked for destruction. An attitude of *laissez aller* may, of course, in their case be carried too far. There are certain buildings,—like to Canonbury Tower, Staple Inn, or Charterhouse,—of whose final sentence we shall all learn with regret, inasmuch as on various points they possess a quasi-national importance which can never be regained. Yet it is equally certain that where an owner is bent upon improving his property by demolition or other way, no society, whether for Restoration, Preservation, or any other 'tation, can hope to prevent him from exercising his legitimate right. A few hours devoted to carefully surveying, planning, and drawing a house that is doomed to removal are worth more than weeks of idle protest and scolding; or of hand-wringing and unavailing lamentation over the avarice and selfishness of the times.

The print may be seen at the Society's address, No. 6, Hanway-street, W.

INDIAN CRAFTSMEN.

ONE of the most popular features at the "Colinderies" is the Indian Market, with its native workers. Crowds gather round the craftsmen all day, attesting the general interest taken in this section of the Exhibition; and, indeed, there are few people who are not interested in seeing clever manipulative skill, and the Hindoo craftsmen certainly give one the impression of being masters of their material. There seems to be no bungling, no hesitation about their movements or methods. They work as though the tasks they were engaged in had been committed to memory, had been rehearsed many times before until the performers were "perfect." It may be that these craftsmen at the "Colinderies" are picked men, and yet, granting that they are more excellent than the average worker, more completely masters of their method than the rank and file, their method would be the same as that which obtains among the Hindoos, and it is their method that is so interesting to study.

The thing that strikes one on seeing these Hindoo workers for the first time is the position of the craftsman while at his work. All the craftsmen we Western people are in the habit of seeing stand up to their work, and hence it follows that the work itself is raised up to such a height as enables the workman to have command over it. The Hindoos, on the contrary, do not seem to have thought that their work could be raised from the position it occupied in remote ages, and so they take themselves down to their work, and all their operations take place on the ground.* It would be quite impossible for any one not long habituated to such movements to sit down with the body and thighs resting on the calves of the leg and to perform any kind of delicate work. We could not keep in such a position for many moments, and to do any delicate work then would be out of the question.

These native craftsmen appear to have command over their work, and they certainly bring some very delicate work to a successful issue; but clever as these Eastern workers may be in carrying on skilful operations in such a position, it is very unlikely they will ever convert us Western folk to their ways. We prefer an elevated platform or table to work on or work at: their bench is Mother Earth; and the wonder is that they can conduct some operations, such as throwing pottery and turning metal work, with anything like success, so little adapted does the position of the worker seem to such operations. The old potter, who is said, though with doubtful authenticity, to be 102, works in the most primitive manner. His wheel is a circular stone slab turning freely upon a pivot working in a hollow formed in another stone. To give it the required circular motion, he takes a piece of stick, and with one end on the outer edge of the stone, and the other end grasped in his hands, he spins the stone round and round for a minute or two, until the wheel has sufficient velocity, and then conducts the operation of "throwing" or "turning" as our own potters do. The best compliment we can pay his skill is to say that

* The Japanese, as those have seen who have visited the "Japanese Village," go so far as to make the floor a revolving disk, and actually bend right down, almost lie down, in fact, when drawing.

he is able to throw some good shapes, such as the round-bellied water-bottles, with long narrow necks; for the wheel does not keep a perfectly even horizontal position the whole time, but wobbles considerably, and even with all his skill it is impossible for him to throw perfectly true shapes, and this accounts for the fact that a great deal of Eastern pottery is not mechanically true.

And as with the potter's mechanical arrangements, so with the other craftsmen. Their mechanical appliances and helps are of the most rudimentary kind, and apparently they seek not to improve upon them. The metal-worker "spinning" or turning copper dishes gives motion to the dish by means of a "string-bow" such as is used by watch-makers and others for drilling holes, and the seal-engraver uses the like means for cutting his gems with. One would be inclined to think that the European lathe is unknown to the native craftsmen. What a contrast these Hindoos present to us! We spend more time in perfecting machinery and appliances than in gaining manipulative skill. The Hindoos seem to disdain mechanical aids except of the rudest kind, and that gives them greater scope for the display of their own inimitable hand-cunning. We may safely aver that they will only preserve their individuality and produce their unique work so long as they employ their own means. With the adoption of European methods will come the loss of individuality, as is happening in those states where European influence has made itself most felt. It seems, of course, a pity, in one sense, that the Hindoo workers should add so much to the difficulty and labour of their work by using defective or rudimentary apparatus, and yet in our country do we not find that the more machinery is perfected the more mechanical and machine-like become the workers? In fact, the craftsman is in time superseded by the lackey of the machine. We have no workers here analogous to these Hindoo craftsmen, who seem to carry everything in their head and at their finger-ends, for we see them at the "Colinderies" carrying the most elaborate patterns in wood, repoussing brass, working in silver and gold, and carrying out the most skilful and difficult work without apparently requiring any external aids, whether of machines or drawings.

There is a figure-modeller at work, and it seems to him no more difficult to model figures, singly or in groups, than it would be for us to cast them from a mould. And very excellent these figures are, full of action and character, and by no means badly proportioned; and yet, as far as we can judge, they are all evolved from his inner consciousness. Like the Japanese, these Hindoos seem to have learned their work by heart, and they are able to reproduce it at any time without hesitation or difficulty. Of course it is said that they work in a groove and never depart from well-established precedent; but, granting this be so, it must be admitted that the result, uniform as it may be, is entirely successful; and it is very questionable whether we work less in a groove than they do, whether, to borrow a parallel simile from Tennyson, "Under the same wheel the same old rut" does not "deepen year by year." And the average result with us is unquestionably inferior to theirs, at least, as far as decorative art is concerned.

Like the Japanese, too, the Hindoos make great use of their feet. Their feet are to them almost as useful as a monkey's are to him, and they are nearly as valuable as a second pair of hands. With the exception of a solitary individual or two born without or minus his hands, we never use our feet, except in locomotion. The Hindoos, like the Japanese, hold the wood or stone they are carving or working with their feet, so that their hands are entirely disengaged.

Equally interesting with the metal and wood work is the weaving. One family is engaged in carpet-making, and very novel and striking is it to us to hear the carpet-weavers chanting, in a monotonous dirge-like voice, the "pattern." Many who see them for the first time might be inclined to think that the weavers were either singing some of their native catches or going through a religious duty. They will be disappointed to hear that they are occupied in nothing more exciting, nothing less romantic than singing the pattern, or rather responding to the man who sits behind with a sample pattern before him, which he reads out to the workers. But there is one interesting

feature in this which we should not miss. We see at once how Eastern patterns have slowly been evolved. We can trace the whole history of woven patterns as we watch these carpet-weavers at work. How in the earliest days they merely alternated the stitches so as to produce lines and squares, and as time went on the squares instead of being simple became more complex, and instead of a series of large single squares or combinations of squares, patterns composed of multitudinous small squares,—for every stitch in a carpet is a square,—were formed, though no attempt was made to alter their character, and hence we find that the patterns in all Eastern carpets have a square angular appearance, and are never flowing and "acrolly." In all work the method should always suggest the pattern, which should be evolved, as we see it has been in the Eastern carpets, out of the method itself; and with the simple intuitive Hindoos this is so in all their works. In their repoussed work we find them using patterns, or, rather, we find them decorating the metal with patterns that the punch and hammer would most easily naturally form. In their carpets, elaborate as they are to the eye, we find the pattern simply an aggregation of simple motifs, such as would be best and easiest produced by a series of square stitches; and in the durrees, for there is a durree weaver at work, we see how it comes about that the decoration takes the form of bands and apparently dense zigzag squares, and the reason for this is at once made plain to us when we see a durree woven; for the fundamental principle in design is that the means and method of production should suggest the design and fix its character. With us too often the opposite to this obtains.

The brilliancy of Eastern dyes has often been dwelt upon, but though we can see a dyer at work, we are no nearer the secret of their success than we were before. The Hindoos are able to get brilliant and luminous colours without crudity, and hence their carpets and woven fabrics are rich and harmonious in colour. We, on the contrary, to obtain harmony (so-called) have to sacrifice brilliancy and depth, just as the French School of colourists to obtain tone use the colours of dirt, and really avoid the difficulties they are supposed to triumph over. There is one colour we never seem to be able to obtain, and that is a rich orange yellow, a colour that plays a most important part in all Eastern carpets. Now that in the Economic Court, presided over by Dr. Watt, much of the raw material used by the Hindoos is exhibited, it would be certainly worth the while of English dyers to inquire into the secret of the success of the Eastern peoples in dying, and see if we cannot alter our methods or use their materials. There is great scope for improvement, notwithstanding the advance made in this department of industry in recent years.

But having thus cursorily glanced at some of the most obvious traits in these Indian craftsmen, what is the conclusion of the whole matter? Wherein do these workers differ most strikingly from those we are habituated to? Not only are they possessed of the most remarkable hand-cunning, the most skilful digit-machinery that humanity can see in operation, but they each individually direct their own hands, so that their labour is not without art. With us we have a less skilful digit-machinery, directed for the most part not by the possessor, but by another. Our craftsmen are divided into those who carry out and those who invent or initiate. And this dual partnership is not united, so that it cannot be detected. Few writers who have worked in collaboration have deceived the reader into the belief that the result has emanated from one brain; and in craftsmen's work this difference is still more strikingly manifest. The worker here has lost his individuality. He is simply a cog in the wheel, a small portion of a huge human machine. Until we restore this personality to our work we shall only be manufacturers and shopkeepers, not craftsmen and artists. Whether it is possible to do this under the present economic conditions of Western life, is of course another question.

Ironwork.—We have received the new illustrated catalogue of iron sections of the New British Iron Company (Limited), a convenient book of reference for specifying, containing a great number of figured sections of rails, bar-iron of various sections, tee-iron, angle-iron, &c.

ARCHITECTURAL ASSOCIATION: VISIT TO THE JUNIOR CARLTON CLUB.

ON Saturday last a large party of the members of the Architectural Association visited this Club-house. They were received by the architect for the extension, Mr. J. Macvicar Anderson, who conducted them over the whole of the building, and gave a most interesting and instructive explanation of every feature.

The original building was erected sixteen or seventeen years ago, from the designs of Mr. David Brandon. It has been extended by the addition of a wing on the west end, and the whole of the interior has been remodelled in a very skilful manner. The principal entrance, which was originally at the end, has been moved to the centre. This very much improves the architectural effect, and has the advantage on plan of allowing the end rooms on either side to be the full depth of the site. A square entrance-hall has been formed, from which steps lead up between Devonshire marble columns, each in one piece, to the inner hall and staircase. Both are lined with Carrara and Devonshire marbles, in various colours. The whole of the front on the right of the entrance is taken up by the smoking-room; it is L-shaped, as at the end it extends to the rear. The back stairs, lifts, &c., occupy the rest of this side. Turning to the left, in front is the writing-room; beyond this, in the new portion, the morning-room. This is a very fine apartment, the full depth of the site, and has a bay window at each end. Round the walls are scagliola columns and pilasters.

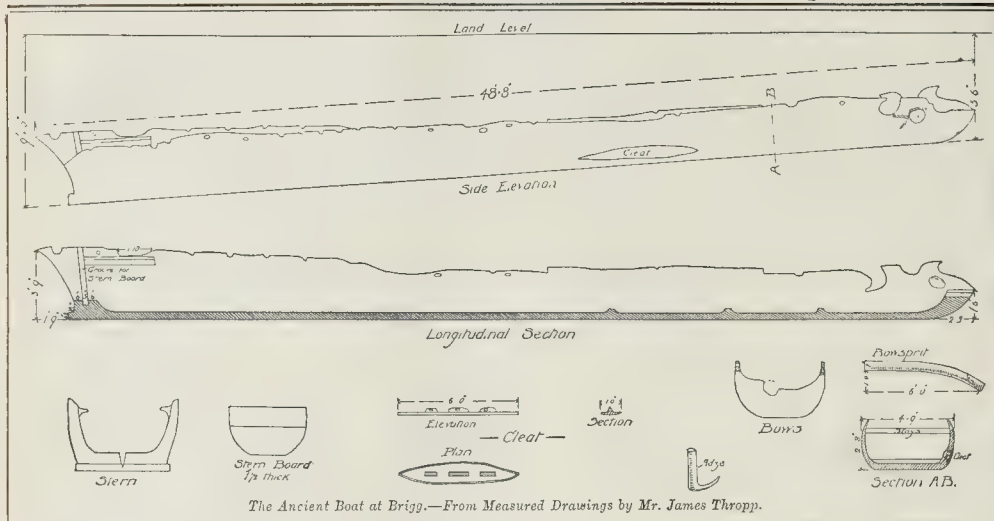
The grand staircase has solid Carrara marble steps, red marble balusters, and grey marble hand-rail. Ascending to the first floor, a very spacious landing is reached, which will be furnished with couches for use as a lounge. The whole of the old frontage on this floor is taken up by the dining-room,—a splendid apartment, 130 ft. long. It is divided up by red scagliola marble columns, and at the end extends to the rear the same as the room below, and has a very pleasant outlook on to St. James's-square. The serving-room is very conveniently placed adjacent to the back stairs; it is fitted up with steam hot-closets, and has five hydraulic lifts. The water required by the latter is not wasted, but pumped up for re-use. The remainder of this floor is occupied by the library, which is similar to the morning-room underneath.

The staircase up to the second floor has the wrought-iron balustrading from the old one adapted. On this floor are three billiard-rooms, two of which have top-lights, the third being intended for night use only. They are large enough for two tables, but Mr. Anderson strongly objects to more than one being placed in a room. The remainder of the floor is occupied by the Parliamentary library, a smoking-room with bar attached, the Secretary's office, which is conveniently placed adjacent to the back stairs, lifts, &c. On the third floor are the bedrooms, lavatories, &c., for the servants; those for the men being to the right of the staircase, and the women's to the left. The lavatory floors are covered with lead turned up against the walls, and have warning-pipes discharging on the stairs, so that any escape of water will make itself seen, and must be attended to at once. In the roof is a tank holding 6,000 gallons.

Between the ground-floor and basement is a mezzanine, in which are the lavatories and water-closets for the use of members. These are approached by a private staircase. Each water-closet has an electric light, automatically arranged so as to be alight when the door is closed and the water-closet in use, and to go out when the door is opened. The remainder of the mezzanine, which is completely shut off, is occupied by the still-room, housekeeper's room, &c.

The kitchen, stores, larder, &c., are in the basement. The boilers and machinery for the electric light are in the vaults under the pavement in Pall Mall. The engines, which are by Armstrong & Sims, are guaranteed to work without the slightest vibration or noise, Edison's "silencer" being used to prevent the latter. Beyond these vaults are a most extensive series of wine-cellars, which extend to the centre of the road.

The electric light is provided throughout. Ventilation has been carefully considered, fresh air being admitted by means of vertical tubes, and foul air extracted through gratings in the ceilings into special shafts. Some of these are taken into a large general shaft, and the



The Ancient Boat at Brigg.—From Measured Drawings by Mr. James Thropp.

remainder carried up separately, with revolving cowl at the top.

The hall and principal corridors are laid with mosaic by Messrs. Burke & Co., who have also done the marble work. The floors of the principal rooms are of parquet manufactured in Brussels and laid by Mr. Ebner on tiles which are set on the fireproof concrete construction. The general contractors are Messrs. Holland & Hannen, whose foreman is Mr. Beal, and the clerk of works is Mr. J. J. Kerss.

Mr. Anderson then took the party to the new drill-hall that has been recently erected for the London Scottish Volunteers. This clever building has been recently described in our pages (see p. 879 of our last volume); it is, therefore, unnecessary to give any particulars now.

A very cordial vote of thanks to Mr. Anderson was given by the members, and the party broke up, having spent three hours in a most instructive manner.

THE BRANT MEMORIAL.

A few privileged guests, including some of the representative citizens over here from Canada, were invited in the early part of June to view the bronze castings of the Brant Memorial, which have now left Mr. Percy Wood's studio at Chelsea for their final resting-place at Brantwood, Ontario, Canada. Mr. Percy Wood, son of the late Mr. Marshall Wood, was the successful competitor for the execution of this National monument, being commissioned by the Brant Memorial Association to execute the memorial on the strength of his clay sketch; the other two competitors being M. Bonheur, of Paris, and Mr. L. P. Hébert, of Montreal. The Dominion Government of Canada assisted the Association by a grant of 1,000*l.*, and a like sum was given by the Grand Council of the Six Nations Indians. The English Government after some hesitation granted enough old bronze cannon to supply the metal for the castings. The memorial is to perpetuate the memory of Thayendanege, or, as he was called in English, Joseph Brant, who was born in 1742, and who died in 1807, the head chief of the Six Nations Indians, through whose personal influence the Six Nations remained staunch to the English crown during the troublesome times of 1775. Brant came to England and was presented to George III., and he seems to have been a man of courage, personal prowess, intellect, and sagacity. The figure of Brant in the memorial is of colossal proportions, being 9 ft. high, and will be placed on the top of the pedestal. The face is modelled from a contemporary portrait, and he wears the leather tunic, the kingly cloak, with the bear's claws necklace, and the Indian moccasins. The combination pipe and tomahawk is in his right hand, and he wears on his head the single eagle plume, also a sign of his rank. The right hand group as you face the memorial shows life-size figures of chiefs of the Mohawks,

Tuscarora, and Oneida nations, bearing the scalping-knife, spear, and peace-pipe. The left-hand group represents chiefs of the Seneca, Onondaga, and Cayuga nations, with the bow and arrows, war-club, and flint-lock gun. As the representatives now living in the Indian reserve of those nations who fought for the English in the eighteenth century have taken a great personal interest in the memorial, the sculptor had to be rigidly accurate in all the details, and sittings were obtained of the descendants of the chiefs figured in the memorial; but one great difficulty was to get pure-bred Indians, for, owing to their intermarriages with Irish, Scotch, English, and French, the present Indians are very mixed. Some photographs Mr. Wood had taken of some of the Indians now living are interesting as showing how the Indian type is in many cases almost wholly obliterated by the admixture of foreign blood. The trophies consist of Indian weapons and implements. The Totems of the Six Nations, the bear, the wolf, and the tortoise, were introduced specially at the request of the Indians themselves. The bassi-reliefs on the base of the pedestal represent, on the front, an Indian war-dance; on the back, Brant addressing the chiefs in Council; while the two circular reliefs represent the Six Nations bear and the Canadian wolf, with appropriate foliage. The pedestal will be of grey Cornish granite, cut by Messrs. F. G. Anstey & Co. The casting was executed by Messrs. R. Masefield & Co., of Chelsea.

The Natural History Museum at Hamburg.—After having surmounted various difficulties connected with the preliminary arrangements, the promoters of this scheme have entrusted to Messrs. Semper & Krutisch, of Hamburg, the erection of the museum above named. At a recent meeting of the local Architectural Association Herr Semper gave an interesting description of the work. The building will be 269 ft. in length and 115 ft. in width. In the basement will be the attendants' rooms and the various apartments required for preparing the objects to be exhibited. The principal room on the ground floor will contain the largest specimens (such as whales, elephants, &c.); it will have an area of about 30,000 square feet, and will be open at the centre to the top of the building. The intermediate floor will contain the zoological section, the director's rooms, and the library. The upper floor will be 40 ft. in height, and will contain a gallery, 30 ft. in width, running along the entire building. This will be lighted in part from above and in part laterally. A supplementary gallery is lighted from above. This mode of construction has necessitated all the internal work being of iron. The heating appliances (by air and steam) are estimated to cost about 1,300*l.*, and the entire structure about 40,000*l.*, a further sum of 10,000*l.* being reserved for the contingent execution of the façade in sandstone instead of cement.

THE ANCIENT BOAT AT BRIGG.

We are indebted to Mr. James Thropp, C.E., County Surveyor for Lincolnshire, for the accompanying drawings of this interesting relic, and we extract from the *Lincolnshire Chronicle* the following remarks on it, forming part of a paper read by Mr. Thropp at a recent meeting of the Lincoln and Nottingham Archaeological Society:—

The unexpected discovery of an ancient canoe or boat at Brigg, Lincolnshire, during the process of excavation for a new gasometer at the Gas Company's works at that town, has been a most interesting and pleasing incident to lovers of antiquities. The premises of the Gas Company are situated on the east side of the river Ancholme, about 200 yards north of the market-place. The boat is made out of the trunk of an oak tree, perfectly straight and true; it is 48 ft. 8 in. long, and varies from 5 ft. to 4 ft. in width, and does not appear to have had branches, except near the bow, where, I think, two have been cut off. It was found about 40 yards from the river, lying due east and west, on what must have been a sloping beach, the stern being 9 ft. below the surface level, and the bow 5 ft. 6 in. below it. The soil is about 1 ft. 5 in. deep, and clay both above and below the position in which the boat rested, and the continued excavation is still in clay. As the work of excavation has been carried on, other objects of interest have been found, enabling us to decide one or two important points respecting the boat. First, the bowsprit was discovered, almost close to the bow, and then, thirteen yards in a southerly direction, the stern-board; also, bones of animals. The boat itself was filled with black mud, and at the bottom three curious leeches, one 6 in. long, were found alive; they are now preserved by the Gas Company in spirits of wine. The groove at the stern was partly filled with dried moss, used apparently for caulking. The stern-board fits the end, and will slide into the grooves; it is of oak planking, 1 1/2 in. thick, and consists of two boards, one being 1 ft. 5 in. wide, and the other, 10 in., by 4 ft. in length; the sides and bottom are shaped to suit the grooving. What were the tools which the boatwrights used to finish the planking? They may have been flint or bronze, but certainly the manipulation was of no ordinary merit in those days. From the end elevation and longitudinal section, it will be observed that part of the stern appears to have been decked, and the boards laid on the two ledges, one on each side, which were worked out of the solid, not framed in. Transverse stays were left in the bottom, when the sinking or cutting out was done, for the purpose of stiffening the boat; three of them are still perfect, and will be noticed in the longitudinal section. The bottom of the boat is flat throughout its entire length; the keel, if it may be so described, at the stern, is splitting, owing, I believe, to shrinkage and the

great strain imposed upon it during the removal to its present temporary position. The stern and the bow were both strengthened by part of the bottom being left more solid, as shown by the longitudinal section. The holes at the sides are not all of the same size; they are chiefly elliptical in shape, and may have been used for ropes when under sail, and partly for stays, of which one has been discovered in almost a fossil state. By what means the tree was hollowed out can only be a matter of conjecture; it may have been charred a certain depth, and finished with bronze or flint tools. Part of a branch of a tree was found, much resembling an adze, and also some flints, which were so hard that the gas manager cut glass with them as readily as if a diamond had been used. It has been suggested that the flints were fixed at the curved end of this adze when in use. Whether the adze was used in the construction or not cannot be determined authoritatively, but it is quite possible it was carried by the ship-carpenter for executing needful repairs. We can see that repairs proved necessary from the discovery of a cleat, 6 ft. long and about 14 in. wide, tapered at the ends, fixed to an old wound on the right or starboard side of the boat, shown in dotted lines on the elevation. The cleat was cut out of a solid piece of wood, the edges are bevelled, and three studs were left so that they might pass through the side of the boat and receive, through the circular holes cut through them, wedges or pins to bring the cleat "home," and secure a perfectly watertight joint. The elevation and longitudinal section of the bow of the boat shows the manner in which it was prepared to receive and support the bowsprit. The irregularity of the sides indicate the gradual decay which was proceeding, although it is fair to assume that some part of the top edges would be fractured in removing it from its late position to the company's yard. Its removal required the utmost care, and I cannot help expressing thanks to the Gas Company, their chief officers and men, for the careful and skilful manner in which they have accomplished the self-imposed duty of preserving for our benefit this extraordinary relic of the past. Whatever its ultimate destination may be, I do hope that the same watchful care it has hitherto received will attend its transit to the British Museum,—not to the cellars thereof, let us hope,—or wherever else it may be localised. It is open to doubt whether it has ever been a sea-going boat, but, at any rate, it would be equal to the demands of ordinary weather in the Humber, and that it has been a sailing one may be inferred, not only from the preparation of the bow for a bowsprit, but from the fact of the bowsprit itself being found; but why a bent one was preferred to a straight I leave to the more experienced to decide. I do not think its transverse strength, on account of its comparatively great length, although stayed, would have enabled it to bear the great strain of waves such as would be met with in the German ocean, but as I am neither a sailor nor a naval architect, this opinion must be taken for what it may be worth. I believe it would carry between forty and fifty men including the sailors, and would evidently, in its day, have been an enemy of no mean power to an opposing force. With regard to its age, supposition from known data leads experts to fix it at not less than 2,000 years; there is every reason to presume that it is of ancient British origin. We can scarcely give the Romans credit for so primitive a design; it is, however, possible that it has carried Roman soldiers, for, in the absence of other craft, doubtless the Romans would impress into their service whatever came to hand, and when it had served their purposes, and finding its sides wearing away, they would leave it to take its chance on the river side, as many a craft is now allowed to sink into the sands on our coast, the oak of whose ribs will be imbedded, and in thousands of years to come, when the sea no longer washes the shore, but upheaval and subsidence have alternately done their work, the generations of those days will speculate on the nature and build of the vessel they will find in the sandstone rocks. To add to the vicissitudes of storm and tempest, of probable battle, of desertion on the river side, and its long rest in the harbour of the ages gone by, the boat at length became the subject of a lawsuit in the High Court of Justice, Chancery Division, before Mr. Justice Chitty, who had to decide whether it should be the privilege of the Lord of the Manor, Mr. Cary-

Elwes, or the Brigg Gas Company, to present it to the authorities of the British Museum. He has given judgment in favour of the Lord of the Manor, who will therefore have the right of disposal of the boat.

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS.

The annual meeting of this Association was held last week at Hanley.

The retiring President, Mr. R. Vawser, of Manchester, read the annual report, from which it appeared that the progress of the Association during the past year had been fairly maintained. During the year twenty-five new members had joined the Association, four had resigned, and eleven names had been written off. There were six honorary members and 244 ordinary members, thereby making a total membership of 250. The balance-sheet showed 206l. 4s. in hand. Leicester was recommended as the most suitable place to hold the next annual meeting. The report was adopted.

The following gentlemen were elected officers for the ensuing year:—President, Mr. J. Lobley. Vice-presidents, Mr. C. Dunscombe, M.A., Liverpool; Mr. J. Gordon, Leicester; Mr. H. U. McKie, Carlisle. Ordinary members of the Council, Messrs. H. P. Boulnois, Portsmouth; A. Brown, Nottingham; J. Cartwright, Bury; T. Coulthurst, Derby; J. H. Cox, Bradford; E. B. Ellice-Clark, Hove; A. M. Fewler, Stockport; T. Hewson, Leeds; T. de C. Meade, Hornsey; A. W. Parry, Reading; R. Read, Gloucester; and T. Walker, Croydon. General honorary secretary, C. Jones, Ealing. Treasurer, Lewis Angell, London. Secretary, T. Cole, London.

After a vote of thanks had been given to the retiring President, the new President, Mr. Lobley, proceeded to give his inaugural address, in the course of which he said,—The objects of the Association have often been ably set forth in the addresses of your former Presidents, and I should only be imperfectly going over the same ground if I attempted to state at length what they are. Suffice it to say that our Association consists of between 200 and 300 members, each representing an Urban Sanitary Authority. We hold meetings in various parts of England, inspect important works, discuss sanitary science in all its branches, and, in the words of Rule 2, "promote and interchange among the members that species of knowledge and practice which falls within the department of an engineer to a local authority." During the past year the Council of the Association has instituted a system of voluntary examinations in all branches of knowledge requisite to those desiring to be surveyors to sanitary authorities, and the result of the first examination held gives promise that this has been a wise step, and will lead to great benefit in future to all concerned. Your Council has also given attention and consideration to a proposed change in the Public Health Act, 1875. For several years past a Bill has been brought into the House of Commons to amend section 150. This is one of the most important sections; indeed, I might say, as regards town surveyors, the most important section in the Act. Those who have had much experience of the working of the existing law, including in that expression the corresponding clauses of the Acts of 1848 and 1858, know well how imperfect it is, and how greatly there is need for amendment. Before the formation of our Association, the men who had most experience in the operation of a law had no proper means of bringing their opinions before the Local Government Board or Committee of the House of Commons. I can lay claim to twenty-five years' town work, to many miles of private street apportionments, first in Liverpool, the largest Urban Authority in England, and subsequently in this town of Hanley. I trust the day is passing away when the practical knowledge thus gained by many of the members of this Association should not be available to those seeking from time to time to amend the law. Your Council has succeeded by its Parliamentary Committee in obtaining important additions to the Bill, and, although it is not entirely such as we might desire, there are so many good points about it that its enactment would on the whole be very advantageous. In approving of this Bill, this Association can claim to be regarding solely the interests of the

public, both ratepayers and owners of property, because there is no doubt that it will very greatly increase the work of the Borough Engineer and the Local Board Surveyor. It is much to be regretted that, after passing through the House of Commons, it should have been wrecked by a side wind in the House of Lords. Without in any way entering into the arguments of those who, in the supposed interests of the railway and canal companies, proposed to exempt them altogether from contributing to the cost of private streets, I venture to think it will be better to continue under the existing statute than that such a clause should become law without a very full and calm consideration. Such consideration could not possibly be given to a clause tacked on to a Bill in the last days of a Parliament; and, indeed, it is difficult to believe that it would have any chance of passing the House of Commons except in a special Bill of exemptions. What, however, must at once strike all of us, is that the railway and canal companies have been singularly ill-advised in risking the passing of the Bill as brought into the House of Lords. As the law stands now, the surveyor of the Authority must apportion the expenses of a street in proportion to the frontages of the property, and cannot take into his consideration that some of the land may belong to a railway company, who do not make any use whatever of the street. The Bill would have made it possible for the Local Authority to take such a circumstance into consideration, and would also have enabled the railway companies to appear before a tribunal, and to state their case with some degree of assurance that the arguments brought forward would result in some abatement in their expenses. It is nothing less than astounding that those most likely to benefit by the proposed change in the law should have prevented that change, by insisting on a clause which, in its present bare form, could not have had a reasonable chance of passing into law. Mr. Lobley then went on to describe the progress of sanitary and other public works in the town of Hanley. He is reported in the *Staffordshire Sentinel* as saying that while, fifteen years ago, there was not one mile of good sewers in Hanley, there were now thirty miles. The Corporation are now engaged in erecting a new Quarter Sessions Court. Many of the features in connexion with this court and approaches are caused by the necessity to adapt it at points all around it with the existing buildings on three sides, and the proposed Public Assembly Hall on the fourth side. The cost of the Town-hall, inclusive of the work in hand, will amount to 15,000l., and the public hall, for which 8,000l. has been borrowed, will bring the total cost to 23,000l. The building will cover nearly an acre of ground, having a length of frontage of 152 ft. and a depth of 262 ft. The public hall, for which the plans are being made, is expected to accommodate 3,000 persons.

Subsequently, Mr. M. O. Tarbotton, M. Inst. C.E., of Nottingham, read a paper entitled "Notes on Recent Sewage Operations in Nottingham and its Neighbourhood"; and Mr. E. B. Ellice-Clark, County Surveyor for West Sussex, read a paper on the maintenance of rural roads. The substance of this paper was printed in our last (see p. 72, ante).

Among other papers read was one on "The Economic Production of Coal Gas," by Mr. R. P. Spice, who again called attention to the coal-lining process, the utility of which, he stated, is now thoroughly established. It had been in uninterrupted use at Tunbridge Wells for two years and a half, and, the character of the coal being ascertained, the results as to the reduction of the sulphur compounds could be accurately foretold.

"Electricity as a Town Illuminant" was the subject of an address by Mr. James N. Shoolbred, M. Inst. C.E., who pointed out that the difficulties in the way of capitalists investing their money in this new illuminant were owing to the restrictions placed upon them by the Government. At the present time this was the only country in which such restrictions were placed upon capitalists investing money in electric light. He referred to the experiments of lighting the art galleries and free libraries with the incandescent lamps, and mentioned the experiments which had been in operation in the House of Commons for some considerable time. The observations which had been taken showed a notable diminution in the heat of the rooms, amounting in many cases to 75 per

cent.; besides that, there was the total suppression of all noxious gases which existed during the gas-burning period.

During the meeting, which extended over three days, the members held their annual dinner, and visited the Bucknall-road canal bridge and retaining-wall, the sanitary hospital, Bucknall; the Nelson and Eastwood bridges, and several other works of interest.

ARCHÆOLOGICAL SOCIETIES.

British Archaeological Association.—We have received the programme of the Darlington and Bishop Auckland Congress, which is to be held, under the presidency of the Bishop of Durham, from Monday, July 26th, to Monday, August 2nd, 1886, with one or two extra days. This is the forty-third annual congress of the Society. Amongst the places to be visited will be Haughton-le-Skerne, Aycliffe, Durham, Piercebridge, Coniscliffe, Gainford, Sainsdrop, Baby Castle, Barnard Castle, Egglestone Abbey, Bishop Auckland, Eascombe, Binchester, Richmond, Easby, Catterick, Croft, Hurworth, Neasham, Sockburn, Diosdale, Aygarth, Bolton Castle, Redmire, Wensley, Middleham Castle and Church, Coverham Abbey, Monkwearmouth, Jarrow, and Hexham.

Cambrian Archaeological Society.—A meeting of the local committee appointed to make arrangements for the visit of this society to Swansea next month was held at the Royal Institution of South Wales on the 8th inst. A successful congress is anticipated.

Lincoln and Nottingham Archaeological Society.—The annual meeting of the Architectural and Archaeological Society of Lincolnshire and Notts was opened at Lincoln on the 30th ult. After morning service in the Minster, a meeting was held in the Chapter-house, under the presidency of the Bishop of Nottingham. The President of Lincoln delivered an interesting preliminary lecture on the architectural history of the Minster, and afterwards conducted the party round the church. In the afternoon, various places of interest were visited, including Newport Arch, the Roman Portico (Bailgate), the Jew's House, John O'Gaun's Stables, the Old Palace, the Vicar's Court, and several churches. In the evening, a meeting was held in the County Assembly-room, when papers on archaeological subjects were read, viz., one on the "Tombs in Lincoln Cathedral," by Mr. M. H. Bloxam, and another on "Pre-Norman Sculptured Stones," by the Rev. G. F. Browne. On the second day of the meeting (July 1), the proceedings commenced with an excursion to Canwick, Branston, Nooton, Dunston, Blankney, Navenby, Somerton Castle, Coleby, Harnston, and Waddington. At an evening meeting, Mr. James Thropp, C.E., County Surveyor, gave a description of the ancient boat which has just been found at Brigg, and of which we give some diagrams and particulars on another page.

Worcester Diocesan Architectural and Archaeological Society.—The first excursion of this society was held on the 29th ult., when a large number of members and their friends proceeded by rail to Hereford, whence they started in carriages for Kilpeck (to see the well-known and unique church there), thence proceeding to Kingston Church and Madley Church.

A New Development of the Tricycle.

We are informed that a new departure in fire extinguishing arrangements has just been introduced by Mr. William Glenister, Chief of the Volunteer Fire Brigade, Hastings, and Mr. J. C. Merryweather, of London. The apparatus forms the subject of a patent, and consists of a tricycle with which the following are embodied:—(1) A hose reel carrying a quantity of specially-constructed hose for winding in a small compass, with all the attachments for delivering on to a fire from the street hydrants. (2) A light double-pump fire-engine in collapsible cistern, said to be capable of throwing 25 gallons per minute, to be worked by two pumpers. (3) A simple fire-escape, with descending ropes and bag. (4) Jumping sheets formed from the riders' seat. The machine is run at full speed by two men, and, if desired, the treads can be so disposed as to work the fire-pump, but for this a special gearing is required. For country districts and suburban towns this improved machine may be found useful.

A CEREMONIAL TROWEL.

This silver trowel was designed by Mr. Robson for presentation to the Princess of Wales on the occasion of the laying of the foundation stone of the People's Palace for East London, of which we gave an illustration in the *Builder* of June 26th. It is finished in parcel-gilding, the handle being formed of boy figures, which support the Princess's coronet. H.R. Highness's monogram is engraved on the blade, which also bears the following inscription* :—

TO HER ROYAL HIGHNESS
THE PRINCESS OF WALES,
IN COMMEMORATION
OF THE LAYING OF THE FOUNDATION STONE
OF THE PEOPLE'S PALACE
FOR EAST LONDON,
ON MONDAY, JUNE 28TH, 1886.
PRESENTED BY THE BEAUMONT TROUSERS.
SIR FREDERICK HAY CURRIE, Chairman.
E. R. ROBSON Architect.
A. BROWNLOW Hon. Sec.



The trowel was especially designed by Mr. E. R. Robson, and executed by Messrs. Stephen Smith & Son, of King-street, Covent-garden.

Illustrations.

ST. PETER'S CHURCH, STREATHAM.

THE eastern portion of this church, including the chancel, vestries, and three bays of nave, was built some fifteen years ago from the designs of Mr. Richard Drew, architect. The building, which stands in a splendid natural position nearly on the summit of Streatham Hill, has remained up to the present time in an unfinished state, with an unsightly temporary west wall facing directly on the Leigham Court

* The monogram and inscription are omitted on the illustration, which is given to show the general design.

road. The advisability of completing the west end was seriously considered in 1883, and at the latter end of that year Mr. G. H. Fellowes Prynn received instructions to prepare the designs. A complete set of plans was made, showing, in addition to two new bays, a tower at the north-west corner and a western terrace with crypt under; also on the north side an enlarged vestry with parish room over; and on the south side a chapel with groined apsidal sanctuary. A flèche was placed at the junction of the chancel and nave roofs, which while being used for the sanctus bell, was intended to be utilised also as part of the system of ventilation. Our full-page illustration shows this first scheme for completion, as it would appear from the north-west corner. The plans were duly passed and tendered for by ten firms, and the tender sent in by Messrs. J. & C. Bowyer, of Upper Norwood, was conditionally accepted. However, circumstances transpired which rendered it impossible for the acting committee to carry out the work. A second scheme was then made by the architect in the hope that it would meet the views of all interested. Both schemes were, however, eventually abandoned and a new committee formed, and the architect received fresh instructions to make out a new scheme on somewhat hard and fast lines, rendering it necessary for him to make a building more picturesque than imposing.

Our illustrations of the adopted scheme show an interior view, looking west, and exterior view from north-west, with small descriptive plans of basement and nave floor.

The general scheme shows a basement with good-sized meeting and class-rooms, lavatory, water-closet, and heating chamber; a small door in the south porch leads to stair in circular turret.

On the nave floor two bays are added to the nave, much of the detail of which is similar to that already existing; the chief feature is the octagonal baptistry, projecting at the west end and divided from the nave by a fine tracery stone screen. There are large north and south porches. The aisles are increased in width 7 ft., the intention being to eventually increase the width of the existing aisles. The work is being carried out in three contracts by Messrs. J. & C. Bowyer, builders, and under the direct supervision of Mr. Prynn. The design for the third scheme, as illustrated, is exhibited in this year's exhibition at the Royal Academy.

SCREENS FROM THE INDIAN EXHIBITION.

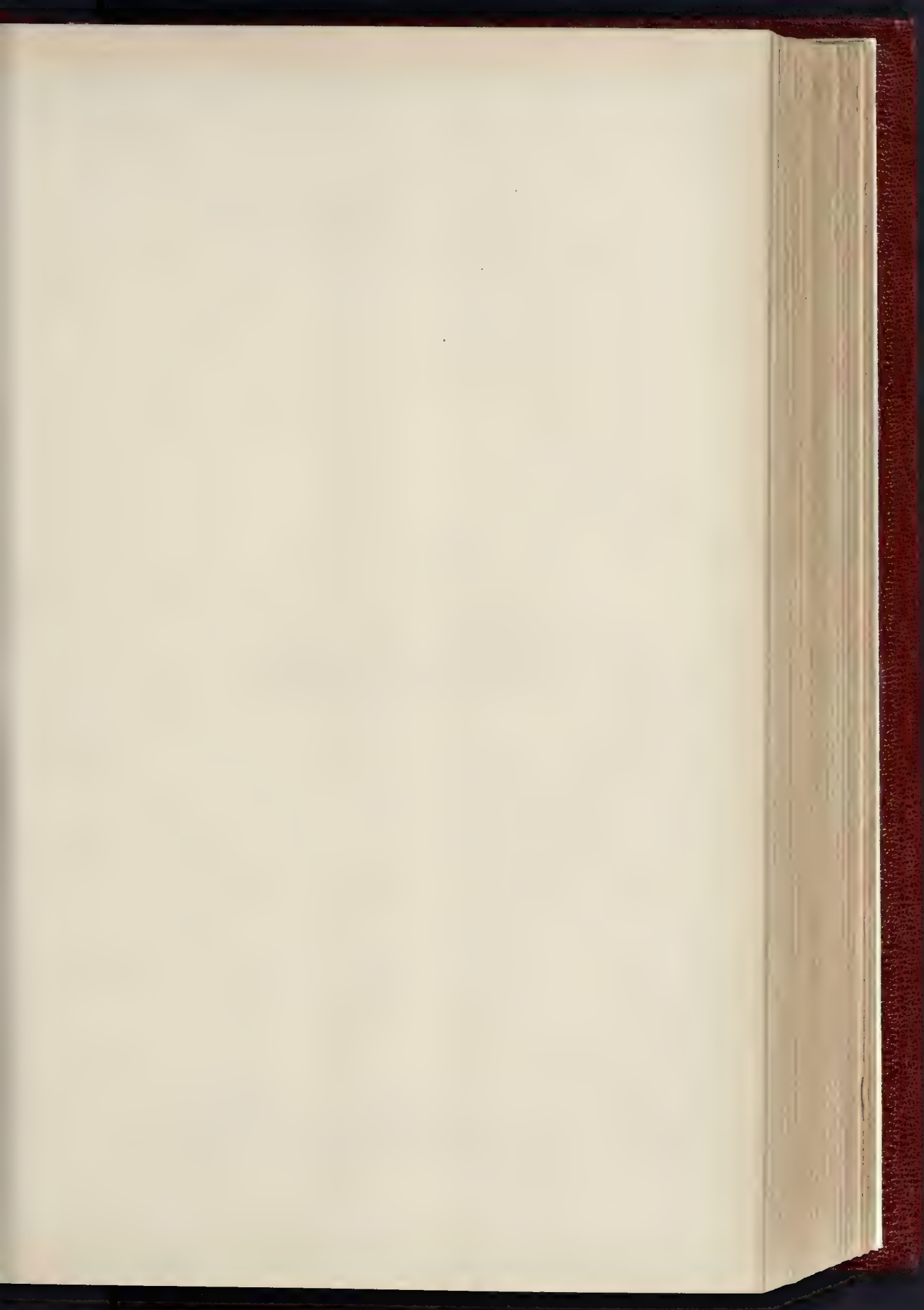
THE portions of the screens from the Bombay Court in the Colonial and Indian Exhibition, of which we give illustrations this week, were executed from the general design of Mr. Griffiths, Superintendent of the Bombay School of Art, and Secretary to the Bombay Committee for the London Exhibition, and consist of two lengths, each of 80 ft., with additional end bays of 12 ft. wide each, the total length of work being 208 ft.

The Baroda section, a portion of which was given, was executed by native artisans under the superintendence of Mr. Wimbridge, the carved details having been selected by him from houses in Surat.

The Bhavnagar Section, which is perhaps the most artistic and one of the richest pieces of work among the screens in the Indian Court, was made in Bhavnagar, under the immediate superintendence of Mr. Proctor-Sims, the State Engineer, assisted, we are informed in the official catalogue, "by a very intelligent native 'mistry'"; but what particular profession of position that word implies we cannot inform the reader. The work is executed in teak, and the details taken from the old palace and from old houses in the town. The perfectly straight struts, covered with surface-carving, are among the most characteristic features in this, which is a piece of purely wooden construction; but an impartial criticism may certainly find fault with them as crushed over with ornament in a way that very much weakens their constructive expression. However, it is a charming bit of work, and we cannot always be logical, even in carpentry.

SUNDERLAND MUNICIPAL BUILDINGS. THIRD PREMIAED DESIGN.

We give the plans and elevations of the design, by Messrs. Doubleday & Caws, to which Mr. Waterhouse awarded the third premium in the recent competition.



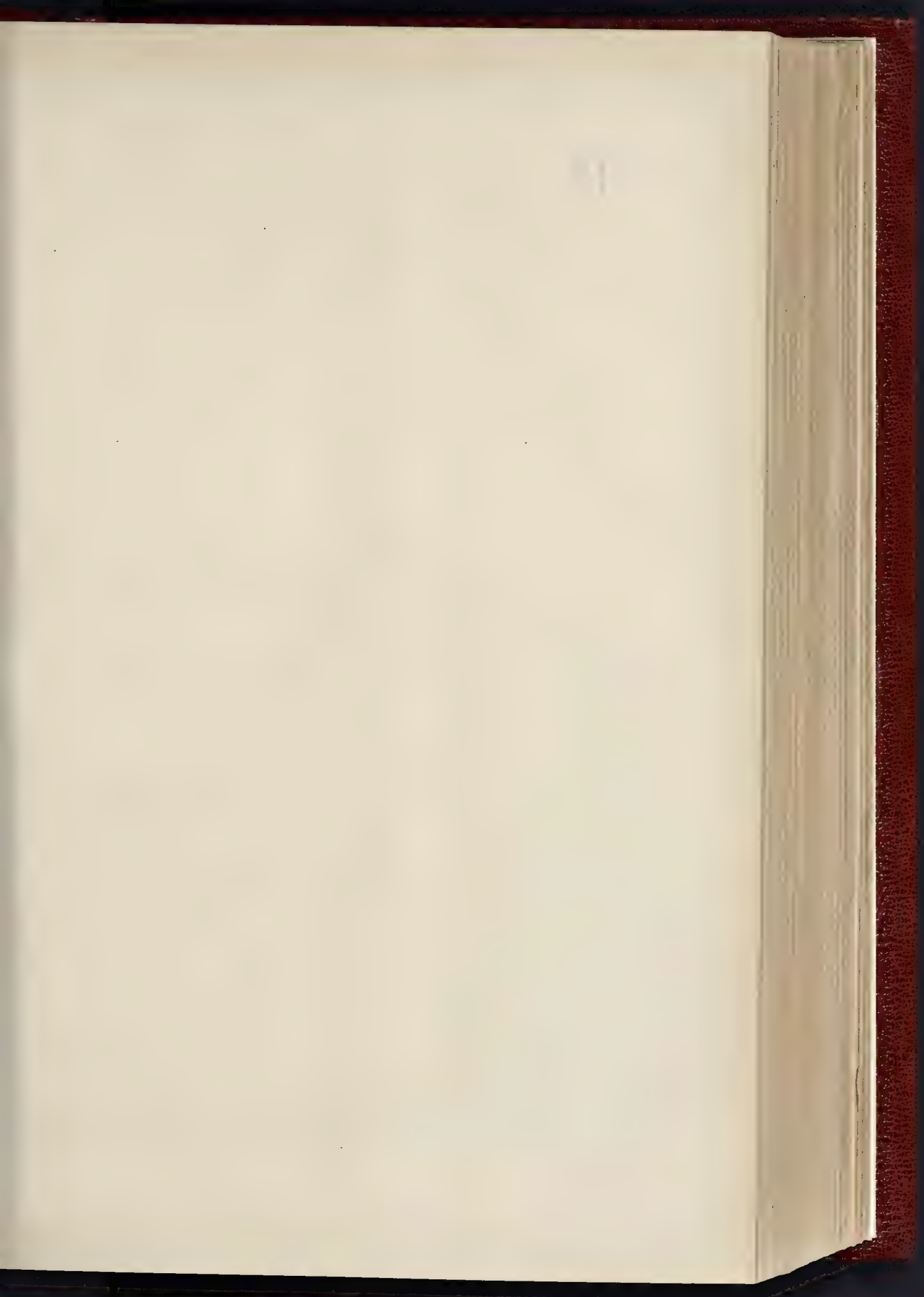
THE BUILDER, JULY 17, 1886.

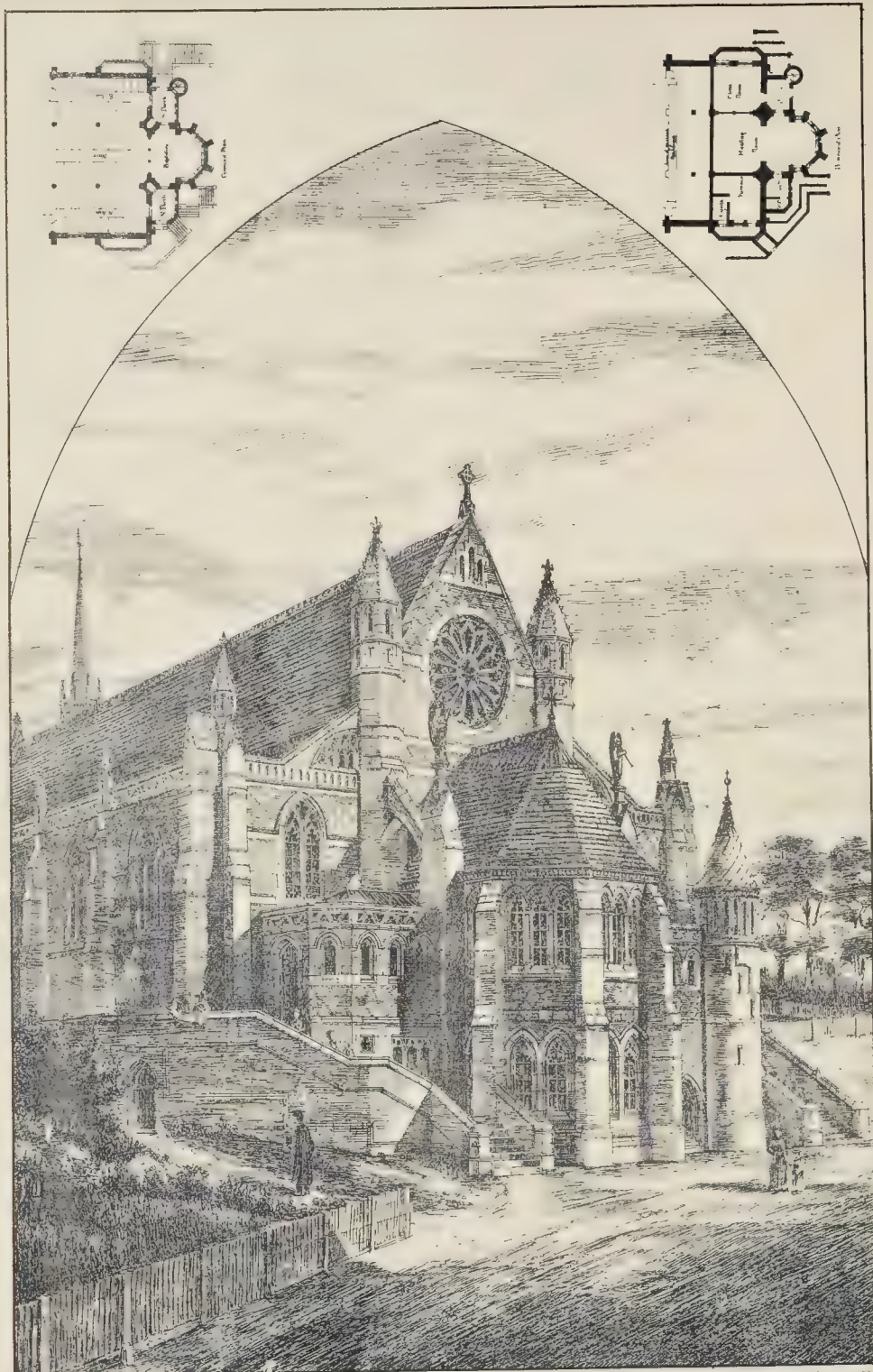




©Queen St London W.C.

ST. PETERS CHURCH, STREATHAM: ORIGINAL DESIGN FOR THE COMPLETION OF THE WEST END.
MR. GEO. H. FELLOWES⁴ PRYNSSE, A.R.I.B.A., ARCHITECT.



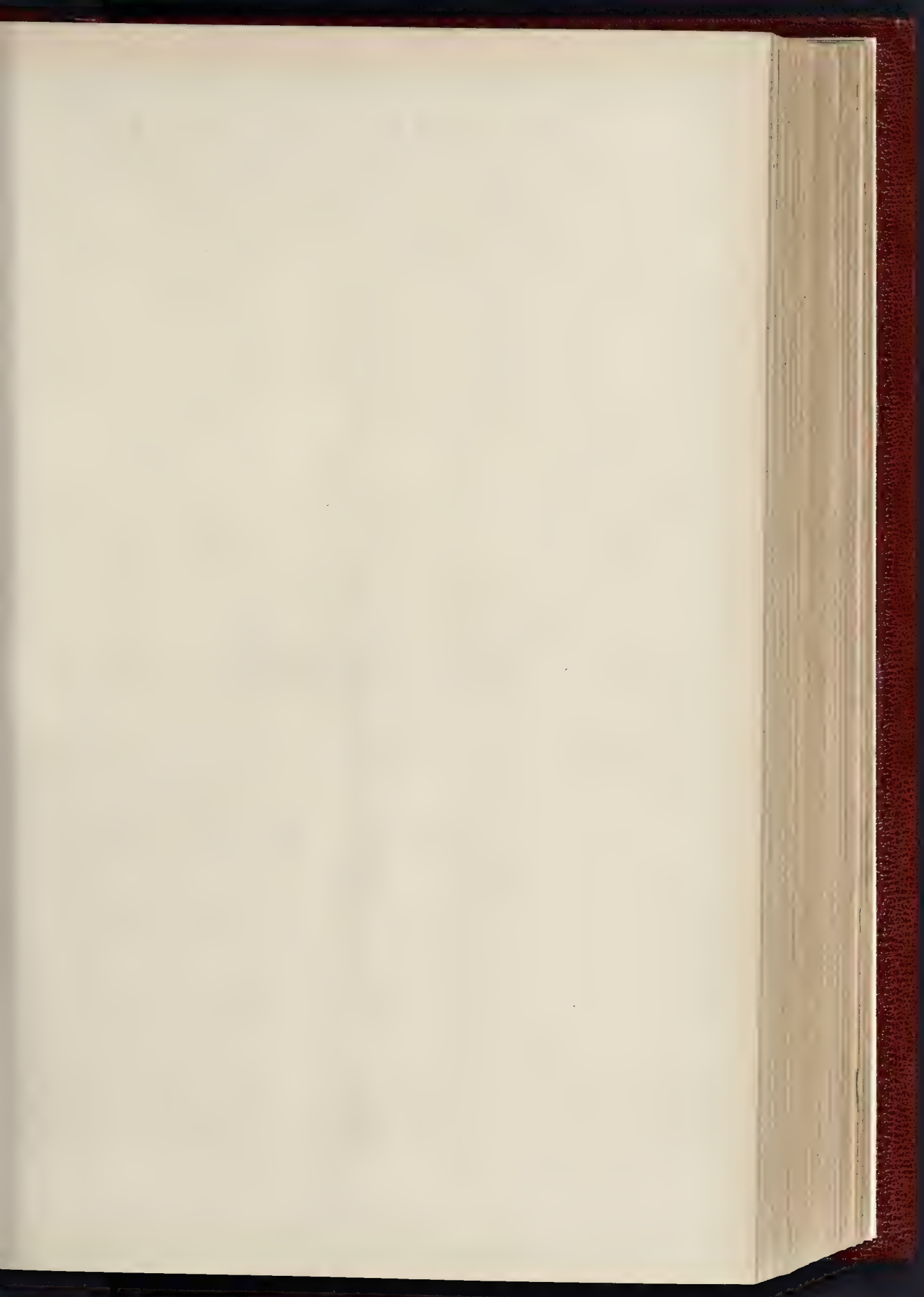


Wyman & Son, Photo-litho.

Queen St. London W.C.

ST. PETER'S CHURCH, STREATHAM: ADOPTED DESIGN FOR THE COMPLETION OF THE WEST END.

MR. GEO. H. FELLOWES PRYNNE, A.R.I.B.A., ARCHITECT.



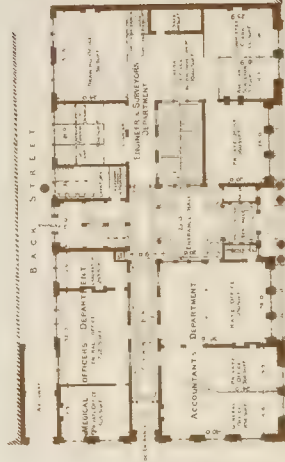
THE BUILDER, JULY 17, 1886.



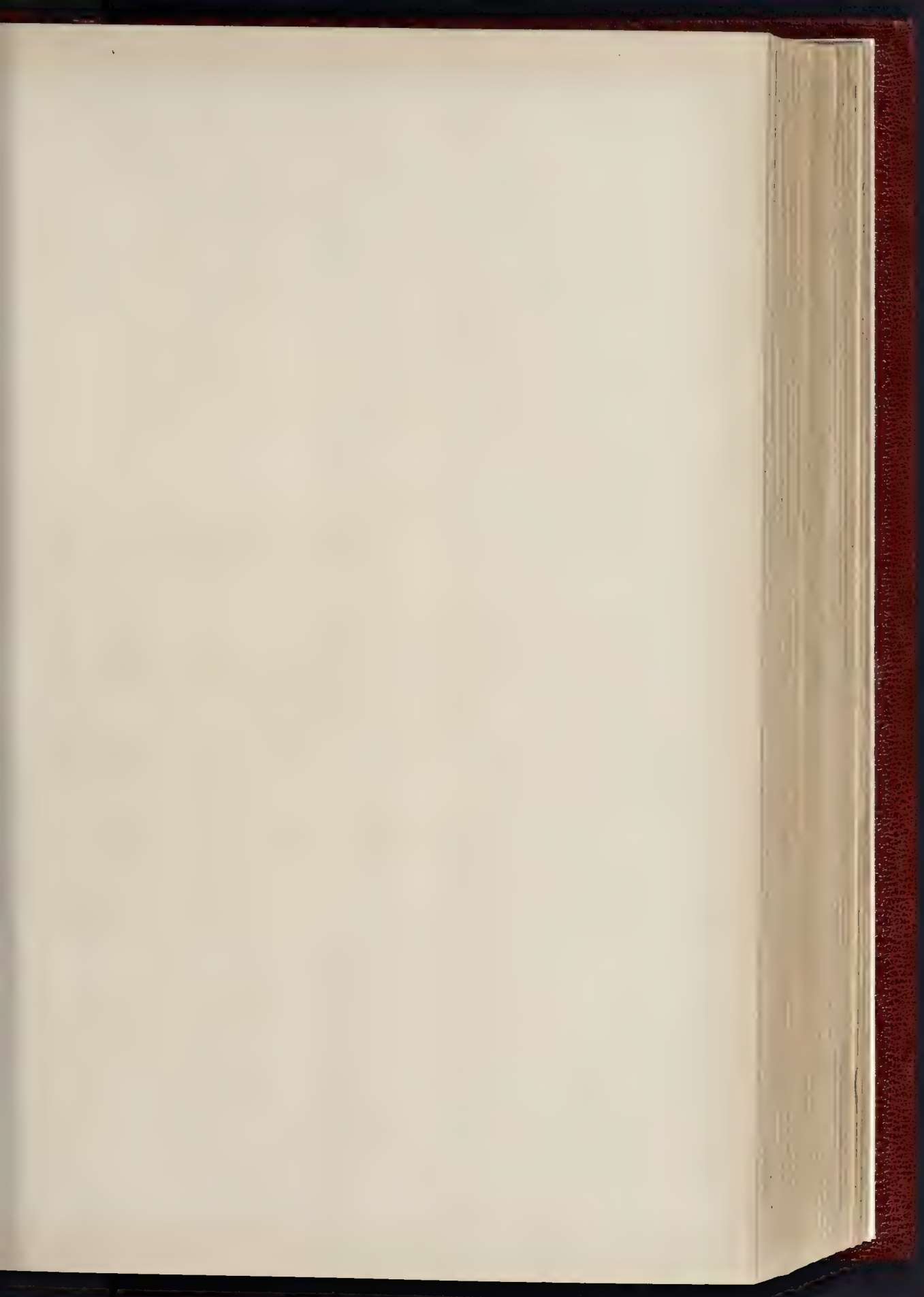
SIDE ELEVATION.



— FIRST FLOOR PLAN.

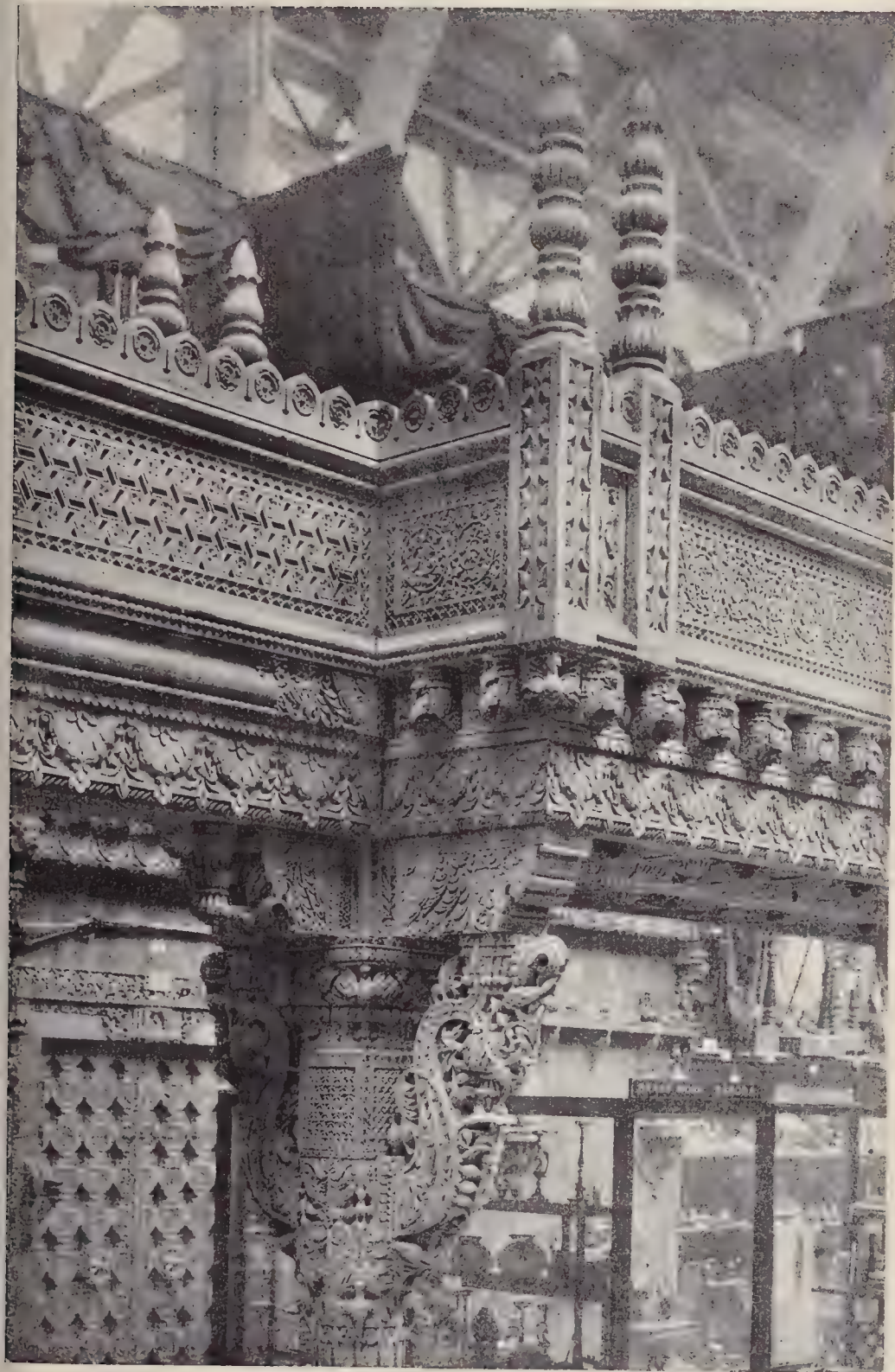


— GROUND PLAN.

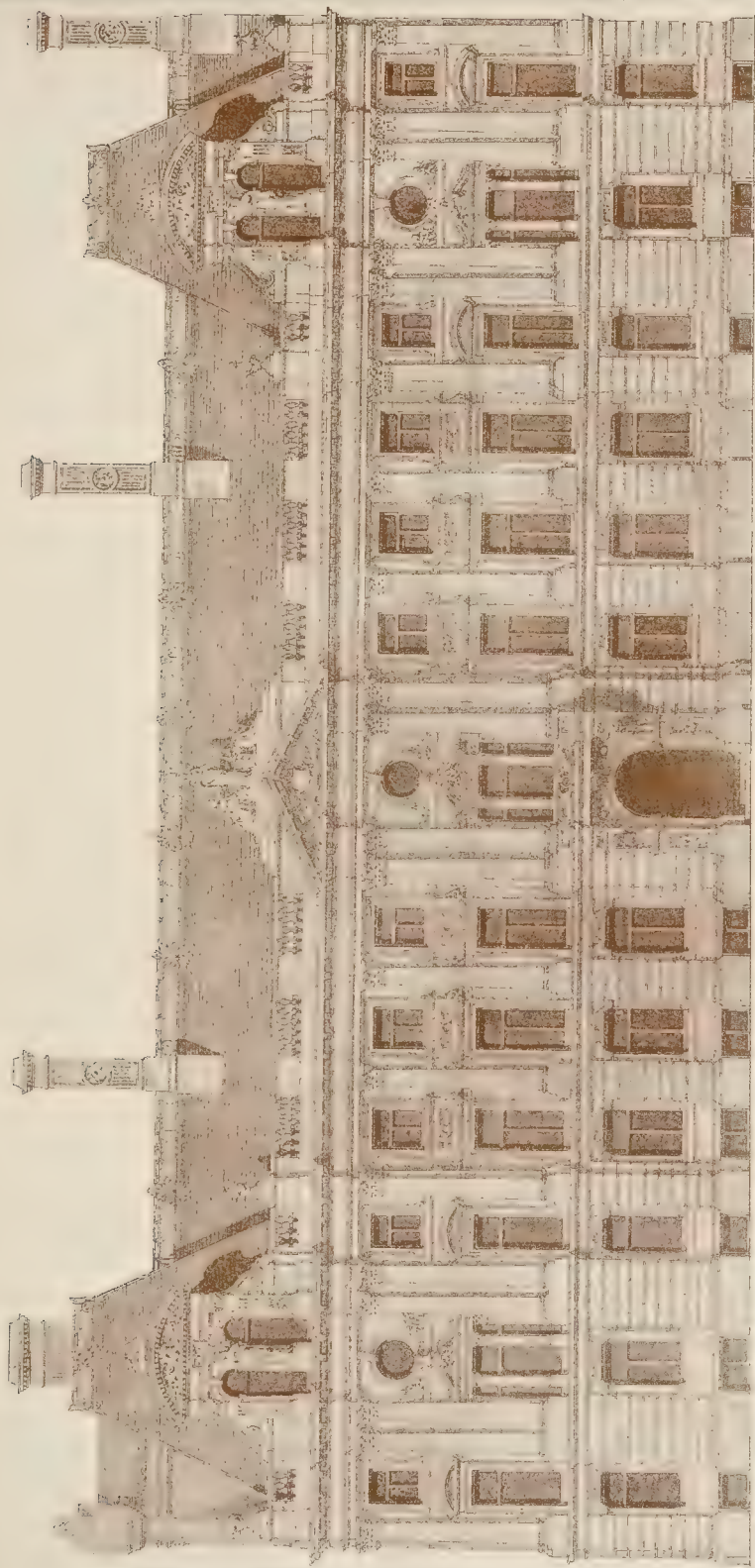




GALLERY FRONT AND BRACKET CAPITAL FROM THE BHAVNAGAR SCREEN IN THE BOMBAY COURT OF THE COLONIAL AND INDIAN EXHIBITION.



GALLERY FRONT AND BRACKET CAPITAL FROM THE BARODA SCREEN IN THE BOMBAY COURT OF THE COLONIAL AND INDIAN EXHIBITION.



PRINCIPAL ELEVATION.

SUNDERLAND MUNICIPAL BUILDINGS COMPETITION.
THIRD PREMIAED DESIGN.—MESSRS. DOUBLEDAY AND CAWS, ARCHITECTS.



Wyman & Sons Photo-litho

Queen St London W.C.

ST. PETER'S CHURCH, STREATHAM: INTERIOR OF THE WEST END.

MR. GEO. H. FELLOWES PRYNNE, A.R.I.B.A., ARCHITECT.

SANITARY INSTITUTE OF GREAT BRITAIN.

ANNUAL DINNER.

The anniversary dinner of this Institute was held on Thursday, 8th inst., at the Holborn Restaurant. The chair was occupied by Captain Douglas Galton, C.B., who was supported by, among others, Mr. Edwin Chadwick, Sir Robert Rawlinson, Mr. Rogers Field, Mr. E. C. Robins, Mr. H. H. Collins, Dr. S. W. North, Prof. H. Robinson, and Mr. E. White Wallis (secretary).

The Chairman proposed the usual loyal and patriotic toasts, Major Flower replying for the "Army, Navy, and Reserve Forces."

Sir Robert Rawlinson proposed "The Houses of Parliament," coupled with the name of Sir Guyer Hunter, who, in replying, referred to the insanitary condition of the House of Commons.

Dr. North, in proposing the toast of the evening, "Success to the Sanitary Institute," said he was happy to be the General Local Secretary for the present year's Congress, to be held at York a month or two hence. He believed the good city of York would extend to the Institute the same cordial welcome it had given to other societies in times past. It was unnecessary to say anything as to the advantage of sanitary science, for the work of the Institute commended itself to the judgment of all thoughtful men. It was now the exponent to the country of sanitary science, and should become the great centre for its diffusion throughout the length and breadth of the land.

The Chairman, in responding, said he was present at the 50th anniversary meeting of the British Association at York, and if the very great hospitality then displayed was an earnest of what the Sanitary Institute would receive, they would never have had a more gratifying reception. This was the tenth year of the existence of the Sanitary Institute, and he believed the members would agree that its progress had been steady and satisfactory. Its objects had always been educational, and it had ever endeavoured to educate the community in matters of sanitary science. One of its most important functions was the annual congress and exhibition, for by these exhibitions, and by careful judging, it showed what was the standard of the sanitary invention of the day. For this they had to thank the gentlemen who were so kind as to give a large amount of time and trouble to the judging of the various exhibits. But it was not merely in holding congresses and exhibitions that the Sanitary Institute had been engaged. One of the most important matters which had been taken in hand by them was the publication, by means of their funds, of Dr. Farr's works, and he hoped they would also be able to publish the works of Mr. John Simon, whose scattered publications were of great value, which would be enormously increased if they could be brought to a focus. He hoped that every one who could, would subscribe to these publications, so that they might be brought out shortly. He was also glad to know that the Sanitary Institute was about to increase its usefulness by uniting with the Parkes Museum, which would enable them to have a permanent museum of sanitary appliances. In doing this they were only fulfilling what seemed to have been the idea of the Prince of Wales when he proposed the Health Exhibition. They proposed to carry on educational work by the delivery of lectures, and to continue the examinations, which had already done a great deal towards improving the sanitary standard of the country.

Mr. Edwin Chadwick proposed the health of "Our Visitors from the Colonies." The presence of these gentlemen that evening denoted their sense of the importance of sanitary science, and they certainly had great need of it. From the first the Colonists had the pressing wants of existence and settlement to attend to, and the sanitary arrangements of their houses and towns were neglected. The consequence was that the finest sites had been destroyed, and an emigrant might leave London with its death-rate of 19 per 1,000, and go to Australia, where the death-rate was much higher, especially amongst the children under five years of age. He was aware that exertions to lessen the death-rate were being made by some of the Colonies; officers had been made to Dr. Richardson to visit the Colonies and expound the means of relief, and that applications had been made to the Local Government Board to obtain the services of its chief sanitary officer, who could not be spared. Earl Granville, however, suggested that the next best thing would be that the information issued by the General Board of Health, for the guidance of Local Boards, should be brought up to the latest experience, and supplied to the Colonies for guidance and application according to their local conditions.

Mr. J. Bosisto, in replying, said that the Colonists did study what was being done in this country in regard to sanitation. After an absence of many years from London, he was much struck with the advance of sanitary science in the metropolis.

Mr. E. C. Robins, F.R.I.B.A., proposed "The Visitors," coupled with the name of Mr. Jerram, President of the Association of Sanitary Inspectors. He considered that if the Sanitary Institute had done nothing more than give birth to the Association with which that gentleman was connected, it would have done much good.

Mr. H. H. Collins, F.R.I.B.A., gave "The Officers of the Institute," bearing testimony to the manner in which they had discharged their several duties. Mr. White Wallis especially merited the appreciation of the members for his arduous labours for the Institute.

Mr. G. J. Symons, F.R.S. (Registrar), and Mr. White Wallis (Secretary), replied to the toast.

IMPROVEMENTS IN SHIP VENTILATORS.

Mr. ROBERT BOYLE, of Robert Boyle & Son, Limited, Holborn-viaduct, has recently patented an improvement in his well-known downcast ventilator for ships, which, in conjunction with the air-pump ventilator, has been largely introduced into the principal steamship lines of this country and the Continent.

The downcast ventilator, as shown in diagram, fig. 1, can be adapted, so far as the height is con-



Fig. 1.

cerned, to meet the requirements of naval architects and shipbuilders, which could not well be done with the old pattern, as a certain height in proportion to the diameter had always to be maintained with it. We are informed that extended experiment has demonstrated the new pattern to be a more powerful and reliable downcast, besides being absolutely watertight, it being found impossible to force water down the ventilator, though there is not a single valve employed, and the air passes down freely and unobstructed. The ventilator is a fixture, there being no movable part about it to get out of order, and it never requires trimming, as it acts with equal efficiency with the wind blowing from any quarter. It never requires to be removed or closed up during stormy weather, as is the case with the ordinary ship ventilator, so that the ventilation of a ship is never stopped or interfered with even though seas may be sweeping it from stem to stern.

Fig. 2 is a diagram of the latest improved air-

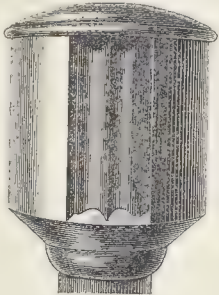


Fig. 2.

pump upcast ventilator for ships, which, besides creating a powerful and constant upward current, and being entirely free from down-draught, is perfectly watertight, so that it can always be kept in action.

Building Land at Bognor.—On Monday last Messrs Baker & Sons submitted to competition, at the Public Hall, a number of building sites on the Strathmore Park Estate, at Bognor. The property has frontages facing the sea, and being the only remaining building land in that immediate locality of the town, there was a large attendance at the sale. The sites offered were thirty in number, having frontages averaging 22 ft. and a depth of 110 ft., together with an hotel plot having a frontage of 54 ft. to the Esplanade. The whole of the plots offered were sold, those facing new roads receding from the sea realising from 35l. to 50l. each, whilst those facing the sea commanded from 100l. to 130l. each. The hotel plot was sold for 315l. There being a call by the company present for more plots to be offered eight additional sites were submitted, all of which were sold at prices ranging from 30l. to 48l. each.

ROYAL ACADEMY.

ADMISSIONS TO THE ARCHITECTURAL SCHOOL.

THE following students have been admitted to the Architectural School of the Royal Academy (Mr. R. Phené Spiers, Master):—

Upper School.

Dennis, L.	Manning, H.
James, F. J.	Selby, E. H.
Leck, W.	Walton, H. D.
Mallows, C. F.	Wilson, C.

Lower School.

Butler, A. M.	Nicolay, G. W.
Daniels, H. S.	Paul, R. W.
Duke, W. M.	Spooner, C. S.
Frere, E. C.	Taylor, N.
Haarer, F. E.	Wilson, W. R.
Hopson, C. H.	Woolacott, H. E.
Murray, J. M.	Youngs, L.

Probationers.

Bance, F. R.	Luncheon, H. V.
Blomfield, A. C.	Oliver, J. P.
Bryden, R.	Page, V. R.
Fletcher, B. F.	Wilson, H. A.
Grogg, H. A.	

LIGHT AND AIR CASE: LARGE CLAIMS BUT SMALL DAMAGES.

SEIVENS V. CLEMENTS, JEAKES, AND CO.

In this case, which occupied the attention of Mr. Justice Denman and a special jury in the Queen's Bench Division for three days early in this month, the plaintiff kept a common lodging-house in Macklin-street, Drury-lane, and the defendants are the well-known firm of engineers, and occupy adjoining premises.

It appeared that the defendants had lately raised the end of one of their buildings, and plaintiff alleged that the new portion of the structure obstructed the light and air flowing laterally into the ancient back windows of his premises, of which he held a lease the unexpired term of which was five years and a half. He also complained that a small stable had been slightly narrowed by replacing a wood enclosure in brick, and that a pier or buttress had been built a few inches over the boundary of his yard. For these matters he claimed several hundred pounds damages, and in addition prayed the Court to grant an injunction to compel the defendants to pull down the offending portions of their new building.

A number of men who habitually used the plaintiff's lodging-house were called on his behalf, as was also Mr. Sewell, architect, and Mr. Harper, surveyor, who all deposed to there being less light and air, especially in the common kitchen, since defendants' new building had been put up.

The defence was that the plaintiff had suffered no damage to his light, and that no trespass had been committed. In support of this view, evidence was given by Mr. Harston (of the firm of A. & C. Harston), architect, and it was stated that Mr. Banister Fletcher concurred, and would have been called, but that, being a candidate for the renewal of Parliamentary honours, his presence was required in Wiltshire. The case was contested at great length (occupying three days) by Mr. Channell, Q.C., and Mr. Davis, on the part of the plaintiff, and Mr. Lumley Smith, Q.C., and Mr. Mitchell, instructed by Messrs. Lee & Pemberton, solicitors, for the defendants.

The Judge requested the jury, if they found any damages, to award a separate sum for each item of complaint, which they did as follows, viz., damage for loss of light and air, 5l.; damage for trespass by piers, 5l.; damage to stable, 3l.; ditto to tank, 1l.; total, 14l. Defendants had paid 25l. into court.

The Judge observed that this was a verdict for defendants, but afterwards proceeding to give judgment for 14l. for plaintiff, defendants' counsel objected to that course, and it was ultimately decided that the verdict of the jury should be reversed; but the Judge would give no judgment. Either party could, if he considered it worth his while, move the Divisional Court for judgment. He, however, refused the application for an injunction to pull down.

The result is that plaintiff cannot get the 14l. awarded to him, nor can defendants get out of court the balance between the 14l. verdict and the 25l. paid in, except by going to the expense of moving the Queen's Bench Division of the High Court, nor until such motion be disposed of, can any decision be arrived at in respect of the more important question of costs.

York Architectural Association.—On Saturday last the members of this Association visited Middleborough, and went over the new Town-hall and municipal offices now in an advanced state of construction. The party was conducted over the buildings by Mr. G. G. Hoskins, the architect, and examined with much interest the arrangement and details of the buildings.

SUNDERLAND MUNICIPAL BUILDINGS.

Sir, — I notice in your last issue (p. 48) allusion is made to the fact that the chimneys shown on the plans of my design for the Sunderland Municipal Buildings are not shown on the main elevation. The reason is just what you suppose, they come behind the ridge, and as they would not be seen from the street and would in elevation convey a wrong impression of the effect of the elevation, they have been omitted, though shown in the sections. On the side elevation, which you have not published, the chimneys are placed on the ridge as they come symmetrically, — and, most probably, in execution the chimneys referred to will be carried on the ridge if I find they will not interfere with the symmetry of the design, — as seen from the street.

This does not appear to me to be rightly described as "a competition dodge," but as an endeavour to give as truthful an idea of the effect of the building as can be done by a geometrical drawing.

BRIGHTWEN BINTON.

PROVINCIAL NEWS.

Brighton.—At a special general Court of the Governors of the Sussex County Hospital on the 7th inst., the Chairman (Mr. Hebbert) moved a resolution to the effect that permission should be granted under Statute 67 to erect such additional buildings as might be required by the Committee of Management. He explained that it was proposed to erect an additional building that should contain eight beds for special cases, and six beds for fever cases. With regard to the beds for fever cases, he mentioned that, although most cases were now sent to the Sanatorium, it was eminently desirable that there should be some provision made for cases that might break out in the hospital itself. Two sites had suggested themselves to the committee. One of these was on the hill where the lawn-tennis court at present stood, and the other was the site where the Museum stood. The first was not a desirable place, owing to the difficulty of access, and the question, therefore, arose as to whether the Museum should be enlarged and adapted to the wants of the institution, or whether it should be pulled down and rebuilt. The present building would afford nothing like adequate accommodation, and he thought it would be better to have it entirely rebuilt. It was estimated that the cost would be between 5,000l. and 6,000l. The motion was unanimously carried.

Gloucester.—From some proceedings at the meeting of the Gloucester Town Council on the 8th inst., it appears that the Council have been in communication with the Dean and Chapter as to the widening of College-street, — a very necessary improvement, — but the Dean and Chapter do not seem at all inclined to co-operate with the Corporation in this matter, though it seems they might do so at no very great sacrifice.

Lewes.—At a meeting of the Lewes Town Council on the 7th inst., the Mayor moved: "That it be an instruction to the Highways and Works Committee to consider the advisability of providing a Public Hall and extending the Municipal buildings at the top of Market-street, and to report thereon to the Council." He said he thought the total cost would not exceed 2,000l., but although there was some difference of opinion on this point, the motion was agreed to.

Lincoln.—On the 6th inst. Mr. Arnold Taylor, Inspector for the Local Government Board, attended at the Guildhall at Lincoln for the purpose of holding an inquiry as to the application of the Lincoln Urban Sanitary Authority for sanction to borrow a further sum of 6,000l. for works of street improvement in Lincoln, in addition to the sum of 30,000l. which has already been obtained on loan for like purposes. Mr. Hebb, Deputy Town Clerk, briefly explained the objects for which the loan was required, and the Inspector promised to report on the application to the Local Government Board.

Richmond, Surrey.—At the recent special Vestry meeting held at Richmond to declare the rates for the ensuing financial year, the Chairman of the Finance Committee said it was a curious circumstance that the rateable value of the parish had not increased on the year. Yet there certainly had been new buildings put up in the parish during that time, and some properties had been improved.

These were standing of course at a larger amount in the rate book. The key to the results was found in the fact that very many applications had been made for reduced assessments, and these had counterbalanced the extra amount put in the rate book for new and improved property.

Tipton.—On Monday afternoon last an extraordinary meeting of the Tipton Local Board was held for the purpose of hearing a report on the sanitary condition of the parish from Dr. Gresswell, of the Local Government Board. Dr. Edgar Underhill presided. Dr. Gresswell (according to the report given in the *Wolverhampton Chronicle*) said he found great defects in the present system of sewerage, but was pleased to learn that a complete scheme of deep drainage was about to be constructed. In his survey of the district he found many houses dilapidated, with defective roofs, and little or no provision for the carrying away of household slops and other offensive fluids. Cesspools were unnecessarily numerous, the ashpits too large, and the privies in many cases in bad repair and much too infrequently emptied. At Dudley Port a combination of cesspools and dirt heaps existed at the rear of certain houses, and the stench therefrom was very properly described by one who lived there as "enough to breed ten thousand fevers." At Princes End he found an ashpit which he was told had not been emptied for years. He found scores of houses absolutely devoid of ashpit accommodation, and the people were obliged to throw their refuse and slops anywhere. He made no complaint of the Inspector of Nuisances, but that official's duties were far too numerous. As had been pointed out by Dr. Ballard several years ago, there was work for two sanitary inspectors at Tipton, but the present officer had also to look after the horses and superintend the removal of night-soil. With regard to the latter he found they had only three men and one horse to remove the night-soil of 30,000 people. He understood that the sanitary and medical officers had not been lax in directing the attention of the Board to these nuisances, but it appeared to him that the Board was rather dilatory in attending to their reports. He found that for years scarlet fever had prevailed to a large extent, and during his visit he found ten cases of typhoid fever in one small court. These and similar diseases originated from insanitary surroundings. He urged upon the Board the necessity of attending to these matters, pointing out that where insanitary conditions existed pauperism ran high. Dr. A. S. Underhill, a member of the Board, remarked that Dr. Gresswell's report reflected seriously upon some of the most respectable ratepayers, and upon past and present members of the Board. Dr. Gresswell replied that his observations were the result of a perfectly impartial survey of the district made by himself, without assistance or direction from anyone.

CHURCH-BUILDING NEWS.

Elton.—All Saints' Church, Elton, Hunts, has recently been restored, at a cost of about 1,500l., which was entirely defrayed by the Earl of Carysfort. The *Peterborough Advertiser* says that the north and south aisle roofs were in a most dilapidated condition. They have been entirely renewed. The porch has been restored, and several other works performed. Mr. Pearson, R.A., was entrusted with the work, which was carried out by Mr. John Thompson, of Peterborough. The church consists of west tower, nave, north and south aisles, and chancel. It exhibits specimens of all the three characteristic periods of Gothic architecture. The nave is the oldest, being Early English. The chancel comes next in point of date, being Decorated, and the tower and aisles are the most modern, being of the Perpendicular period. Previously to the present restoration, it had been considered that the nave was entirely without a clearstory. The aisle roofs came up to the nave battlements on the outside, and on the inside there was nothing but a plain plastered wall. When the builders removed the aisle roof it was discovered that there were three square-headed clearstory windows on either side, which had been blocked up in the last century with masonry, plastered over, and the roofs of the aisles carried up to conceal them on the exterior. Now, however, the aisle roofs have been placed at their proper and original level. The masonry has been removed from the blocked-up windows. The

tower rises to a considerable height, and has four stages. It is built of ashlar, which has weathered into a variety of hues, producing a very pleasing effect. The work of restoration has not touched this. The old vestry has been converted into an organ-chamber. The new organ has been built by Messrs. Lewis & Co., of London, the case having been designed by the architect.

Flixborough.—The new Church of All Saints Flixborough, Lincolnshire, was consecrated on the 30th ult. The church, which has been erected from the designs of Mr. C. Hodgson Fowler, F.S.A., of Durham, is Late Decorated in style, with a spire of timber covered with lead. The chancel roof has been decorated in colour by Mr. Powell, of Lincoln. The walls of the nave are finished with smooth white plaster. The walling stone is from a pit of ironstone in the parish, and the dressed stone from Park Nook, near Doncaster. The cost of the church will not exceed 1,700l.

Glossopdale (Pocklington).—The church here was re-opened after re-fitting on July 7th. The chancel floor has been laid with lozenges of Tadcaster stone and slate. New oak stalls, pulpit, and nave benches have been provided, also oak reredos with cornice filled with pateras, new heating apparatus, and vestry. The architect is Mr. Temple L. Moore, of Hampstead, and the contractors Messrs. Shepherdson & Sons, of Driffield. Mr. Renton Gibbs supplied the heating apparatus.

Glastonbury.—The restored and enlarged Church of St. Benedict (originally dedicated to St. Benignus, the scholar and successor of St. Patrick) was re-opened on the 8th inst. by the Bishop of Bath and Wells (Lord A. Hervey). For many years the edifice has been falling into decay, and in June, 1884, a public meeting was held in the Town-hall, when Mr. and Mrs. Austin's and Miss Holman's conditional offer to bear the expense of a new south aisle, at a cost of 800l., was made and accepted; other subscriptions were promised, and after a time, and the collapse of part of the roof during service one Sunday morning in January of last year, plans were obtained from Mr. Sedding, the Diocesan Architect, and the work was placed in the hands of Messrs. Merrick & Sons. On the 14th of May, 1885, the pillar stones of the new south aisle were laid. The builders worked with energy, and by Christmas, 1885, the church was sufficiently restored to be occupied by the congregation, the first service being held on Christmas Day. The estimated cost of the work is:—General restoration of the church, about 1,050l.; the tower, 300l.; and the new south aisle, 800l., besides architect's commission and expenses; and of this a good portion has been raised. The restoration comprises the rebuilding of the greater portion of the tower and of the exterior wall and battlements, new roofing and seating, and in addition to this pinnacles have been added to the tower, and a new south aisle has been erected.

Lewis Town.—On the 2nd inst., Mr. W. Lewis, of Bontnewydd House, laid at Lewis Town the corner-stone of a new church, which has been named St. Mary's Church, and will meet a long-felt need in the district. Lewis Town is one of the outlying districts of the parish of Gelligaer, at the entrance of the south end of the Taff Bargoed Valley, and is rapidly becoming an important place, owing to the Harris Navigation Colliery, on the banks of the Taff Bargoed river on the opposite side, becoming an important steam coal colliery, at which several hundreds of hands find employment. The site upon which the church will stand belonged to the Bontnewydd estate, and has been given by Mr. Lewis. The church will consist of a nave and chancel, with an organ-chamber on the south side and a vestry on the north side of the chancel, and a porch. The church is Gothic in style, and the walls will be built of local blue Pennant stone, with Pencoed best pressed brick, and Dumfries red stone facings. Inside, the arches over the organ-chamber, vestry doors, and chancel-arch, as well as the font, will be of Bath stone. The church is being built from plans prepared by Mr. E. M. Bruce Vaughan, of Cardiff, and Mr. Haine, builder, of Cowbridge-road, Cardiff, has been entrusted with the contract, the amount of the same being 965l.

Appointment.—Mr. Fredk. West, architect of Croydon, was, on Tuesday last, appointed Surveyor to the Guardians of the Croydon Union.

DISSENTING CHURCH-BUILDING NEWS.

Croydon.—The West Croydon Congregational Church was opened on the 6th inst. It is designed in the Early Decorated style, and consists of a nave with central passage, two side aisles, double transepts, and deeply-recessed apse, with choir-stalls on either side, pulpit on the left, and organ-chamber on the right. Externally the church is faced with Kentish rag, with dressings of Monks Park Bath stone, while Farleigh Down stone, relieved with bands of blue Bath, is used on the inside. The building is ventilated by fresh-air inlets in walls, and Boyle's extractors in roof. The nave columns are of Portland stone, and all the fittings are in pitch pine. There are spacious vestries at the rear, as well as a large church-parlour. The cost of the building has been 10,800*l*. Among the gifts which have been made to the church may be mentioned a Caen stone pulpit, with marble and onyx slabs, presented by Miss Peacock, of Grosvenor House, Thornton Heath, at a cost of 300*l*., and executed by Mr. S. Sansom, of Kennington-road, Lambeth, from designs by the architect; Mr. Sansom also presented a table font, supported on a column of very rare marble, and richly carved, besides which Mr. Sansom executed the carving to the entire building. Mrs. P. A. Peacock gave a stained-glass west window, executed by Mr. Frampton, of Buckingham Palace-road, at a cost of 500*l*.; while a clock and chimes, and a peal of eight bells, were given by Mr. J. S. Balfour, J.P. These were supplied by Messrs. Gillett & Bland. The organ is by Messrs. Hill & Son. The warming of the church was carried out by Mr. T. Boulting, of Union-street, Middlesex Hospital; the lighting by Messrs. Vaughan & Brown, of Farringdon-street; the glazing by Mr. W. Gibbs, of Blackfriars-road; and the tile pavements were supplied by Messrs. Smith & Co., of Coalville, Leicestershire. The whole of the Bath stone was from the quarries of Mr. I. Sumson, of Bath. Mr. Lawrence was clerk of the works, and Mr. Jones foreman to the contractor. The whole of the building was designed and carried out under the superintendence of Mr. W. D. Church, architect, of South-place, Finsbury. Mr. J. Holloway, of Marmion Works, Lavender-hill, Wandsworth, was the builder, and he completed the building in three months less than the contract time.

Hednesford.—On the 5th inst. the foundation stones of a new Primitive Methodist Chapel at Chase Town were laid by Sir J. Swinburne, Bart., and Mr. T. Harrison Evans, of Walsall. The building is to be of red brick, with stone facings, and will cost about 800*l*. Mr. J. Short, Chase Town, is the architect, and Mr. T. Mason, of Hednesford, the builder.

The Roman Remains at Bath.—The blending of ancient Roman and modern building skill is much more apparent now at the baths, owing to a recent discovery. It may be remembered that when the Gloucestershire Archaeological Society paid a visit to the Roman baths, Major Davis expressed an opinion that the greater part of the south wall of the King's Bath was Roman work, including the outline of an arch embedded therein. Since the commencement of the building around the antique circular bath, the City Architect has had drawn a portion of the wall enclosing the arch, with the result that the latter is, he is convinced, unquestionably Roman. It is about 2 ft. 9 in. thick, and so well preserved that the upper part of it is to be left open for inspection and to admit light. The bold curve of the arch will thus form a central and harmonious object at the northern end of the apartment which will enclose the circular bath. Its dimensions, including the pillars supporting the arading, are 76 ft. in length by 40 ft. in length, or about the same size as the banquet-room, the difference being that the latter is 4 ft. longer. A small ledge in each pillar shows where the ancient work ends and the new begins—an arrangement that will prevent confusion and misapprehension. Should the City Architect's views be accepted, they must need to modify, to some extent, the theory of the complete effacement of the Roman wall structure, since a portion of it must have stood and been incorporated by the medieval restorers of the baths. — *Bath Chronicle*.

The Student's Column.

STONE QUARRIES.—III.

DISTRIBUTION OF THE METAMORPHIC AND IGNEOUS ROCKS.

IN the last article we gave an outline of the classification, extent, and development of the aqueous rocks. We shall now endeavour to show the position of the archæan, metamorphic, and igneous rocks, with reference to them, but shall not attempt to classify further, as the divisions already proposed are enough for our purpose.

Broadly speaking, we find, underneath the Cambrian, those called Archæan which, in most cases, are highly altered rocks of pre-Cambrian age. The nonconformity that exists between these two great divisions is probably the greatest in the world, for the archæans had time to become metamorphosed and denuded to a very large extent before the lowest Cambrian beds were deposited, and pebbles formed of these archæan rocks are found at the base of the Cambrian, at many places in Wales,—a good proof of their existence prior to Cambrian times.

From the fact, however, that certain portions of the archæans are composed of lavas and other igneous rocks, not very much altered, and because of the extreme difficulty, in some cases, in the absence of paleontological evidence, of determining the base of the Cambrian, some geologists have considered that many of the rocks now classed as archæan were eruptive and intrusive rocks of subsequent periods. Now, it is quite certain that igneous rocks of Cambrian age exist, and in the same areas as the archæan rocks, but these must be put aside as quite distinct and separate from those of archæan age, especially when the pebble bed exists of the composition and in the position alluded to. When an igneous mass bursts through sedimentary strata, it always more or less alters the surrounding rock by baking it, but it never produces a pebble bed of its own composition at the points of contact, a phenomenon required by those who do not admit the archæan age of the rocks. A pebble bed could only be formed by denudation of the mass in the ordinary manner after its consolidation.

We enlarge on this point to show that although many of the stones quarried in the archæan series in Wales are known in the market as granite, they are not granite at all. The more crystalline varieties have frequently a granitoid structure, such, for example, as that quarried at Twt Hill, Carnarvon; but the foliation which they exhibit entitles them to be called granitoid-gneiss rather than granite. Again, there is a total absence of mica in some of these crystalline rocks.

Archæan rocks are found in the Wrekin, Malvern Hills, Charnwood Forest, and Cornwall, in England; North and South Wales; the North-west and Grampian Mountain areas of Scotland; and towards Lough Foyle, and perhaps in Wicklow, in Ireland.

Of the other metamorphic rocks, slate is the most important. The principal slate quarries are situated in North Wales, especially in Carnarvonshire. Others are found in Cornwall and Devon, at Delabole, Tavistock, &c. Slate also comes from upper Silurian rocks near Kendal, at Ulverstone and Skiddaw in the Lake district.

Scotch slates are found near Perth, Dalbeattie, Crieff, Forfar, Aberdeen, and Inverary. Irish slate quarries are situated at Corbally, in lower Silurian rocks (called Killaloe), from Valencia in the Devonian series, and in lower carboniferous beds at certain places in county Cork. Slates are also worked at Carrick-on-Suir and Ashford Bridge.

We will now turn our attention to the crystalline igneous rocks, the most prominent member of which is granite.

It was not so very long ago that granite was thought to be the oldest rock in existence at the surface of the earth; in fact, it was made to occupy the position now held by the archæans. But, thanks to patient research, it is now known that it may be of very various ages, and even granite of middle Tertiary age has been exposed to the surface. The only reason why it is not found of still more recent age is because the great thickness of superincumbent rocks, necessary for its formation, have not yet been long enough subjected to atmospheric agencies to become denuded sufficiently to bare the granite underneath.

Bearing these things in mind, we must not be surprised that the granites of the British Islands, although having a somewhat kindred origin, are of different ages.

The principal granite quarries of England are situated in Cornwall and Devon, and at Shap in Westmoreland. The rock also occurs in the Scilly, Lundy, and Channel Islands. Syenitic granite is worked round Mountsorrel, and at Charnwood Forest, near Loughborough.

Sir H. de la Beche has shown that the granites of Devon and Cornwall are of an age intermediate between the Triassic and lower Carboniferous periods. Many tracts of granite in this area rise through Devonian and Carboniferous strata, the evidence being very clear.

The principal granitic bosses range from the Scilly Islands to Dartmoor. That the various slates, sandstones, calcareous and trappean rocks which at present bound these granite bosses, and smaller patches, existed prior to the intrusion of the granite, is shown by the displacement of these rocks by the latter, by the mode in which minor groups of them are sometimes cut off by it on the line of strike, and by the granitic matter which has been driven from the bodies of it into cracks and fissures formed in these adjoining rocks.* The strata in the vicinity of the bosses are metamorphosed.

Scotch granites are chiefly quarried in Aberdeenshire, Kirkcubrightshire, Argyleshire, Arran, and Mull. In a lesser degree, it is also obtained from parts of Perthshire, Banffshire, Sutherland, and in the Hebrides.

The two areas in Aberdeenshire, where granite is worked, are in the vicinity and to the northward of Aberdeen, and around Peterhead. Houghton thinks that the former granite is much more ancient than the latter.†

Granites occur in the South of Scotland in the lower Silurian tracts. The strata in some cases do not dip away from them on all sides, but, with trifling exceptions, maintain their normal north-east and south-west strike up to the granite on one side, and resume it again on the other. The granite, indeed, has not merely pushed aside the strata so as to make its way past, but actually occupies the place of so much Silurian rock, which has disappeared as if it had been blown out or melted up into the granite. There is usually a metamorphosed belt of about a mile in width, in which, as they approach the granite, the stratified rocks assume a schistose or gneissoid character. Numerous small, dark, often angular patches or fragments of mica-schist may be observed in the marginal parts of the granite. Occasionally granite veins protrude from the main masses, but in the metamorphosed zone which surrounds the Criffel granite area in Kirkcubright, hundreds of dykes and veins of various igneous rocks occur.‡

Granite is chiefly obtained in Ireland from the following districts:—Donegal, Galway, Wicklow, Wexford, Dublin, in the mountain ranges of Mourne, at Newry, Slieve Croob, Carlingford mountain, Belleek, co. Fermanagh, and in a few islands.

The granites of Galway are associated with strata probably of lower Silurian age. The most extensive granite district in the British islands is to be found in Ireland. It stretches south from Dublin through the counties of Wicklow and Carlow into Kilkenny and Wexford, and occupies an area about 70 miles in length and from 7 to 17 miles in width. This mass supplies an admirable illustration of the relation between granite and the surrounding rocks. The lower Silurian strata in which it is found was apparently contorted before the granite made its appearance. Patches of lower Silurian beds that lie on it, at distances from the main mass, occur in such a manner as to bear no apparent relation to the movements which it could have produced. For a mile or more, the aqueous rocks which surrounded the mass have been made into mica-schist (a metamorphic rock), whilst veins from the central mass pierce it in several directions.

The granite of the Mourne district is of great interest, although it is not much quarried. It is an example of granite that has forced its way *en masse* into its overlying rocks. Prof. Hull, in speaking of it, says it is, in that sense, truly irruptive, and seems to have been intruded amongst the stratified rocks in a state bordering

* Rep. on Geology of Cornwall, &c. (1839), p. 165.

† Proceedings Royal Society, xviii. (1870).

‡ Geikie, "Text-Book of Geol." (1882), p. 643.

on solidity, and with a temperature only sufficient to indurate, but not to completely metamorphose the Silurian rocks by which it is surrounded, and, in some places, surmounted.* Nevertheless, it would appear that along the outer margin and in extruded veins it passes into a quartz porphyry,†—a rock made fundamentally of a very fine-grained ground mass, composed mainly of orthoclase feldspar, and quartz, through which some of the minerals are crystallised in conspicuous forms.

The granite of Carlingford mountain, which in some parts is syenitic, is thought to be newer in age than the carboniferous period, and it is seen penetrating carboniferous limestone.

The syenite quarries of Great Britain are few in number, but are mostly very well known in the market, because of the excellent road metal some of them produce. Patches of syenite exist scattered over our islands, notably in the Malvern Hills, Mountsorrel district, four or five places in North Wales; Strontian, Argyllshire, and Isle of Skye, in Scotland; in Donegal and the Carlingford mountain in Ireland; and lastly, but not least, in Jersey and Guernsey. It is from the two latter islands that the well known tough road-metal comes.

We will now say something of the non-crystalline igneous rocks or lavas. Many large Continental towns are built largely of the compact lavas and tuffs quarried in their vicinity; but although we have plenty of such rocks in our islands they have never been quarried to any great extent. This arises principally from the fact that so many kinds are not durable and require very careful selection, and unless judiciously arranged they have not a very attractive appearance. In some districts, however, they are used for building and road metal. They occur principally in the Lake District, Bardonia Hill (Leicestershire), in Devon and Cornwall, South of Durham, and North of Yorkshire; North and South Wales; the Cheviot Hills; Arran, Mull, and many parts of Scotland; North-east of Ireland; and dotted here and there in most of the granite districts.

Books.

Die alten Kyprien in Kunst und Cultus. Studien von Dr. A. E. J. Holwerda. Mit mehreren lithographischen Abbildungen und einer Lichtdruck-Tafel. Leiden, Brill. 1885.

IT has been too much the fashion to regard the art of Cyprus as valuable chiefly because it reflected in succession the arts of Egypt, Assyria, Phoenicia, and Greece. This misconception Dr. Holwerda sets right. He shows that from its earliest rise down to the fourth century B.C. there is in Cyprian work a clearly recognisable element which is neither Egyptian, Assyrian, Phoenician, nor Hellenic. To the analysis of this proper and peculiar Cyprian factor he devotes the most important section of his book. He gives, however, also an interesting discussion of the well-known bronze bowl of Idalion, with its frieze representing a sacrificial ceremony. This ceremony he believes was in honour of the Cyprian Aphrodite. From this bowl he proceeds to an interesting survey of the general custom of votive offerings, and more especially of the custom of offering the portrait of the worshipper. The book is illustrated by seven lithographic plates and two heliotype, including a reproduction of the famous bowl. It should be read by all who are interested, not only in the art of the East, but by those who are concerned to unravel the complex influences that acted on the development of archaic Greek art. It has this further interest for English readers, that Dr. Holwerda's views are avowedly based on a careful study of the Cyprian antiquities of the British Museum.

Adolf Boetticher. Olympia das Fest und seine Städte nach den Berichten der Alten und den Ergebnissen der deutschen Ausgrabungen. Mit 95 Holzschnitten und 21 Tafeln in Kupferdruck, Lichtdruck Lithographie, &c. Zweite durchgesehene und erweiterte Auflage. Berlin: J. Springer. 1886.

It is a sign of the constantly-increasing interest in archaeological matters that a second edition of Dr. Boetticher's popular book on Olympia should be required, and we are glad that he has taken the opportunity to enlarge

the scope of the work, and, especially in the matter of illustration, very materially to improve it. The metopes, reliefs of the Zeus Temple have entirely fresh woodcuts; the head of the Hermes of Praxiteles is beautifully reproduced. Grütner's restoration of the Nike also appears for the first time, and the portrait statue of an Elean woman with the signature of the Athenian sculptor, Dionysios, son of Apollonios. It is, however, in the increased number of its architectural plans that the new edition is most noteworthy. The Exedra of Herodes Atticus is now amply illustrated, and many details about the various treasure-houses have been added. The principal additions to the text occurs in the discussion of the buildings of Macedonian times, and in the sketch given of the history of Olympia during the Middle Ages. The book is not so widely known in England as it deserves, even for non-German readers it is a valuable possession on account of its wealth of illustrations, by a study of which, in connexion with the Olympian casts of the South Kensington Museum, a very good notion of the principal discoveries may be obtained.

The Iron Process: a Certain, Simple, Cheap, and Effectual Remedy for the Danger, Nuisance, Cost, and Inefficiency of the Methods now adopted for dealing with Sewage. By FRANCIS B. CONDER, M. Inst. C.E. Guildford: Billing & Sons. 1886.

MR. F. B. CONDER, C.E., proposes to treat town sewage with sulphate of iron. He has gone, indeed, a little further than a bare proposition, having taken a patent for the process, and applied it, on a small scale, at Guildford and Stratford at Bow, as stated in the pamphlet above named, and has procured from Mr. G. Midgley Taylor, F.C.S., an analysis of sewage treated with the anhydrous sulphate of iron, by which he finds that "the putrescent character of both precipitate and effluent is entirely removed, and all germs are destroyed by the iron, as far as microscopic analysis has yet been carried." The use of sulphate of iron is not new, as Mr. Conder no doubt knows; it formed a principal ingredient in the process patented in 1867 by Mr. Bonneville on behalf of Messrs. Honzeau & Devedeux, and goes by the name of Holden's process, from having been adopted by Mr. Angus Holden, of Bradford, Yorks., and by him recommended for general use in dealing with town sewage, but it was expressly declared by that patent that lime was to be used with the other ingredient. Now lime produces in the sludge deposited, and in the water flowing off, characters which are objectionable, and Mr. Conder uses the iron only, which we think may answer very well if it can be thoroughly incorporated,—a small quantity of iron with a large quantity of sewage. This requires either a long time or powerful machinery, and either of these involves expense, for time means tank room. Several good processes have been invented for the clarification of sewage water, but when put into practice they become of no effect, because town authorities omit the more expensive ingredient and fall back upon lime alone, which is cheap; it serves, however, the purpose of town authorities in showing to the Local Government Board that they are doing something.

The Mechanics of Materials, and of Beams, Columns, and Shafts. By MANSFIELD MERRIMAN. New York: John Wiley & Sons. London: John Trübner & Co.

THIS is one of an already large and ever-increasing class of books prepared by the professor for the class-room. On the first page we are informed that "The principal materials used in engineering constructions are timber, brick, stone, cast iron, wrought iron, and steel,"—information practical enough, if not very original or exhaustive. We are further informed, by means of a table, that the average weight of "timber" is 40 lb. per cubic foot, and its specific gravity is 0.6; whilst "stone" weighs 160 lb. per cubic foot, and has a specific gravity of 2.6. These figures are to be "carefully memorised" as "a basis for more precise knowledge," and "unless otherwise stated are used in the examples and problems in the book." This will give a good idea of the method of the book. With regard to the manner it is only necessary to state that Professor Merriman has a scholarly talent for clear and simple explanation. The resistance

and elasticity of materials is first dealt with. The definitions of stresses and strains are given in the usual way. The application of these principles to pipes, cylinders, and riveted joints is next discussed, after which come a couple of chapters on simple beams and cantilevers, and on restrained beams and continuous beams. The compression of columns, the tension of shafts, and results of combined stresses are duly considered, and the book ends with an appendix and some tables of constants. All these subjects are treated from an academical point of view, and to the student who already possesses a fair knowledge of mathematics the exercises set will afford an excellent means of sharpening the understanding and exercising the powers of the mind generally.

A Manual of Mechanics. By T. M. GOODEVE, M.A. London: Longmans, Green, & Co.

THIS is an excellent little book, treating of a variety of subjects that lie at the root of the mechanic's craft. It has but two faults: the first, a rather serious one, that there is no index; and the second, which is aggravated by the first, that it embraces too wide a field of research. These defects render the book unsuitable for the purposes of reference; for, although it contains much excellent information, it is difficult to know where to pitch on it. However, the work is declared to be for the use of students, and has, therefore, we suppose, been prepared more for the class-room than the workshop. We can hardly find fault with the author for the class of readers he selects, but we cannot help regretting that so much facility and clearness of expression should not have been put to more practical account. The book opens with an introductory chapter on the properties of matter, measures of velocity, the laws of motion, and measure of force. The author follows the beaten track, and clearly in such matters as these there is little new to be said. The principles of the parallelogram of forces, of gravity, conversion of motion, &c., lead up to the application of natural laws to the science of mechanics, a large number of illustrations from practical work being given.

The Practical Mechanic's Workshop Companion. By WILLIAM TEMPLETON. New edition, revised and enlarged by WALTER S. HUTTON. London: Crosby Lockwood & Co.

OUR old familiar "Templeton" comes to us in a new guise. Years before the numerous modern engineers' pocket-books, and such-like compilations were born or thought of, Templeton was the only friend that the mechanic could call his own. But, like other faithful servants, "Templeton" became somewhat rusty in the course of many years' work, so that when younger and more vigorous rivals arose, he gradually became less and less consulted. The publishers have, however, recast the work, and added to it such information as will bring it up to the requirements of to-day. There are all the old tables, and, so far as our memory carries us,—for we must plead guilty to some ingratitude to our old servant, which has dropped out of sight during the last few years,—the first part of the book remains very much as it was of old. The "Simple Practical Questions," the chapter on Geometry, the "Measurement of Solids," and such-like elucidations of knotty points in the smallest compass, will doubtless be again and again referred to by the budding engineer or hard-handed mechanic, as they have been so often in times past,—unless, indeed, science-classes and technical education shall render textbooks of any kind unnecessary.

Tables are, of course, given of diameters, areas, and circumferences of circles. Squares, cubes, roots, and reciprocals occupy a considerable space. The book has been so far brought down to date as to treat of the gas-engine and compound locomotive engine. Prof. Kennedy's riveting experiments are also quoted at some length. We find no mention of triple compound engines; or, for that matter, of marine engines of any type. The Galloway boiler is illustrated, but no illustration is given of any other class.

A Treatise on Friction and Lost Work in Machinery and Millwork. By ROBERT H. THURSTON, A.M. New York: John Wiley & Sons. London: Trübner & Co.

THIS work undertaken by Professor Thurston is one of great importance, to which too little attention has been paid. The millowner or manufacturer studies how to reduce expenditure

* Building and Ornam. Stones (1872), p. 44.

† See horizontal section, No. 22, Geol. Surv. Ireland.

in many ways; by economy in first cost of coal, by better combustion of fuel, by increased efficiency of heating surface of the boiler, or, in the engine, by compounding the cylinders, by higher pressures and piston speeds, but too often loses more than the gain obtained by such efforts in an unscientific train of gearing, or undue friction of moving parts. The reason of this is not far to seek. The generation of steam and the best manner of using it in the steam-engine have always been favourite studies both with men of science and practical engineers; and their importance is too often insisted on to be neglected. Efficiency of the moving parts appears, however, not to have the same fascination for the majority of those persons manufacturers mostly depend upon for counsel and instruction, although, when it is remembered that fifty per cent. of the total power supplied is often lost in this way, its commercial importance will be duly recognised. It is for these reasons that the book in question is additionally welcome.

Although Professor Thurston cannot claim to have done for the mechanic what Foucault did for the naval architect by original research and experiment, he deserves our thanks for having brought together so much useful information between the covers of a single volume. The first part of the work is devoted to the nature and theory of friction, in which the question is efficiently and simply handled. Although there is a great deal in this section that any person of ordinary intelligence will be able to follow, it stands to reason that to follow so complex a subject right through requires a higher mathematical knowledge than is generally possessed by those who are not professional engineers.

In the chapter on lubricants the different materials most commonly in use are treated of, and their values in various situations assigned. Sperm oil is given the first place as a general lubricant for bearings, but its high price precludes it from being used generally. Lubricators of various sorts are also treated of, some of the newest kinds being illustrated in this section. The work concludes with the details of a number of experiments on the friction of surfaces, and some remarks on the "Finance of Lost Work."

Calvert's Mechanic's Reference Book of Practical and Entertaining Information for Handicraftsmen. Manchester and London: John Heywood. Manchester: John Calvert. 1886.

This is, in fact, a reprint of Calvert's *Mechanic's Almanac* from 1880 to 1885. It contains a great deal of information arranged (or not arranged) in a rather haphazard and miscellaneous manner. We doubt if these miscellany collections do anything to promote real study, but they are sometimes useful for reference when a bit of special information is wanted, and when well indexed, as this volume appears to be.

The "Practical Treatise on Mensuration" appended to the volume has, however, a distinct and appreciable value.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,021, Revolving Shutters. A. Dufrene, Paris.

To obviate the noise in shutters of corrugated metal, which noise is occasioned by the space which it is requisite to leave between the shutter and its guides, improvements are introduced into their construction. Bands or strips of suitable section, so as not to impede the rolling, move in guides only large enough to permit a sliding movement of the bands therein. In this manner the play being considerably reduced the noise is prevented. One or more bands of steel are fitted to shutters of great width in order to give rigidity to the shutter.

7,362, Shop Counters. W. Parnall.

The object of this invention is to provide doors in the counter, which is of the usual shape, so that the contents may be withdrawn and placed in cold-air or ice chambers constructed also in the counter. The front top edge or angular corner is cut away to allow show-cases, biscuit tins, &c., to be placed therein.

5,393, Stop for Doors and Windows. A. Spencer.

The seating for the rubber stop or cushion is shaped in such a manner that when the screws that fasten the holder down are tightened, the base of the indiarubber cushion is forced into the shape of a collar, thereby preventing the possibility of pulling the rubber stop or cushion out.

12,470, Whitewash Brush. T. Murphy.

This device is intended to remedy the defect in brushes of the ordinary make, where the handles are weakened by the cutting of apertures for the reception of the knots of bristles, and are liable to split. Whitewash or distemper brushes are usually made of two or three knots, that is, separate bundles of hair, placed side by side in a single row. These "knots" are attached to a flat wood handle in such a manner that the wood is in the centre, the hair being firmly bound to it with wire or twine. To leave space for this binding or tying, a slot or opening is made in the wood handle between each knot, which causes the tendency to split. The improvement consists of a shield or plate of metal, leather, or some other strong substance placed on one or both sides of the handle, and surrounding or traversing the apertures, and braced or fastened, so that, should a fracture take place in the wood, the handle cannot separate, and the usefulness of the brush remains unimpaired.

NEW APPLICATIONS FOR LETTERS PATENT.

July 2.—8,665, W. Barracough, Safety Locked Door Chains.—8,676, W. Temple, Mouthpiece for Horizontal Brickmaking Machines.—8,697, S. Johnson, Sanitary Arrangement for Water-closets, &c.—8,699, R. Mahubb, Woodworker's Cramp.—8,713, M. Blanchard, Ornamental Tiles, &c.
July 3.—8,725, J. Bennett, Pigments.—8,731, E. Abate, Stoves.—8,747, J. Aniello and Others, Anti-fouling and Preservative Paint or Varnish.
July 5.—8,763, S. Ingham and Others, Multiple Wood-turning Machine.—8,765, R. Adams, Fittings for Convertible Sashes, &c.
July 6.—8,790, J. Evans, sen., Bench Vices.—8,793, G. Schultz, Window Fastenings.—8,797, T. Thorp, Glass Enamelling.—8,818, M. Rothschild, Mortising Machines.—8,837, F. Lyte, White Lead.
July 7.—8,872, W. Potter and Others, Hinges and Door Closers.—8,873, E. Grach, Dressing Stones, Tiles, and Flags.—8,876, H. Hennes, Self-setting Fastenings for Doors and Windows.—8,886, J. Price and J. Wayne, Fire Grates.—8,869, W. Dryden, Fastening Window Sashes.
July 8.—8,919, J. Hart, Locks, Latches, &c.—8,937, E. Hiscox, Connecting Gas, Water Pipes, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

4,887, S. Giles and W. Petrie, Decorating Lin-crusta Walton, &c.—5,316, W. Allen, Automatic Syphon for flushing closets.—5,697, H. Weinreich, Ground-brushes for Painting.—6,091, C. Shuterston, Preventing Shocks in Water Supply-pipes.—6,100, W. Macfarlane, Water-closets.—6,176, J. Deesley, Flushing Cisterns.—6,653, J. Higson, Riddles for Brick-making, &c.—6,865, J. Asbury, Traps for Drains, &c.—6,920, E. Edwards, Pneumatic Apparatus for Actuating Doors, Bolts, &c.—7,114, R. Stoffert and T. Dykes, Girders.—7,292, W. Brenton, Sash Fastener.—7,307, W. Verity and J. Walker, Construction of Floors.—7,326, E. Breething, Roofing Tiles, &c.—8,090, R. Ash, Ventilation.—5,752, J. Parsons, Drain-pipes.—5,950, T. and H. Grimbleby, Roofing Tiles.—6,486, H. Price, Hopper Ventilating Casements.—6,509, P. Justice, Gas-fittings.—6,912, G. Butt, Wood Mouldings.—8,318, S. Wallis and T. Wiseman, Cowl.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,416, J. Shanks, Water-closets.—10,721, T. Mercer, Collecting and Storing Rain-water from Roofs.—11,114, G. Greig, Diffusing Air Supplied for Ventilation.—12,155, J. Bedford, Ventilators.
12,463, J. C. Cushing, Water-closet Basin.—12,632, B. Skipworth, Self-acting Window Fastener.—6,099, R. Mason, jun., Valve Apparatus for Water-closets.—6,850, G. Redfern, Preventing Concussion in Water-pipes.—7,242, N. Haigh, Automatic Feeding-motion for Wood Tenoning Machines.—10,249, J. White, Water Waste Preventing Cistern.—11,001, W. Hassall, Jointing Stoneware, Concrete Pipes, &c.—11,141, H. Dickson, Chimney Tops.—11,453, J. Farmer, Making and Pressing Bricks.—11,462, C. Walton, Pressing, Bricks, Tiles, &c.—12,056, T. Norrington, Ventilating Apparatus.—14,726, R. Lee and J. Hodgson, Concrete Fireproof Building Material.—7,361, H. Lake, Manufacture of Cement.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 1.
By DRIVER & CO.
Addington, Kent—A fruit and hop plantation, 46, or 189, freehold £350
Eight freehold cottages and gardens 683
By WILKINSON & SON.
Brighton—19, Albany-villas, copyhold 1,000
JULY 2.
By DRIVER & CO.
Isle of Wight, Ryde—The freehold residence, Duver 410
2, Chester Houses, term 99 years, no ground-rent 400
JULY 5.
By TUNLEY & CO.
Shoreditch—139 and 139, High-street, 78 years, ground-rent 11, 1,000
Chelsea—42, Whitehead-grove, and a ground-rent of 14, 1 year, 21 years, ground-rent 1s. 630
7 and 8, Walton-street, 56 years, ground-rent 1s. 1,700

86, Walton-street, 56 years, no ground-rent £750
35 to 41 odd, Green-street, and a ground-rent of 4, term 67 years, no ground-rent 1,600
1 and 3, Rawling-street, 14 years, ground-rent 1s. 450
42, Godfrey-street, 34 years, ground-rent 1s. 360
Hammersmith—Ground-rent of 282, 10s., reversion in about 70 years 620
By MITCHELL & SCORRELL.
City-road—21 to 24, Richmond-street, freehold 1,147
Hammersmith—268, King-street, 22 years, ground-rent 6s. 420
By WETTERBALL & GREEN.
Harrow—Orchard and Laburnum Houses, freehold 1,445
JULY 6.
By C. & H. WHITE.
Camberwell—30 and 31, Clarendon-street, 39 years, ground-rent 6s. 10s. 407
Lambeth—67, Regent-street, freehold 430
Wandsworth—7, 8, and 9, Lydden-road, freehold 355
Garratt-lane—Two plots of freehold land 180
By DEBENHAM, TAYSON, & CO.
Camberwell—43 and 44, New Church-road, freehold 1,200
Worcester Park, Redcross-road—Ground-rents of 15s., reversion in 79 years 300
Grafton-road, two enclosures of land, 6s. 3s. 28p. freehold 600
Grafton-road, enclosures of land, 31s. 1s. 4p. freehold 3,000
Salisbury-road, two enclosures of land, 8s. 1s. 33p. freehold 785
By CHINKOCK, GALSWORTHY, & CO.
Yorkshire, near Ripon—The East Tanfield Estate, containing 1,100s. 2s. 2p., freehold 30,000
JULY 7.
By SALTER, LEE, & CO.
Fulham—37, Lilyville-road, 92 years, ground-rent 8s. 665
By LEARD & DAVE.
Cumberland Market—20, Redhill-street, 35 years, ground-rent 19s. 130
Somers Town—48 and 49, Little Clarendon-street, 4 years, ground-rent 14s. 14
By W. HALL.
Waltham—1 to 4, Alfred-cottages, freehold 200
Edgware-road—No. 268, term 8 years, ground-rent 6s., with reversion for 14 years 510
JULY 8.
By BRADLEY & CO.
Bury St. Edmunds, near—Two plots of freehold land, 6s. 3s. 28p. 150
By H. V. CRAWF.
Poplar—2, Woollett-street, freehold 245
By DUNN & SOMER.
City—A profit rental of 241, 14s., term 19 years ... 1,420
By LEMAN, SHARP, & HARRINGTON.
City, Clement's-lane—Ground-rent of 621, 10s., reversion in 54 years 1,630
Norwood, Auckland-road—The residences Summer-leigh and Redholme, 56 years, ground-rent 4s. 1,450
Lower Clapton—149, Clarence-road, freehold 500
By DEBENHAM, TAYSON, & CO.
Whitechapel-road—No. 105 and 1, Thomas-street, 23 years, ground-rent 70s. 450
By NEWSON & HARDING.
Islington—26, Compton-terrace, 31 years, ground-rent 10s. 650
No. 257 and 258, Upper-street, freehold 7,800
Cauden Town—165, Great College-street, freehold 2,900
By H. RUTLEY.
Regent's Park—Ground-rent of 54, reversion in 61 years 135
Ground-rent of 77, 1s., reversion in 53 years 255
Euston-square—Ground-rents of 211, term 33 years 315
Hampstead-road—7, Little George-street, 24 years, ground-rent, 4s. 7s. 230
Cauden Town—158, Arlington-road, 25 years, ground-rent 4s. 215
By C. C. & T. MOORE.
Bethnal Green—23, Collingwood-street, freehold .. 240
Mile End—145, 147, and 157, Jubilee-street, and 4, Woolsey-street, 11 years, ground-rent 15s. 390
140 and 156, Jubilee-street, 14 years, ground-rent 4s. 10s. 185
By E. SIMSON.
Wandsworth Common—5, Arundel-terrace, freehold Peckham, Carlton-grove—Ground-rents of 40s., reversion in 67 years 1,160
Dulwich—43, Colveston-crescent, 70 years, ground-rent 7s. 10s. 450
Kennington—44 and 46, Devonshire-street, 4 years, ground-rent 6s. 60
By BURN & SONS.
Hackney-road—69 and 61, Dove-row, freehold 475
45, Mansford-street, freehold 620
14 and 16, Minerva-street, 18 years, ground-rent 3s. 340
37, 39, and 41, Temple-street, 18 years, ground-rent 6s. 13s. 6d. 230
1, 13, 2, and 3, Seabright-street, 33 years, ground-rent 12s. 2s. 600
Hoxton—13, Allerton-street, 21 years, ground-rent 6s. 7s. 2d. 80
16 and 18, Allerton-street, 21 years, ground-rent 7s. 7s. 220
29, 30, and 31, Allerton-street, 21 years, ground-rent 10s. 355
Peckham—50, 68, 78, and 89, Hill-street, and ground-rents of 10s. 4s., 24 years, ground-rent 6s. 15s. 370
Bethnal Green—The Bricklayers' Arms public-house, freehold 2,230
16 and 17, Church-row, freehold 1,010
JULY 9.
By H. C. NEWSON.
Pimlico—43, Moreton-place, 45 years, ground-rent 8s. 625
Eccleston-square—28, Barwick-street, 34 years, ground-rent 6s. 590
Pimlico—157, Tachbrook-street, 41 years, ground-rent 8s. 555
Westminster—12, Winchester-terrace, 48 years, ground-rent 6s. 1s. 390
12, Vincent-street, 23 years, ground-rent 6s. 120
14 to 24 even, Vincent-street, 23 years, ground-rent 36s. 815
By NORRIS, TAYLOR, WATNEY, & CO.
St. Giles's—56, High-street, freehold 1,320
Kennington-grove—Copyhold ground-rents of 70s., term 69 years 1,020

By HAMPTON & SONS.	
Clerkenwell—25 to 35 odd, Exmouth-street, 29 years, ground-rent, 12 <i>u</i>	£1,523
By BAKER & SONS.	
Ham Common—The freehold residence, Selby House.....	575
Lindfield, Sussex—Two copyhold cottages, and a plot of land.....	320
Shenley—An enclosure of freehold land, 9 <i>u</i> , Or. 1 <i>u</i>	350
An enclosure of freehold land, 2 <i>u</i> 3 <i>u</i> , Or. 1 <i>u</i>	2,000
An enclosure of freehold land, 3 <i>u</i> 5 <i>u</i> , Or. 1 <i>u</i>	8,000
By G. A. WILKINSON.	
Hornsey—Ground-rent of 4 <i>u</i> , reversion in 91 years.....	1,240
Ground-rents of 4 <i>u</i> , reversion in 91 years.....	950
Anerley—18, Beverley-road, 79 years, ground-rent 1 <i>u</i>	340

MEETINGS.

SATURDAY, JULY 17.

Architectural Association.—Visit to Penshurst Place and Chiddingtons. (See advertisement on front page of last week's Builder.)

TUESDAY, JULY 22.

Builders' Benevolent Institution.—Annual meeting, Willis's Rooms. 3 p.m.

Miscellaneous.

Lead Coated Iron Sheets.—Attempts have frequently been made in times past to use lead as a protective covering for metal sheets, but the success hitherto achieved in this direction has been small. Lead while in a molten state absorbs various gases, and is thus prevented from adhering to metallic surfaces, small holes and blisters appearing in the lead covering. In addition to this, melted lead runs thick and sluggish, so that a coating formed from it is unevenly distributed, and full of ridges and inequalities. A new process recently introduced by the Ajax Metal Company of Philadelphia, and which has been patented in this country by Mr. J. Calmer, of that city, appears to have overcome these difficulties. Metallic lead is treated with sal-ammoniac, arsenic, phosphorus, and borax, or a similar flux, which so changes the nature of the metal that iron or steel sheets can be treated with it by a process similar to galvanising with zinc. The process is described as follows:—Ordinary pig-lead is melted in a suitable vessel, after which the surface of the melted metal is covered with powdered charcoal, in order to prevent oxidation, and retain the materials afterwards introduced. For every hundred pounds of lead thus melted, three ounces of sal-ammoniac are added, after which half an ounce of arsenic, then one ounce of phosphorus, and, lastly, half an ounce of borax, or a similar flux. These substances are introduced separately, and all that is then necessary in order to coat an article is to free the surfaces from dirt or scale, and dip them in the same manner as when galvanising with zinc. Should the metal when prepared not be needed for immediate use, it may be run into bars or ingots for future application, either as solder, or for coating metallic surfaces, or for mixing with other soft metals, such as zinc, tin, copper, &c. The method is not only applicable to lead, but may be used with various metals used for coating, such as tin, zinc, &c. It is claimed by the inventor that lead treated in this way will attach itself more strongly to iron or steel than zinc, and an equal surface may be covered with less than half the weight of metal that would be required if using zinc in the ordinary process of galvanising, so that, according to this statement, a saving of fifty per cent. of weight is gained by using lead on this system, so far as the protective coating is concerned. In addition to this, it is stated that the deterioration in strength that takes place when iron is "galvanised" is not present when the lead coating is used. If these statements are borne out by practical experience,—and, so far as we can judge from samples submitted to us, they appear to be well founded,—there is no doubt that the new process will have a wide application. For covering roofs, in place of sheet lead or zinc, for wire rope, coating chains and telegraph wires, and many other purposes, the system will doubtless prove valuable. The invention is being introduced into this country by Messrs. P. S. Justice & Co., of 46, Chancery-lane, who are the agents for the Ajax Metal Company.

A Large Clock and Chimes have recently been erected in Chard Parish Church, Somerset, the gift of Mr. George England. The clock shows time on two skeleton dials, strikes the hours upon a 25 cwt. bell, and the chimes play upon the eight bells. Messrs. John Smith & Sons, Midland Clock Works, Derby, carried out the work.

The Low Price of Steel and Iron.

Messrs. Matheson & Grant's half-yearly engineering trades' report, issued on the 16th inst., says:—The continued fall in the prices of iron can only be remedied by the voluntary or forced reduction of output, but no common agreement or equitable system of doing this seems possible. The stocks of pig-iron continue to increase both at Middlesbrough and Glasgow, and a financial collapse of some of the holders may be looked for. The fall in the value of rolled iron is greater than the saving in cost by the cheapness of materials and wages, although in the latter respect the sliding scale arrangement admits of an adjustment wanting in other trades. In the desire to bring expenditure into accord with current prices there is a falling off of quality in some of the cheaper kinds of iron which cannot but cause harm in the foreign markets of this country. Amidst the further general fall in values during the last six months, steel has moved faster than iron, and the due proportion between the two is not yet established. The combination among the English and Continental rail-makers, which last year prevented prices falling below 4*l*. 10*s*. per ton, came to an end early in the spring, and at a few of the best situated works, with the latest appliances, steel rails have been sold at less than 4*l*. per ton. As the present rates, with freight and duty added, only exceed the United States current prices by about one dollar, a resumption of shipments to America is not improbable, especially as the rail mills there are well employed at firm prices. The output of steel plates and bars has been considerable, the falling off in shipbuilding having been met more largely than heretofore by the increasing demand for bridges. The producing capacity is, however, still in excess, and the keen competition confirms the fact that the cost of production is primarily governed by the advantages arising from geographical position."

The Birkbeck Building Society.—The thirty-fifth annual meeting of this society was held on the 8th inst., at the Offices, 29 and 30, Southampton-buildings, Chancery-lane. The report, adopted unanimously by the meeting, states that the receipts during the year ending 31st of March last amounted to 7,619,003*l*., making a total from the commencement of the society of 92,259,679*l*. The deposits from members and others were 6,855,149*l*., and the payments on shares were 136,674*l*. The gross profits on the year were 148,174*l*., of which 136,576*l*. have been appropriated to the payment of interest and bonus to shareholders and interest to depositors and defraying expenses of management, leaving a net profit of 11,598*l*., making, with the balance brought from last year, a sum of 189,696*l*. in excess of liabilities. The permanent guarantee fund, which now stands at 110,000*l*., is invested in Consols. The balance, 79,696*l*., is carried forward to next year's account. The balance-sheet shows a sum of 3,391,394*l*. of surplus funds which are temporarily invested in Consols and other securities.

Wolverhampton Borough Surveyorship. At the meeting of the Wolverhampton Town Council on Monday afternoon, the General Purposes Committee reported that they had received a letter from the Borough Surveyor (Mr. G. Eastlake Thoms, M. Inst. C.E.) resigning his appointment as Engineer and Surveyor to the Corporation of Wolverhampton, as from the 1st of August next, and thanking the members of the Council for the kindness and consideration he had invariably received at their hands during the past nine years. On the recommendation of the Committee, the resignation was accepted, and the present Assistant Surveyor, Mr. R. E. W. Berrington, was appointed to succeed Mr. Thoms, at a salary of 220*l*. a year.

The Royal Agricultural Show at Norwich.—At Stand No. 210 (Machinery in Motion Department), Messrs. Marshall, Sons, & Co., of Gainsborough, exhibit a large assortment of their well-known productions, foremost amongst which may be mentioned their portable engines of 6, 7, and 14-horse power, the first of which is fitted with their patent apparatus for raising and lowering the chimney. This is an ingenious contrivance, and is a very useful adjunct to a portable engine.

Trade Mem.—Messrs. Rottmann, Strome, & Co., of St. Mary Axe, E.C., announce that they have established a house at 46, Gordon-street, Glasgow, situate in the new block of buildings by Messrs. Bennett & Son.

Finsbury and Shoreditch Polytechnic.

On Saturday afternoon the Princess Christian laid the foundation-stone of the Finsbury and Shoreditch Polytechnic, in Appold-street, Finsbury-square. The main object of the founders of the institution is to provide a technical training of a practical and elementary kind, suited to the requirements and means of young mechanics and artisans; and it will be conducted on the model of the Polytechnic, in Regent-street. The building is to consist of a swimming-bath and a gymnasium on the basement floor; a concert-hall (66 ft. by 40 ft.), a games-room, a drawing-room, a reading-room, and a refreshment-room, with lavatories, on the ground-floor; a gallery to the hall, workshops designed for technical instruction, and classrooms, on the first floor; and a flat concrete roof, to be used as a play-ground, for open-air concerts, promenading, &c., this roof being about 120 ft. by 70 ft. The elevation will be in the Tudor style. The cost of the building, without fittings, will be about 8,000*l*. Mr. H. W. Dobb (Borer & Dobb), London-wall, is the architect, and the builder is Mr. J. H. Mollett, both of whom had the honour of being presented to the Princess.

Appointments in the Gift of the Metropolitan Board of Works.—Mr. Harben has given notice that at the meeting of the Board this Friday, the 16th inst., he will move (a) "That no person shall be allowed to be a candidate for any office or situation in the gift or appointment of the Board who is a member of the Board, or who has been so within three calendar months of the day of election, unless the office or situation has become vacant since such person ceased to be a member of the Board." (b) "That no son of any member of the Board shall be admitted a candidate for any office or situation in the gift or appointment of the Board or any Committee."

Wimbledon Camp.—We are informed that this year the whole of the Camp is lighted by Messrs. Defries' Safety Lamps and Safety Mineral Oil. The burners are of three sizes, 43, 62, and 85 candle-power. The result is a brilliant illumination, said to be obtained at a saving of four-fifths of what gas would have cost. The lamps are made on the Company's new patented principle, whereby the oil is placed outside and on top of the lantern. The effect of this arrangement is that the flame is always at the same height, every drop of oil is consumed, and there is no shadow cast.

Building Materials in the Rhine Provinces.—An interesting paper was lately read by Herr Wiethase before the Architectural and Engineering Association at Cologne, according to which it would seem that the improved means of transport now available permit building stone to be carried an average distance of about 120 miles instead of only 20 miles, as was formerly the case. This fact has much to do with the present development of architectural skill in Western Germany. The Kyllthal stone, which comes from near Treves, is largely used in Cologne, where the extensive municipal improvements have caused exceptional building activity during the last few years.

Proposed New Park for Hammersmith. We are glad to see that the Works and General Purposes Committee of the Metropolitan Board of Works have resolved to recommend "That the Board do apply to Parliament in the next Session for power to acquire the Ravenscourt Park Estate, Hammersmith, for the purpose of laying the same out as a public park, subject to the Vestry of Hammersmith contributing one half of the cost, and that it be referred back to the Committee to enter into a conditional agreement for the acquisition of the said estate, and to the Parliamentary Committee to take steps for obtaining the necessary Parliamentary powers."

PRICES CURRENT OF MATERIALS.

		2 s. d.	2 s. d.	2 s. d.
TIMBER.				
Greenheart, B.C.	.....ton	2	5	0
Teak, E.I.	.....load	11	0	0
Sequoia, U.S.	.....foot cube	0	2	0
St. Canada	.....foot cube	3	0	0
Birch	.....load	2	10	0
Elm	.....load	3	10	0
Fir, Dautsch, &c.	.....load	1	10	0
Oak	.....load	2	10	0
Canada	.....load	4	0	0
Fine, Canada red	.....load	2	10	0
Oak	.....yellow	3	10	0
Lath, Dautsch	.....load	8	0	0
St. Petersburg	.....load	4	0	0
Wainscot, Riga	.....log	2	15	0
Olson, crown	.....load	3	7	0
Deal, Finland, 2nd and 1st.	.....std. 100	7	0	0
Deal	.....4th and 3rd	6	0	0
Rigs	.....std. 100	6	0	0

TIMBER (continued).		£. s. d.	£. s. d.
Deal, St. Petersburg, 1st yellow	8	0	14
" 2nd	7	0	8
" white	7	0	10
Bowditch	8	0	10
White Oak	7	0	17
Canada Pine, 1st	17	0	30
" 2nd	12	0	17
" 3rd	8	0	10
" Spruce 1st	8	0	11
" 3rd and 2nd	5	0	7
New Brunswick, &c.	5	0	7
Battens, all kinds	4	0	12
Flooring Boards, sq. 1 in., prepared, first	0	9	0
Second	0	7	8
Other qualities	0	5	8
Cedar, Cuba	0	0	3
Honduras, &c.	0	0	2
Australian	0	0	2
Managany, Cuba	0	0	5
St. Domingo, cargo average	0	0	5
Mexican	0	0	3
Tobacco	0	0	4
Roanoke	0	0	4
Maple, Bird's-eye	0	0	8
Rose, Rio	7	0	10
Bahia	6	0	10
Bos. Tor.	4	10	0
Staffordshire, London	5	5	0
Sheets, single, in London	6	15	0
Hoops	0	0	7
Nail-roads	6	10	0

METALS.

Iron—Pig, in Scotland	0	0	0
Bar, Welsh, in London	4	10	0
" " in Wales	5	0	0
Staffordshire, London	5	5	0
Sheets, single, in London	6	15	0
Hoops	0	0	7
Nail-roads	6	10	0

METALS (continued).		£. s. d.	£. s. d.
COPPER—			
British, cake and ingot	42	0	0
Best selected	43	0	0
Sheets, strong	49	0	0
" India	46	0	0
Australian	0	0	0
Chili, bars	58	0	0
Yellow Metal	0	0	4
Lead—Pig, Spanish	13	2	0
English, common brands	13	12	0
Sheet, English	13	2	0

STEEL—			
Silesian, special	14	5	0
Ordinary brands	14	0	0
TR—			
Banca	0	0	0
Billiton	0	0	0
Straits	100	15	0
Australian	101	0	0
English	104	0	0
ZINC—			
English sheet	18	0	0

OILS.

Linseed	21	0	0
Cocoon, Coochin	32	10	0
Ceylon	28	0	0
Copra	0	0	0
Palm, Lagos	24	0	0
Palm-nut Kernel	0	0	0
Rapeseed, English pale	22	5	0
" brown	20	15	0
Cottonseed, refined	18	0	0
Tallow and Oleine	25	0	0
Lubricating, U.S.	8	0	0
" Refined	0	0	0
TURPENTINE—			
American, in casks	1	5	0
Tar—Stockholm	15	0	0
Archangel	0	10	0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Rebuilding Workhouse	Elham Union	21l.	August 30th	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Portland Cement	Hove Commissioners	Official	July 25th	ii.
Construction of Newry Bridge	Acton Local Board	Official	July 25th	ii.
Cleaning, and Re-painting Infirmary	Woolwich Union	Official	July 21st	ii.
Painting, &c., Parkhurst (Isle of Wight)	War Department	do.	do.	i.
Well Sinking	Newport Pagnell B.S.A.	G. W. Branson	do.	ii.
Wood Paving	St. Martin-in-the-fields	Official	July 22nd	ii.
Repairs, &c.	St. George-in-the-East	Wilson, Son, & Aldwinckle	July 23rd	xiii.
Road Materials	Richmond (Survey) U.S.A.	Official	July 23rd	xiii.
Painting, Lime-whiting, &c., Brecon	War Department	Official	July 24th	ii.
Construction of Reservoir, Supply of Pipes, &c.	Crawley Water Co.	W. Matthews	July 28th	ii.
Seven Cottages, Otterbourne	Southampton Corporation	R. W. Nylph	July 27th	ii.
Board-Room, Offices, and Premises	Stationers' Company	C. G. Lawson	do.	ii.
Flats, Broken Granite, &c.	Southgate Local Board	Official	do.	ii.
New Post Office, Aldershot	Comm. of H.M. Works	H. Holton	do.	ii.
Town-hall, Municipal Offices, &c.	Dewsbury Corporation	J. Laidis	July 28th	ii.
Erection of new	Barnet Union	H. Saxon Snell	do.	xiii.
Drainage Works	St. George's Union	W. Brentnall	July 30th	ii.
Road Making	Tunbridge Wells Lcl Bd	R. Vining	July 31st	ii.
Back Culvert and Pipe Drain	Yaxley Corporation	B. Latham	do.	xiii.
Water Works Construction	Milton Mowbray U.S.A.	T. & C. Hawkeley	do.	ii.
Laying Pipes	Oxford Corporation	J. W. Pegg	do.	xiii.
Drying and Storage Shed	Met. Asylums Board	Pollard & Forder	August 2nd	ii.
Well Sinking	Farnham Water Co. Lim	Official	August 3rd	xiii.
Land Reclamation	Great Western Ry. Co.	Flitler & Rote	August 5th	ii.
Construction of Reservoirs, &c.	Oswestry Corporation	Official	August 10th	ii.
Yellow Deal Deals and Battens	Eton Union	W. Hill	August 25th	ii.
New Town Hall	Portsmouth Cor.			

TENDERS.

ASHTON-UNDER-LYNE.—For altering six single cottages into through houses. Mr. J. H. Burton, architect, Ashton-under-Lyne:—	
William Neal, Ashton-under-Lyne	£110 0 0
John Robinson, Ashton-under-Lyne	107 0 0
John Clayton, Denton	101 10 0
Allen Holmes, Ashton-under-Lyne	93 0 0
H. Rowland, Ashton-under-Lyne	88 10 0
Z. Pike, Holey Hill	85 15 0
Walter Clough, Ashton-under-Lyne	55 0 0
Charles Morris, Ashton-under-Lyne	83 0 0
J. W. Williamson, Ashton-under-Lyne	82 0 0
Thomas Dean, Ashton-under-Lyne	82 0 0
* Accepted.	

BLACKHEATH.—For alterations and decorative work to Macartney House, Blackheath, for the Rev. Walford Green. Messrs. Dunk & Geden, architects, Leadenhall-street:—	
Colls & Sons	£1,685 0 0
S. J. Jerrard (accepted)	1,374 0 0
For new conservatory:—	
Arthur Dashedwood & Co. (accepted)	181 0 0

BOW.—For sundry alterations to and fitting up the bar of the Coach and Horses public-house, Bow-road, for London and Burton Brewery. Mr. T. S. Archer, architect:—	
Barnes	2,668 0 0
Lidstone & Son	518 0 0
Holliday & Greenwood	511 0 0

Bar Fittings	
Holliday & Greenwood	335 0 0
Lidstone & Son	134 0 0
Barnes	98 10 0
New Fronts.	
Lidstone & Son	148 0 0
Barnes	80 0 0

* Accepted, at 10,351l., after fresh tenders from five selected builders.

BROCKMOOR (near Birmingham).—For the erection of schools, for the Kingswinford School Board. Messrs. Robinson & Beekley, Brierly Hill, and Mr. J. H. Burton, Ashton-under-Lyne, joint architects:—	
S. Bennett & Son, Brierly Hill	£2,058 0 0
John Guest, Brettell-lane	1,960 0 0
W. Willett, Old Hill	1,949 0 0
C. A. Horton, Brierly Hill	1,987 0 0
H. Bates, Dudley	1,800 0 0
Dorse & Son, Cradley Heath	1,750 0 0
* Accepted.	

CHATHAM.—For erecting ten cottages at Chatham, for Mr. M. Packer. Mr. J. W. Nash, architect, Rochester:—	
G. West, Strood	£2,500 0 0
J. L. Trueman, Chatham	2,125 0 0
C. Fowle, Chatham	2,118 0 0
Edser & Bockham, Chatham	1,985 0 0
W. Fry, Rochester (accepted)	1,825 0 0
C. E. Skinner, Chatham (accepted)	1,715 0 0

CHISLEHURST.—For stables, &c., near Chislehurst, Kent. Mr. St. Pierre Harris, architect and surveyor, Basinghall-street:—	
Otway, Chislehurst	£1,087 0 0
Knight, Sidcup	1,067 0 0
Hart Bros. St. Mary Cray	850 0 0
Coleman, Poplar	837 0 0
F. Wood, Chislehurst (accepted)	797 0 0

COLCHESTER.—For building house in Bergholt-road, Colchester, for Mr. J. Topfield. Mr. Walter Scargill, architect. No quantities:—	
F. Dupont (accepted)	£235 0 0
S. Garwood	238 0 0
W. Pitt & Son	281 10 0
[All of Colchester.]	

FOLKESTONE.—For public library and museum at Folkestone. Mr. Brightwen Bunyon, architect:—	
J. E. Hughes	£5,025 0 0
Hayward & Parnonoff	4,412 0 0
Tilden, Tunbridge	4,122 0 0
William Brooks	4,100 0 0
Daniel Baker	4,076 0 0
H. M. Moody	4,052 16 0
George C. Conley	3,997 0 0
W. H. Holdom	3,883 0 0
W. G. Prebble	3,860 0 0
Robert Webster	3,833 0 0
[Architect's estimate, £4,507.]	
* Accepted by the Corporation, subject to the approval of the Local Government Board.	

GILLINGHAM (near Chatham).—For erecting corn store, for Mr. R. Tassell. Mr. J. W. Nash, architect, Rochester:—	
A. F. Smith	£393 0 0
C. Snow	324 0 0
C. E. Skinner	753 0 0
A. H. Filley (accepted)	635 10 0

HASTINGS.—For new stabling, for Mr. G. A. Thorpe, Higher Oke, Hastings. Messrs. W. H. & J. D. Murray, architects, Hastings:—	
Snow	£534 0 0
W. E. Warran	530 0 0
Eldridge & Crutenden	496 0 0
Small	479 3 9

LAMBETH.—For new oak seating at the parish church, Lambeth. Mr. J. Oldrid Scott, architect:—	
Farmer & Brindley, Lambeth	£1,443 0 0
Robinson, London	1,212 0 0
Laphorne & Co. Lambeth	926 0 0
Elwell, Yorkshire	890 0 0

LONDON.—For the erection of the Thrawl-street, Whitechapel, Workmen's Dwellings, for the East-End Dwellings Company (Limited). Messrs. Davis & Emanuel, architects, Finsbury-circus. Quantities by Mr. F. Downing, Whitehall-yard, S.W.:—	
Thomas Boyce	£14,100 0 0
Samuel Chasen	14,060 0 0
William Sturmer	13,491 0 0
F. & F. J. Wood	12,583 0 0
George Shaw	12,564 0 0
Wall, Bros.	12,360 0 0
Colls & Sons	12,350 0 0
Mowlem & Co.	12,300 0 0
E. Lawrence & Sons	11,989 0 0
C. S. S. Williams & Son	11,989 0 0
S. J. Jerrard	11,939 0 0
John Grover & Son	11,673 0 0
Harris & Wardrop (accepted)	11,663 0 0

LONDON.—For warehouse and offices, No. 74, Lower Thames-street, E.C., for Messrs. Reynolds & Eason. Mr. Banister Fletcher, architect:—	
Fanthorpe	£3,334 0 0
Chesnut	3,022 0 0
Tyerman	2,980 0 0
Gentry	2,922 0 0
Kiddle & Sons	2,910 0 0
Scrivenor	2,892 0 0
Nightingale	2,845 0 0
Asby Bros.	2,835 0 0
Garrud	2,819 0 0
Asby & Horner	2,790 0 0
Pritchard & Son	2,720 0 0
Mills Bros.	2,720 0 0
W. & H. Castle	2,683 0 0
Potter	2,610 0 0
Jackson & Todd	2,429 0 0
J. O. Richardson (accepted)	2,327 0 0

LONDON.—For the erection of additional stabling, Baker's-row, Whitechapel, under the superintendence of Mr. Lanham, for the London General Omnibus Company:—	
Hack	£1,344 0 0
Evans	1,308 0 0
Garrud	1,275 0 0
Haynes	1,150 0 0
Musley	1,037 0 0
G. Parker (accepted)	1,040 0 0
Knight	950 0 0
North Bros.	940 0 0

LONDON.—For erection of buildings, Oxford-street.
Mr. Geo. Edwards, architect, Queen Victoria-street.
Quantities supplied by Mr. H. Lovegrove, Budget-row.—
Martin Wells & Co. £10,390 0 0
Higgs & Hill 9,940 0 0
Chas. Wall 9,390 0 0
Patman & Fotheringham 9,983 0 0
Perry & Co. 9,930 0 0
Stimpson & Co. 8,330 0 0
Mark 8,320 0 0
Scrivenor & Co. 8,781 0 0
Shepherd 8,682 0 0
Brace & Sons 8,673 0 0
Ward & Lambie 8,643 0 0
G. & J. Green (accepted) 7,995 0 0

LONDON.—For alterations, &c., at 68, Dean-street, Soho, for Sir Richard F. Sutton, Bart. Mr. D. Cubitt Nichols, architect.—
Wetherill, Lee, & Martin (accepted) ... £144 10 0

LONDON.—For alterations and decorations at No. 37, Clarges-street, Piccadilly, for Mrs. J. Elvin.—
W. & E. Curtis £235 0 0
Aldin 215 0 0
Scott 185 0 0
Wetherill, Lee, & Martin (accepted) ... 175 15 0

LONDON.—For alterations at the Blind School, St. John's Wood. Mr. Charles Bell, architect, Quantities by Mr. H. Lovegrove.—
Langridge £931 0 0
Burford 809 0 0
Boden 907 0 0
Allen & Sons 790 0 0
Scrivenor & Co. 745 0 0

LONDON.—For alterations, decorations, &c., at 38, Clarges-street, Piccadilly, for Mr. F. Elvin.—
W. & E. Curtis £235 0 0
Aldin 266 0 0
Wetherill, Lee, & Martin (accepted) ... 224 15 0
Scott 217 0 0

LONDON.—For warehouse and office fixtures and fittings at 49 to 52, Jewin-street, and 1 to 3, Jewin-crescent, for Messrs. Dalton, Barton, & Co. Messrs. Dunk & Geden, architects, Leadenhall-street, E.C.—
F. Sage & Co. £1,431 0 0
J. & J. Greenwood 1,220 0 0
D. King & Son (accepted) 1,200 0 0
Greene and Eddowes 102 10 0
R. Waygood & Co. (accepted) 102 10 0

LONDON.—For alterations to premises, Farringdon-street, for Mr. W. Lawley. Mr. Jas. Young, architect.—
Trent, Bros. (accepted) £465 0 0

MANFIELD (Notts.).—For building business premises, Market-place, Mansfield, for Mr. Wm. Taylor, Mr. R. Frank Vallance, architect. Quantities by the architect.—
F. Jay, Nottingham £1,137 0 0
Reeve & Tomlinson, Bulwell 1,135 14 0
G. Bradner, Mansfield 1,092 0 0
E. Cuddy, Mansfield 1,079 0 0
W. A. Vallance, Mansfield 1,058 0 0
H. Allop, Mansfield 999 0 0
J. Greenwood, Mansfield 995 0 0
S. & G. Frisby, Mansfield 990 0 0
H. Vickers, Nottingham 950 0 0
Fisher Bros., Mansfield 968 0 0
J. Moss, Mansfield 967 3 3
F. Sadler, Nottingham 957 6 6
F. Shaw, Ilkeston (accepted) 9 0 0

MANFIELD (Notts.).—For the erection of a residence on the Lindley Estate, Mansfield, Notts., for Mr. W. F. Sanders. Mr. R. Frank Vallance, architect, Mansfield. Quantities by the architect.—

	House.	Boundary Walls, &c.
J. Sadler, Nottingham	£2,599 0 0	£133 14 0
Reeve & Tomlinson, Bulwell	1,754 0 0	214 0 0
H. Vickers, Nottingham	1,605 0 0	185 0 0
F. Jay, Nottingham	1,497 0 0	222 0 0
J. Moss, Mansfield	1,403 0 0	151 18 6
J. Greenwood, Mansfield	1,429 0 0	110 0 0
H. Allop, Mansfield	1,391 0 0	81 0 0
S. & G. Frisby, Mansfield	1,349 0 0	112 0 0
Fisher Bros., Mansfield	1,287 0 0	179 0 0
F. Shaw, Ilkeston	1,265 0 0	198 0 0
W. A. Vallance, Mansfield	1,245 0 0	107 11 0
E. Cuddy, Mansfield	1,193 0 0	92 10 0

* Accepted.

OPENSRAW.—For enlarging the Congregational school in Lees-street. Mr. J. H. Burton, Ashton-under-Lyne, architect.—

Hannah Fielding, Droyliden	£2,017 0 0
Thomas Benson, Openshaw	1,002 0 0
William Neal, Ashton-under-Lyne	883 0 0
E. & C. Jackson, Higher Openshaw	850 0 0
Thomas Dean, Ashton-under-Lyne	849 0 0
Allen Holmes, Ashton-under-Lyne	847 0 0
J. W. Williamson, Ashton-under-Lyne	833 0 0
J. McFarlane, Manchester	826 0 0
Davison & Carr, Manchester	815 0 0
Butters & Carson, Manchester	812 0 0
William Holt, Manchester	806 0 0
John Smith, Openshaw	803 0 0
John Robinson, Ashton-under-Lyne	798 0 0
Jabez Gibson, Dukinfield	797 0 0
R. H. Grayson, Bradford	760 0 0
John Ross, Manchester (accepted)	743 0 0

ORPINGTON.—For stables at Orpington, Kent. Mr. St. Pierre Harris, architect.—
Knight, Sidcup £218 0 0
Treadwell, Orpington 183 0 0
Laslett, Farborough (accepted) 187 0 0

POPLAR.—For new stabling, at the Eagle Chemical Works, Poplar, for Messrs. J. F. Johnsons & Co. Messrs. Dunk & Geden, architects, Leadenhall-street, E.C.—
W. Stubbs (accepted) £685 0 0

SUDBURY.—For villa at Sudbury, near Harrow, Middlesex, for Mr. Thos. J. Harris. Mr. Chas. H. Worley, architect, Great James-street. Quantities supplied by Mr. R. C. Glend.—
Rodwell £1,098 0 0
Holliday & Greenwood 1,077 0 0
Burdon 900 0 0
G. & J. Green (accepted) 585 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

THE INDEX and TITLE-PAGE for Volume L (Jan to June, 1886), is given as a Supplement with the present Number. A COLOURED TITLE-PAGE will be sent, gratis, on personal application to the office. CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each. READING CASES (Claret), with Straps, to hold a Month's Numbers, Twelve Shillings and Sixpence, will be ready on the 21st inst. SUBSCRIBER'S VOLUMES, on long sent to the Office, will be bound at a cost of 2s. 6d. each.

CHARGES FOR ADVERTISEMENTS. SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS. Six lines (about thirty words) or under 6s. 6d. Each additional line at ten words 6s. 6d. Terms for Special Trade Advertisements, also for special advertisements in the last page, Compulsory Notices, Notices by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED. FOUR LINES (about thirty words) or under 2s. 6d. Each additional line (about ten words) 6s. 6d. PERMANENT IS ABSOLUTELY NECESSARY. ** Stamps must not be sent, but all results must be sent to the office. Letters will be forwarded addressed envelopes are sent, together with sufficient stamps to cover the postage.

DOUGLAS FORKBEINER, Publisher. Addressed to No. 46, Catherine-street, W.C. Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

For further Particulars and Prices apply to THE BUILDER, 46, Catherine-street, Covent Garden, W.C. Free of charge. Letters will be forwarded addressed envelopes are sent, together with sufficient stamps to cover the postage.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C. Free of charge. Letters will be forwarded addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION. "THE BUILDER" is supplied twice from the Office to residents in any part of the United Kingdom at the rate of 18s. per annum. To all parts of Europe, America, Asia, and New Zealand, 25s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FORKBEINER, Publisher, No. 46, Catherine-street, W.C.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

M. T. W.—I. & P. (thanks).—R. S. H.—A. R.—J. B. (shall have attention).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the writer, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return registered communications.

Letters or communications (by and more powerful) which have been duplicated for other journals, are NOT DESIRED.

All communications relating to literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND, Box Ground, Combe Down,

Corsham Down, And Farleigh Down.

RANDELL, SAUNDERS, & CO., Limited, Corsham, Wilts. [ADVT.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [ADVT.]

Doubling Freestone.

THE CHELYNCH STONE. The stone from these quarries is known as the "Weather-Beaten" and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.

THE BRAMBLEDITCH STONE. It is of the same crystalline nature as the Chelchynch Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES FRANK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—MR. E. WILLIAMS, 16, Craven-street, Strand, W.C. [ADVT.]

Doubling Free Stone For prices, &c., address S. & J. STAPLE.

HAM HILL STONE, Quarry Owners, Stone

and Lime Merchants,

Stoke-under-Ham, Ilminster. [ADVT.]

(Ground or Lump),

Ham Hill Stone! Ham Hill Stone!!!

For Ham Hill Stone of best quality and workmanship, apply to JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Established 1837. Agents, MATTHEWS & GEARD, Albany Wharf, Regent's Park Basin, N.W. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouses, floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, lun-rooms, and terraces. [ADVT.]

Asphalte.

Seyssel, Patent Metallic Lava, and White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [ADVT.]

BANNER EXHAUSTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY,

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

Vol. LI. No. 2268.

SATURDAY, JULY 24, 1896.

ILLUSTRATIONS.

Interior of the Portico of the Temple of Vesta at Rome.—Reproduced from an Engraving by Rossini	128-127
Church of St. Mary, Hamptonstead.—Messrs. Goldie, Child, & Goldie, Architects	130-131
Decorative Work in the Indian Exhibition	134
House, Castle Carey, Somerset.—Mr. Chas. Bell, Architect	135
Board School, Runcorn, Cheshire.—Messrs. F. & G. Holme, Architects	135
Trinity Presbyterian Church, Wimbledon.—Messrs. Potts, Sulman, & Jennings, Architects	135

CONTENTS.

The Architectural History of Cambridge	115	Preservation of Calshot Castle	141	A Question of Trade Mark: "Monks' Park" Stamp.—Sumner	147
Notes	117	Architectural Association: Visit to Chiddingstone and Penshurst-place	142	v. Fictor & Sons	147
A New Drill-Hall and an Old Artillery Ground	119	The Merchant Engine	141	The "Iron Process" for Sewage	145
The Colonial and Indian Exhibition: Stone Carving, Metal Work, and Textiles in Indian Court	119	The Tyrus Controversy	142	Draught Ventilators	145
Concrete Buildings	122	The Kent Archaeological Society at Rochester	143	Truro Cathedral: Central Tower Lantern Stage	146
Heraldic Motives	124	The Builders' Accident Insurance Limited	143	Provincial News	146
View in the Colonnade of the Temple of Vesta, Rome	124	Builders' Benevolent Institution	143	Church Building News	146
Church and Presbytery of St. Mary, Hamptonstead	124	Competitions	144	The Student's Column: Stone Quarries.—V.	147
Residence at Castle Carey, Somerset	124	Obituary	144	Recent Patents	147
New Board Schools, Greenway-road, Runcorn, Cheshire	124	Archaeological Societies	144	Recent Sales of Property	148
Trinity Presbyterian Church, Wimbledon	141	A New Spanner	145	A New Suburban Building Estate	148
Rothsburg-on-the-Tauber	141	Summer Sketching	145	Miscellaneous	148
				Prices Current of Building Materials	149

The Architectural History of Cambridge.



HE most cold-blooded critic,—and we give thanks that we are, in De Quincey's phrase, "no such cattle,"—could hardly refrain from enthusiasm in touching on a subject of such interest as this, or on a work so

worthy of the subject* as that which the genius and energy of Professor Willis projected and partially carried out, and which the long and conscientious labour of his legatees, Mr. Clark, has elaborated into the splendid book now before the public. It is true that, with the exception of the great Chapel of King's College, "the Parthenon of Tudor architecture," as it has been not inaptly called, the buildings to be dealt with do not represent the greatest or most important class of architectural work; nor in their disposition is there any such striking *coup d'œil* as that realised in the sister university, in—

"The stream-like windings of that glorious street,"

which Wordsworth has immortalised. The most striking architectural effect in the town, perhaps, is on King's-parade, with the picturesque gate of King's in the foreground, the chapel towering on the right, and the wide sweep of lawn surrounded by the level lines of the quadrangle buildings. Generally speaking, however, the architectural beauty of Cambridge has something of a shy and reticent type. The streets are narrow; the colleges stand apart, each in its own *temenos*; they surprise you with a sudden picture, the more charming because unexpected, on turning the corner of some narrow lane; they gleam pleasantly among their trees as seen from "the backs" on the further bank of "Camus, reverend sire,"—reverend, alas! more by association than in aspect. Cambridge architecture, with the exception, again, of King's Chapel (which is never long out of one's mind in thinking of Cambridge) is not aspiring in character. We might cite as another exception, perhaps, the modern chapel of St. John's, externally not one of the happiest of its architect's works, though the lofty narthex or ante-chapel is a fine bit of interior effect. In general, however, the element of horizontality prevails, the more emphasised by the general flatness of the

ground and the constant recurrence of the beautifully-kept level lawns to which the college buildings form the background or the enclosure. Indeed, the quiet sober lines of the architecture seem peculiarly to harmonise with the effect of these level expanses of green; the two constituents of the architectural picture seem as if designed specially for each other. Everywhere it is the architecture of repose; but of a repose dignified, marked with a faded but stately grace of its own, the more emphasised, to the occasional visitor, by contrast with the approach to it; for surely never had a great university town a more uninteresting and unpromising road of access than that into Cambridge from the railway.

Architecturally, then, the aspect of old Cambridge is singularly reposeful and devoid of all fussiness, pretence, and vulgarity (we can hardly say the same for all the new additions); it seems emphatically the architectural expression of study and culture, removed from the turmoil of this hurrying century. This peculiar charm can be felt and appreciated, doubtless, by many; not to feel it, indeed, would argue a mind duller than the fat weed by Lethe's wharf. But there is the further and deeply interesting historical side to the picture. By what steps did this assemblage of buildings dedicated to learning arise and get moulded into its present shape? That is the question which the eager mind of Willis set itself to investigate, and the answer to which is formulated in this fine and (to use once more a rather hard-worked epithet) monumental publication.

The first beginning of Willis's task was in the form of a lecture "On the Collegiate and other Buildings in Cambridge," delivered in the Senate House on July 5, 1854, on the occasion of the visit of the Archaeological Institute to Cambridge,—a lecture which, though nearly unnoticed by the press, excited the greatest enthusiasm among those who heard it, and which he was earnestly requested to publish; but soon found he could do no justice to the subject in a pamphlet, and announced his intention of developing it into a detailed history. But in this extended labour he made but slow progress; and Mr. Clark thinks that, not having intended publication in the first instance, the labour of going over and verifying the materials again proved very irksome to him. "He accomplished this task, however, for several colleges, at least up to a certain point, as for instance for Trinity College, where he was evidently fascinated by the interesting problem which the original arrangement of the site presented, and where the presence of his friend Dr. Whewell no doubt stimulated him to special activity. The extent of his research

there is shown by the enormous mass of material which he had collected, and by the numerous plans of the site which he had made and rejected, but which he evidently thought worth preserving for future reference. At King's College also, where the site is of nearly equal interest, he had made similar collections."

In 1860, on the occasion of the meeting of the Architectural Congress at Cambridge, he gave a second lecture on "The Architectural History of the University," and told his audience that he proposed to bring out a book on the subject very shortly; and in the following year, as Rede Lecturer, he dealt more in detail with a portion of the subject,—*"The Architectural History of Trinity College."* Yet still the materials kept increasing, and his fastidious care delayed publication, besides his continual preparation of important papers for the yearly meetings of the Archaeological Institute; and, subsequently, the illness and death of Mrs. Willis gave a shock to his system from which he never sufficiently recovered to resume any serious literary work. He told Mr. Clark that he had bequeathed the manuscript and all the materials to him, but was still unwilling to part with them during his own lifetime.

When Mr. Clark eventually came to examine this important bequest, he found that though the manuscript was arranged and grouped in the most orderly manner, the work on no one college was complete; if the history of the building was complete, that of the site would be unfinished, or *vice versa*; and eventually Mr. Clark came to the conclusion that to make the most of the materials collected, and to complete them satisfactorily, it would be necessary for him to go over again the whole track of evidence from the beginning, as well as furnishing the portions not yet undertaken. This task has occupied him eleven years; but the result is a work of permanent value.

The colleges are taken in the order of the date of their foundation, commencing with Peterhouse, founded by Bishop Hugh de Balsham, who in 1284 removed his scholars from the Hospital of St. John, and placed them in two hostels by the Church of St. Peter outside Trumpington Gates,—an act which was confirmed by a charter of Edward I. in the following year. But before enlarging on the histories of the separate colleges, we have a chapter on the early history of Cambridge, or Grantebridge, as it was originally called, the bridge over the Granta or Grant, the river being referred to as late as 1702, in an Act of Parliament, as the "river *Cham*, alias *Grant*." The author suggests that "Camboritur," the name of a Roman station which may with probability be identified with

* The Architectural History of the University of Cambridge and of the Colleges of Cambridge, and Etc. By the late Robert Willis, M.A., F.R.S., Jacksonian Professor in the University of Cambridge. Edited, with large additions, and brought up to the present time, by John Willis Clark, M.A., late Fellow of Trinity College, Cambridge. University Press, Cambridge, 1886.

the site on the right bank of the river near the ancient bridge, meant "the ford at the bend," and that the name of the site was eventually and by degrees transferred to the river. The author gives some of the stages of the transformation, Camden (1586) mentioning both names as in use; Speed's map of Cambridgeshire (1610), giving Cam; Drayton's "Polyolbion" mentioning both Cam and Grant, but the word "Grant" alone appearing on the map; and Logan's map of the town (1688) giving the title "the river Cam" at full length. It takes us back curiously to the practical origin of names, that both our great universities derive their names from the means of getting across a river. In the fourth volume, devoted entirely to maps and plans, the plan of Cambridge before the colleges is given as far as can be ascertained or conjectured from ancient maps and existing names and landmarks; and in this case, as well as in some of the plans of the colleges, the plan of Cambridge as existing is printed as a fly-leaf on tracing cloth, so that it can be placed over the ancient plan, and the changes and similarities compared: an excellent arrangement. The main lines of thoroughfare have persisted in their course since the site of Jesus College and close was that of the nunnery of St. Rhadegund, since the Augustinian monks occupied the site on which now stands the Natural History Museum, and the Dominicans held, apparently within exactly the same boundaries, the enclosure which is now occupied by Emmanuel College and its grounds. The colleges are almost entirely within the extent of the old town; the new town, the "secular" portion of it, if we may so distinguish it, having spread and developed almost entirely to the eastward, away from the river and the colleges. Indeed, the latter, with their grounds, have for a long period formed an unbroken chain along a considerable portion of the river bank, stopping the progress of secular building in that direction; the grounds of Queen's, King's, Clare, Trinity, and St. John's extending also to the western bank of the river, over that succession of stone bridges which form such a picturesque element of this portion of the scene. The old plans actually existing, however, do not apparently go back further than the latter part of the sixteenth century; at least, Willis gives that drawn by Lyne for Dr. Caius's history of the university in 1574, as the eldest. This, in reality, is a bird's-eye view, and Willis adds some remarks, the point of which will be evident to all who have compared old engravings of still existing buildings with the reality, on the curiously conventional and often utterly untruthful manner in which buildings are represented in such views at that date. Mr. Clark, however, —for we presume the remarks interpolated in brackets are his,—thinks this map a valuable record as to the relative positions and the names of streets and places, though it cannot be trusted for the verisimilitude of the building. The earliest measured plan is that of John Hammond (1592), now mounted and framed in the Selden Library. In this measured plan, however, the buildings are shown in bird's-eye perspective, and these small perspective views of many of the colleges are reproduced as a portion of the illustrations of the college histories.

Of the other authorities used in the work Mr. Clark has a good deal to say, on which we can only touch briefly. For the history of the site the best authorities are the royal letters patent authorising the foundation, and the conveyances of further additions of land, usually preserved in the muniment-room of the college; and these give often very minutely the boundaries of the land conveyed, and points of the compass, but no measurements, though in many cases the dimensions can be pretty well made out by comparison with the existing landmarks and street lines. The authorities for the history of the buildings are the accounts for work done (some of which are printed as appendices), and the collection of manuscripts of Baker and Cole, members of the University in the seventeenth and eighteenth centuries respectively. The former had been a member of the University

for sixty-six years, and his memoranda, partly among the Harleian MSS. in the British Museum and partly in the University Library, fill forty-two folio volumes; but he had no special interest in architecture. Cole, on the contrary, was a man of architectural tastes, and his MS. collection, bequeathed (ninety-folios!) to the British Museum, is described by Mr. Clark as "an invaluable storehouse of information about the town, county, university, and colleges of Cambridge."

A great portion of the third volume of the work before us is occupied by a lengthened essay, or series of essays, on the component parts of a college, tracing the manner in which these grew up into separate and necessary requirements. We should rather have expected this

between the two; and that the features which may be supposed to favour this idea (such as the chapel, taking the place of the Mediaeval church which was an essential part of the monastery), in reality grew up very gradually, and were developed, little by little, as practical requirements seemed to point to the necessity for them. The buildings at first supposed to be required for a college were little more than lodgings, a refectory, and a kitchen. The devotions of the students were performed in the parish church. "The attempt to build a quadrangle on a settled plan, containing the chambers and official buildings dispersed in order round about the area, in which form all these early colleges now present themselves, was not made till long after their establish-



The Gate of Honour, Caius College (Restored).

portion to have formed the introduction to the history of particular colleges; but Mr. Clark seems to think the history and theory of the college institution generally would be better appreciated after the reader had gone through the detailed facts connected with the actual colleges. The great and most obvious distinction between a college and a monastery, in regard to plan and arrangement, is the separate habitation for each member, in place of the day-room or fraternity and the common dormitory. But apart from this, the object of the author is to show that, whatever resemblance may be imagined between the general idea of a college and a monastery, and in spite of the fact that the oldest colleges date back to monastic periods and even occupy the actual sites of monastic establishments, there is, in fact, no connexion

ment. For, in fact, until the collegiate system had fairly stood the test of a long trial, it was hardly possible to determine what arrangement of buildings would be best adapted for its practical working, while the continual growth and improvement of the system in each successive foundation demanded enlargements and changes." In modern times, overcrowding of the colleges has in some cases brought round a recurrence to an "accidental" system of housing, and members of colleges have had to live out of the colleges to which they were attached*, thus preserving a kind of practical

* A good many years ago (whether it be so now we know not, for University slang fluctuates) an undergraduate at Cambridge who lived in lodgings out of his college was called a "beast," i.e., we presume, not strictly speaking a college "man."

reminiscence of the fact that a college consists not in the material buildings and their arrangement so much as in the spiritual and intellectual fellowship of students under a recognised system and authority. The earliest college at Cambridge, Peterhouse, as already noted, was commenced merely by settling the scholars in a couple of "hostels"; and Bishop de Balsham's additional bequest to them at his death (the scholars being then fifteen in number) of three hundred marks for erecting new buildings, only enabled them to build a refectory and enlarge their site. Eventually they completed their quadrangle; and here it may be observed how inherent in the human mind is the tendency to build in quadrangles. It is not a sanitary method of building—at all events, unless the proportion of height of building to enclosed area is very small; but (like a good many other insanitary proceedings) it is very pleasing to the æsthetic perceptions. Willis notes as the first quadrangle college plan carried out, of malice prepense, in that form, William of Wykeham's New College at Oxford, and his remarks anent the chapel are worth quoting:—

"The most original feature of the arrangements is that the chapel and hall form a continuous range of building on the north side, the altar of the former being placed against the partition wall which has the high table of the latter on its other side. The chapel, therefore, has no east window, but in lieu thereof a lofty pile of tabernacle work and imagery covers the whole surface of the east wall. The ante-chapel occupies two bays of the seven into which the length of the whole chapel is divided, but it has the novel peculiarity of projecting considerably north and south in the manner of transepts, so that the whole plan looks like a cross church lacking the nave. Hence many have imagined that this plan was imitated from the chapel of Merton College, not remembering that the transepts of the latter were erected forty years after Wykeham's, and that the remains of these western arches, now filled with masonry, show that a nave with arches formed part of the original design; this building being heretofore, as now, both a collegiate chapel and a parochial church. No nave, however, was intended at New College, and the statutes furnish a clue to the motive of the large ante-chapel, by enjoining that disputations in civil law, canon law, and theology are to take place therein. The transverse position of the ante-chapel is an ingenious device to obtain space for it without intruding on the portion of the site intended for the cloister cemetery."

Thus the narthex of the modern St. John's Chapel at Cambridge appears to be a return (whether intentionally or not) to the form of ante-chapel which was made a precedent by Wykeham, though without either the practical or constitutional reasons which governed the plan of the former.

We have just referred to the unsanitary effect or defect of the quadrangle plan when completely carried out. In the chapter following that from which the last quotation was made, Willis introduces a very interesting practical testimony on this head from the directions of Dr. Caius (1565) in regard to the court which he built on the south side of Gonville Hall to receive the students of his new foundation. This court was built on the new principle of having only two parallel ranges of buildings on the east and west sides, the chapel and part of the master's lodge of Gonville Hall forming the north side, the quadrangle being bounded on the south side only by a low wall, having in the centre the detached gateway called the "Gate of Honour,"—that most interesting and picturesque but now much-crumbled structure, of which the accompanying restoration is given in the chapter on Caius College, and reproduced here by the kind permission of the publishers. And this is what Dr. Caius left on record on the subject of his quadrangle plan:—

"We decree that no building be constructed which shall shut in the entire south side of the College of our foundation, lest for lack of free ventilation the air should become foul, the health of our College, and still more the health of Gonville's College, should become impaired, and disease and death be thereby rendered more frequent in both."

Dr. Caius, it would seem, was not only in advance of his own day, but in advance of ours, in his notions of sanitary planning. What would he have said to the quadrangles of the new War Offices as proposed?

The "Combination-room" Willis seems to

admit to be more like a direct descendant from the monastery plan than any other part of the typical college plan. It is the counterpart of the room called "common house," or "common hall," which formed part of every Benedictine monastery. The "Eton Boy," if we remember rightly, characterised the combination-room or common room at Eton as a room in which the masters congregated at certain times of the day "for reasons best known to themselves." We can recall one combination-room,—we will not say in what college,—which lives in our memory as the scene of the production of some of the best port we ever remember to have come across; but these are memories out of keeping with the gravity of the present occasion, although Lord Tennyson has recorded that,—

"Softly, through a vinous mist,
My College friendships glimmer."

We commend to the reader's attention the long, interesting, and largely-illustrated chapter on that fascinating subject, "The Library," which follows that on the Combination-room, but of which we have not space to say anything. Some of the interesting points in the architectural history of the separate colleges we must touch on in another notice.

NOTES.



FFTER surmounting difficulties and obstacles which would long ago have given the death-blow to many a less ambitious project, the promoters of the Manchester Ship Canal have placed their scheme before the public for investment. The prospectus issued on Tuesday last shows that of the eight millions share capital authorised, $7\frac{1}{2}$ millions are offered for subscription in 10s. shares, and that 4 per cent. interest will be paid on the amount called up during the four years required for construction. The special authority for this payment of interest out of capital was one of the few Acts of general interest passed by the late short-lived Parliament, and this will doubtless considerably influence the investing public. It was certainly desirable, after the promoters had succeeded in satisfying Parliament as to the practicability and utility of the scheme, that its progress should be facilitated, and these special powers are calculated to have that effect. The canal is estimated to reduce the expense of conveying merchandise from Liverpool to Manchester 60 per cent., besides lessening transshipment risks, and expediting delivery. It will be navigable for vessels of the largest tonnage, and will serve Manchester, Runcorn, and Warrington direct, and indirectly a very large manufacturing district; besides which the directors hope that it will be the means of creating local industries, and that they are justified in anticipating dividends of 18 per cent. If these hopes are realised, it is evident that not only will great benefit accrue to the trade of Manchester and district, but that this will be very much at the expense of the Liverpool Dock Companies (in spite of the repeated declarations of the Liverpool opponents that their commercial interests would be quite unaffected, and that they were only anxious about the effect on the Mersey) and the railways serving between Liverpool and Manchester. The natural and persistent opposition of these interests has caused the preliminary expenses to reach the enormous sum of 146,000l., and the men of Manchester may look upon the struggle as a brilliant Parliamentary success. We hope that Messrs. Lucas & Aird, who have contracted for the execution of the whole of the works for 5,750,000l., may be equally successful in overcoming the difficulties of construction.

IN another column we print a long letter on the Tiryns question from Mr. Stillman, whose main object seems to be to refute the idea that he was actuated in his attack upon Drs. Schliemann and Dörpfeld by any personal motive. This may be; but from what we have heard of other matters besides the Tiryns controversy, we incline to think that Mr. Stillman has, to say the least, an

unfortunate proclivity towards attacking those who have made discoveries in which he has had no share. In a letter in the *Times* of the 16th, Mr. Stillman thinks it necessary to explain to the world in general and to Dr. Dörpfeld in particular the special claims of Mr. Penrose (behind whose coach Mr. Stillman seems to have climbed) to be regarded as an authority on Greek archaeology, a matter on which we do not believe Dr. Dörpfeld requires to be enlightened. The same issue of the *Times* contains a letter from Dr. Dörpfeld in regard to the antiquity of the stone-saw and tubular drill, in which he mentions the evidence of the use of these tools on two fragments of "the dome-like sepulchre at Mycenæ," which are in the Archaic Room at the British Museum, numbered 220 and 221. We have examined these carefully, and have no doubt of the correctness of Dr. Dörpfeld's statement as to the evidence of these fragments, the authenticity of which we presume will not be disputed. The question as to the Tiryns walls can only really be settled on the spot; but we take it that Dr. Dörpfeld is a much tougher and better-equipped antagonist than the *Times* and its irrepressible correspondent seem to be aware of.

THE advertisement inviting candidates for the appointment of Superintending Architect to the Metropolitan Board of Works has attracted a much smaller number of aspirants for the post than might have been expected, looking to the amount of the salary offered and the dignity of the position. Only twenty-one candidates have presented themselves, and among these but few well-known names are to be observed. One of the competitors, Mr. De Bionville, was engaged from 1872 to 1881 in organising the Office of Works in Japan. Some of the candidates appear from their lists of works executed under their supervision to be engineers rather than architects. The following is a complete list of candidates: G. J. Barry (Liverpool), C. A. C. De Bionville, F. S. Brereton, F. Caws (Sunderland), J. G. Gibbins (Brighton), B. T. Giraud, H. Roumieu Gough, Horace Gundry, J. Stanislaus Hansom (Kensington), J. Lewis Holmes, F. W. Hornblower (Liverpool), H. Lovegrove, J. Douglass Mathews, J. H. Nuttall (Liverpool), Edward Power, T. Singleton (Manchester), P. Gordon Smith (Architect to the Local Government Board), E. J. Tarver, Robert Walker, W. Woodward, T. C. Yates. The limitation as to age has probably cut out some candidates of whom we heard. We can hardly see that Mr. Vulliamy's shoes will be filled out of that list; but we would at all events urge on the Board the desirability of appointing to the post an architect and a man of general education, not a mere surveyor, however energetic, business-like, or "pushing" he may be.

THE last great event in the railway world has been the completion of the Canadian Pacific Railway, which is now open for regular work the whole distance from the St. Lawrence river to Vancouver, in British Columbia. The first daily through train left Montreal on Monday, June 28th, at 8 p.m., and reached the Pacific terminus on Sunday morning, July 4th, only 132 hours' journey from sea to sea, and quicker by about twenty hours than the usual trans-continental journey from New York to San Francisco. It is, even in these days, when there is little room left for wonder, a stupendous achievement, and it is impossible to foretell the changes which it will bring about in the great lines of ocean and railroad traffic. Even now, at the very outset, the Japanese, than whom a more clear-sighted trading population does not exist, are preparing to take advantage of the reasonable through rates to send their tea to Europe *via* Canada. A great future is before Vancouver, as the Pacific point for so much European and American traffic, while British Columbia will be able to offer vastly greater inducements to settlers.

IN the Seventh Annual Report of the Archaeological Institute of America the question is raised how best can the Institute follow up its recent signal successes at Assos. Two fields for exploration for the coming winter and spring are suggested, the Cyrenaica and Magna Græcia, but the report evidently inclines to Magna Græcia as more attractive and also more accessible. Tarentum, Croton, Sybaris, all the network of Greek colonies, have to be scientifically investigated, rich finds of terracottas having already stimulated discovery. The report proceeds to say, "As a site for research, Tarentum would seem to unite many advantages: the climate is healthy, so that excavations might be carried on during the entire year: the modern city, on the site of the ancient Acropolis, would furnish an abundance of workmen; and, finally, desultory excavations have here, more than at any other site, yielded satisfactory results." The British Museum, we may add, possesses a horse's head of great merit from Tarentum, recently presented by an amateur explorer. It is pleasing to find that the recommendation of the report has been acted on. The Council has decided to send Mr. J. Thacker Clarke, the leader of the recent Assos expedition, in command of an exploration to some Magna Græcia site. In addition to funds supplied by the Institute, the sum of 2,000 dollars is required. The editor of the *American Journal* prints an appeal for contributions to be sent to the managing editor, Baltimore, before October 1st. If sufficient funds are forthcoming, the work is to be begun early in the winter. With our own British School at Athens, and the Egypt Exploration Fund to support it, it can perhaps scarcely be expected that England can help, but it is well that an object so praiseworthy should be widely known.

SO much has been said of late about Pelagic architecture in connexion with the various explorations or discoveries in Greece, Italy, and other countries, that a few words concerning these remote people may not be altogether out of place. As far as their history goes, they are almost mythical, the principal authority concerning them being Dionysius of Halicarnassus, who states that they came from Asia, and colonised Greece, Spain, and Italy, making a very decided mark wherever they settled, and becoming powerful and wealthy. Their date is vaguely put at some fifteen centuries before Christ; but, however this may be, their architecture had a pronounced character, and although it was of an exceedingly rude type, with scarcely any idea of sentiment or art, it was clear that the builders of that age were expert, and that they knew the principles of good construction. Wherever found, Pelagic, Phalassic, or Cyclopean remains consist of walls of the rudest and roughest description, inclosing areas, which Homer believed to be devoted to the worship of the gods,—ponderous masses of stone cut in irregular parallelepipeds and polygons, all put together without the least appearance of cement or mortar. In a few cases, such as in the walls of the Acropolis of Cephalu, there are some evidences of a higher type of architecture, the doorway having jambs and cornices of an Egyptian character and with slight approaches to ornamentation. The Pelagic buildings hitherto found in Italy are as follows:—The ruins of Fanum (recorded in Virgil) at Terracina; the ruins of the sanctuary of Mars at Fiume, now Forano; remains of walls at the Lake Fucino; the Sanctuary of Circe at Promontorio Circeo; walls at Fondi, Alatri, and Ferentino; walls of the Acropolis at Cephalu and at Core (now Cora); well at Tusculum with conical arch; walls at Cortona and Trebula, the latter called the "Devil's walls."

THERE has, for twelve years, been in existence in Edinburgh a club called the Cockburn Association,* having for its object

* The Association takes its name from the late Lord Cockburn, who had an intense love for the northern metropolis, and who, shortly before his death, published a vigorous pamphlet, with the title, "How best to Destroy the Beauty of Edinburgh," in which, amongst other pithy things, he declared that he "would sooner hang a city magistrate than cut down a city tree."

the conservation of ancient and interesting structures in the city, and the keeping of a vigilant eye upon contemplated improvements, and offering suggestions connected therewith. It appears from the last annual report of the Association that, amongst other matters discussed, was a proposal to restore the Chapel Royal at Holyrood. At the annual meeting of the Association, held on the 16th inst., Lord Moncreiff, the chairman, in moving the adoption of the report, said that "in regard to the restoration of Holyrood Chapel, it was not intended to express in the report any opinion upon that proposition except this, that a relic so interesting to the whole nation ought to be at all events preserved as far as it could be in its existent state, and if any operations were to be carried out with the purpose of restoration, that these should be conducted with the greatest care and attention. His own opinion was that while preservation of course was exceedingly desirable, restoration was not possible." The restoration of the old Parliamentary hall of the castle, which is being carried out by Mr. H. J. Elanc at the cost of Mr. Nelson, publisher, is quite another matter. The hall has been divided and applied to quite other purposes, and its restoration does not involve the obliteration of details executed by the hands of Mediaeval masons, as might be the case were Holyrood Chapel subjected to the manipulation of the modern workman.

THE designs for the new Church of St. Paul, in the Vicarage Gardens, Kensington, are now on view in the Kensington Vestry-hall. The church is to replace the present iron building, and is to seat 1,000 worshippers, at a cost of about 10l. a sitting. There are eight sets of designs, none of which rise to any remarkable degree of excellence, though several represent what would be very convenient and not unattractive churches. "Janua Coeli" has a long building with nave and chancel under one roof, with lean-to aisles and a glazed porch or narthex at the west end. The elevations show a fine tower over the north porch, which would be an effective feature commanding the length of the street approaching it, but this feature is omitted in the rather hastily drawn exterior view, and a bald and rather ugly porch is shown instead. The church is in brick, and very early in character, with round-headed clearstory windows and a concrete hexapartite vault shown in a scratchily drawn interior perspective which does nothing like justice to the design. "Credo," in a very neat and effective set of drawings, shows a design somewhat similar in general idea to the last, but later in point of style, and with large transepts that effectively break the length inside and out. The beautifully-drawn interior view shows a more decorative treatment than has been attempted in most of the other designs. The church is in three spans, each covered with quadripartite wooden vaults; there is no clearstory, but the lofty aisle windows would give ample light to the interior. There is no external feature in the shape of tower or turret. In plan both these designs are simple, orthodox, and convenient. "Design," in a careful set of drawings, with two coloured perspective views, shows a design somewhat ambitious in arrangement, and perhaps more appropriate to a larger building. The chancel has an apsidal termination, with an ambulatory round it, and vestries beyond, the effects produced by this arrangement and by the lofty nave arcade would doubtless be fine, but outside the short nave and squat bell-turret rather spoil the effect. We have some doubt whether it would be possible to carry the bell-turret with the support shown. "Hope" exhibits a somewhat fussy and broken-up design in a set of drawings of similar character; the good feature of the building would be the very considerable amount of open space obtained immediately in front of the pulpit, but everything else seems sacrificed for that advantage. This competitor shows a vicarage house. The style is early, with lancet windows. "Three Bells" shows a fair design of Late Gothic type, and "Rabacim," a simple building with lancet windows and a

rather ugly squat tower or belfry nearly on the ground.

IF a person were asked whether a chapel was a house, he would be inclined to suppose he was being asked a riddle. This, however, was the question which the Court of Appeal in *Wright v. Ingle* ("Law Reports," 16 Q.B.D. 379), had to decide. But, in truth, the question arose on the 105th section of the Metropolis Management Act, 1855, by which a Vestry is empowered to pave a new street, and "the owners of the houses" forming it are to pay their share of the expenditure. The case in question decided that the Wesleyan Chapel the subject of the action was a house, and that the trustees were the owners within the meaning of this Act. The reasons for this decision depending on the consideration of the Act in question cannot now be entered into, but it is worthy of note that the Court also held that a church, being a consecrated edifice, its legal status was changed, and it thus could not be called "a house" within the technical meaning of this statute. It is not altogether beside the mark to observe that, though chapels cannot be used as dwelling-houses while employed for religious services, yet it is possible to point to dwelling-houses which were at one time chapels, and in consequence of not being consecrated have, after some internal additions, been used as dwelling-houses. For the definition of a house for the purposes of this Act given by Lord Esher was,—land upon which there is a building which "is or may be used for the habitation of man."

A CLAMOUR seems to have been raised in Acton by some ratepayers because the Acton Local Board altered their scheme of drainage, without advertising afresh for tenders for the carrying out of those alterations, and because the oral concurrence only of the District Inspector, and not the written approval of the central authority, had been obtained to the carrying out of those alterations. The Board proposed to lay through Chiswick to the River Thames a 5-ft. culvert effluent sewer, but they soon discovered that the laying of this wide sewer through private lands in a neighbouring parish would involve very large outlay in the shape of compensation for disturbance to private owners. The Local Surveyor, Mr. Lailey, hit upon a plan, which afterwards obtained the approval of Sir Joseph Bazalgette, by which the sewer could be reduced to more than one half its originally proposed size, by the erection at the pumping-station of an effluent storage tank which would act as a reservoir during flow tides; the storage capacity necessary in these circumstances being simply transferred from the pipe to the tank, with the result that the Board save nearly 6,000l. on the cost of this portion of the scheme. Yet some of the ratepayers objected to these alterations, though they led to a saving. The Local Government Board has now written to the Acton Board that it offers no objections to the alterations in question, though the central authority is silent on a very important point,—as it very often is,—whether these alterations should have formed the subject of a fresh contract. Its silence may be taken as an approval of the Local Board's action in the matter.

THE collection of the works of Rubens belonging to the Duke of Marlborough, and now awaiting dispersion by the hammer in Messrs. Christie's galleries, is a very remarkable one from a Rubens point of view, though we confess it does not excite us to the enthusiasm which we have seen expressed about it in some other quarters. Taking each of the principal pictures separately, one recognises fully the force and richness of the work, in spite of its want of sentiment; but a whole roomful of works of this type, however powerful in themselves, does not impress us pleasantly. The collection probably will not be kept together, however, and each of the larger paintings will most likely go to a separate owner; and one such "robust" painting in a house, provided there is a large hall or gallery to

hang it in, one could do with. We doubt, however, whether Rubens has the value in the pictorial market that he once had; but the sale will bring this to a practical test. There are other pictures of interest, of the Dutch School, and a very fine collection of china, which should be looked at.

WE are glad to see that the venerable old border town of Shrewsbury is seriously taking in hand the question of a better water-supply, which the recent attacks of typhoid in the suburbs show is a necessity that can no longer be delayed. The present scheme, which is estimated to cost 25,675*l.*, is to tap the Severn a considerable distance above the present intake, so as to escape the sewage of the town and of the County Lunatic Asylum, which now falls into it. From this point the water will be carried to Shrewsbury by gravitation, and a pumping-station, service-tanks, and wells will be provided. The new intake is proposed to be made at a distance of 200 yards from the Asylum outfall, but, if advisable, it is perfectly easy to increase this distance at a very small cost. An alternative mode has been suggested of bringing the water from the Church Stretton Hills, a distance of over twelve miles, but there is no reason to suppose that the water would be any better, while the cost of the undertaking would not be less than 100,000*l.*

AT the Goupil Gallery is a small but very varied collection of pictures that have been exhibited in this year's *Salon*. It includes Bouguereau's "Spring," a picture affected in idea but exquisite in execution, both in the drawing and colouring of the figure. Israel's pathetic picture "When one grows old," representing an old peasant-woman, as brown and gnarled as an old tree trunk, trying to warm her hands over the fire, gains additional effect by contrast with its next neighbour, "L'Eveil," by Carolus Duran, a young girl in the first flush of youth, half reclined on a luxurious couch with an amber satin drapery as a background. Flameng's "La Jeu de Fusil," landscape with architecture and figures, is a wonderfully powerful representation of a hot, bright daylight effect, with buildings and figures equally well treated. There are two fine coast scenes by Mesdag, and a view of Windsor Castle by Mr. F. M. Boggis (one of the French-American artists), powerful and broad in style, and a welcome variation from a certain English painter's eternal purple Windsors; but unfortunately the great tower, and the buildings adjoining it, are all palpably leaning to the left, looking doleful to the architectural eye.

A NEW DRILL-HALL AND AN OLD ARTILLERY GROUND.

EXCLUDED from Westminster Hall, the 7th Middlesex Rifle Volunteers,—more familiarly known to our readers perhaps by their Cockney appellation of "London Scottish,"—have just established themselves on a plot of land at no great distance therefrom. The new headquarters are close to those, behind Auckland stables, which were opened on the 22nd of May last for their comrades in arms, the Queen's (Westminster). For the capacious drill-hall with its appurtenant buildings and offices* was taken a site (whereof presently as Palmer's Village) that possesses more than ordinary interest in connexion with the annals of our citizen soldiers. Situated by the end of Brewer's-row, behind the Emanuel or Anne Lady Dacre's Hospital, and just north of Victoria-street, it verges upon the old Westminster Artillery Ground, one of the areas which formerly were set apart for military exercise. At the present day Victoria-street traverses Palmer's Village and the northern side of that ground. In Strype's *Stow* (1720) this is cited as "the new Artillery Ground." It then covered some 1,400 square yards; whilst its confines might be clearly traced through the surrounding fields, gardens, and waste lands. The actual locality, however, would

seem to have been devoted to martial uses from a much earlier period, inasmuch as we have record of the parishioners being required to provide certain archers' butts in compliance with a precept from Queen Elizabeth. It is beyond our province to discuss how the arquebus and fire-lock, coupled with the adoption of brass pieces, superseded the obsolete artillery for their skill wherewith the Finsbury and Islington marksmen, together with their comrades, the "dukes," "marquises," and "earls," of Shoreditch, Clerkenwell, Pancras, &c., had been so justly famed. In course of time the Westminster ground proved too limited in extent for the safe discharge of ordnance or musketry. And though as lately as 1763, *teste* Bardwell, there were "no buildings in Tothill-fields, or on the Artillery Ground," the latter soon suffered considerable encroachment. In fact, it disappeared almost entirely, before the building operations which, until recent changes, rendered this one of the most densely crowded and ill-favoured quarters of the town. Artillery-place, Artillery-row, and the Artillery Brewery alone survive to tell a bygone tale.

Nevertheless, it is curious to recall how certain little cases remained, even to within living memory, to bear testimony to the *ci-devant* rural character of the district. Under this category we may instance the many garden houses, not forgetting Milton's in Petty France; most of them cottages, though, with their dwarf wooden palings and trellis-worked doorways. The few examples of these that can still be found by him who shall be at the pains to seek for them are but awaiting their turn to vanish in the general demolition which is clearing away old Westminster. Of such a kind too were Brewer's Green, Palmer's Village, and the now altered Stratton, or Stretton, Ground. The last-named derived its title from Stourton House, a mansion of the Lords Dacre of the South, descendants of Sir Richard Fienes, Constable of the Tower and Lord Chamberlain to King Edward IV.'s consort, who, having married Joane, heiress (1547) to her grandfather Thomas, sixth baron, was summoned to Parliament during the interval, 9th October, 1459, to 15th November, 1482.* According to Bardwell, *ut supra*, there were, barely 125 years since, "but few houses in James-street, and none behind it; nor any filthy courts between Petty France (York-street) and the Park; nor any buildings in Palmer's Village or Tothill-fields." Situated south-westwards of the Great and Little Almonies, and lying below the river high-water mark, the village site came to be thus styled from the twelve almshouses, with a chapel and a school attached thereto, which one James Palmer, B.D., founded (1654) in Tothill Side. His almshouses and school, as also, we understand, the Black Coat School, abutted on Palmer's passage; the Army and Navy Hotel, by Christ Church, Victoria-street, and the vacant space at its rear, represent their original position. Beyond Palmer's passage, *nunc* Palmer-street, between the hotel and the Peabody-buildings, stood Nicholas Butler's Almshouses (1675), near to the existing Blue Coat School. The Palmer and Butler charities are newly settled in Rochester-row. "The Blew Coat School, built in the year 1709," as witness the inscription, beneath the statue, on its northern front,† stands for a while secure on the southern side of Caxton, *præ* Little Chapel-street, just between the new drill-hall and the walk locally known as Blue Coat Ring. Its own three-sided plot of ground further encloses the master's dwelling-house (1709) and the Girls' School (1868) adjoining thereto. "Palmer's Village" does not appear in the "Company of Parish Clerks' New Remarks," 1732; or in the "New Complete Guide," fourteenth edition, for 1774-5; or in R. Wilkinson's "New and Improved Plan of London, Westminster, and Southwark," 1799. In J. Lockie's "Topography of London," 1810, it is stated to be "about half a mile from Buckingham-gate along James-street bearing to the right entrance on the north side of Bridewell. To this description the volume for 1813 adds "Brewer's-green."‡ In his "Curiosities of London,"

1855, John Timbs writes, "Thirty years since here was an old wayside inn (the Prince of Orange), rows of cottages with gardens, and the village green, upon which the maypole was annually set up; this ruralia has now disappeared, and with it from maps and plans the name of Palmer's Village." Hardly so: the village is distinctly set out, and by name too, in Cross's large map of 1836, whilst the site is indicated in the "Ordnance Survey," 1869. Timbs, moreover, is wrong apparently when he says that the almshouses were "built in 1566 by the Rev. Edward [sic] Palmer." We are credibly informed by an aged man who recollects to have disported in his youth around the maypole that the village green can at this date be identified with the ground occupied by the Army and Navy, and the Army and Navy Auxiliary Stores. The village inn, by sign of the Prince of Orange, and the Blue Coat Boy (as the Albert) have been rebuilt. Some would maintain that Brewer's Green is but another name for the village green. However this may be, Brewer's Green appears as a postal address in the Directory for 1865. Rebuilt as a stable-yard, Brewer's-row represents the pleasant grove that led to the brewery behind the modern Victoria-street; Brewer-street, and the tavern sign of the "Two Brewers" in Buckingham-row (since, together with Little James-street, absorbed into James-street) demonstrate how this quarter has long been in favour with the brewing fraternity.

The Green's Brewhouse of R. Wilkinson's map, quoted above, and shown thereon as next south of the chapel,—Dr. Dodd's chapel,—in Charlotte-street, Stafford-row, we take to be the predecessor of the Stag Brewery,—Elliot & Watney's, lately re-constituted as Watney & Co., Limited. There, at the Stag Brewery, they render familiar to us the white hart, a favourite cognisance of King Richard II., which is frequently repeated along the sculptured interior string-course of his Westminster Hall.

Other changes are imminent in this locality. For example, the Corporation of London are open to treat for the conversion of the property occupied by the Emanuel Hospital, James-street, lying between the Drill-hall and the Westminster Congregational Chapel (1840) which has supplanted the former Westminster Hospital. Dacre's Almshouses, by the way, form one of the views in this year's series issued by the Society for Photographing Relics of Old London. Again, some old freeholds at the elbow of James and Caxton streets are in the market. We may here remind the members of the "London Scottish" that their compatriots in arms, though under very different circumstances, have been at Westminster before them. Heath's *Chronicle* relates how the Scots prisoners of 1651 were driven like to a herd of swine through Westminster to Tothill-fields and there sold to several merchants, and sent to the Barbadoes,—the oldest, as such, by the bye, of our British colonies. We read, moreover, in one of the Uxetham Society's Civil War Tracts of Lancashire that of these "Scots, Highlanders, or Redbanks," to the number of 4,000,—and who were accompanied by their guide-wives and bairns,—no less than 1,200 were buried in Tothill-fields.

THE COLONIAL AND INDIAN EXHIBITION:

STONE CARVING, METAL-WORK, AND TEXTILES IN INDIAN COURT.

THE skill shown by the Hindoos in their wood-carving is even more strikingly manifested in their stone-carving, for this latter material seems to be better adapted for displaying the skill of the cunning worker than wood. What will strike many people who examine Indian stone-carving for the first time in detail is the very Classic character of its motifs. Fig. E (see lithographed plate), taken from a sandstone screen from Multra, is conceived in the best spirit of Classicism, being chaste, graceful in the flow of its lines, and yet full of crispness, character, and swing. Fig. C, again, simple as the design is, is Classical in the best sense, and has all the reserve and simplicity of one of the Hellenic historic borders. Fig. A bears a strong likeness to fig. E, and the breaking up of the continuous scroll by the interposition of the flowers is very happy. But the skill of the Hindoo stone-carver is even more strikingly shown in the scroll-like panels

* The Lords Dacre, of the North, were descended from Sir Humphrey Dacre, whom Edward IV. elevated Lord Dacre of Gloucestre, co. Cumberland, the ancient seat of the Yaufes. He was uncle to the Joane of the text.

† At the back, above the fresco of a scholar, is inscribed "This school founded 1653."

‡ For notices of the site and demolition of this prison, see the *Builder*, xlv, 244-245 (8th and 15th March, 1884).

* The building was described at some length in the *Builder* for June 19 last, p. 879.



Metal-Work in the Indian Exhibition.

in figs. B and D. Fig. D, from Jodpur, is a pierced or fret-work pattern, and is of singular and unique beauty. This pierced stone-work is largely employed by the Hindoos in the decoration of their buildings, and it is rather surprising, seeing the qualities gained by this stone fret-work, that European builders have not introduced such work into their buildings. We have nothing equivalent to such work. Fig. D, like figs. A, C, and E, is in slight relief, and is most delicately and beautifully carved. It is a very perfect piece of designing,—especially so in the way each scroll springs from a sort of ornamental sheath, a plan followed in nature, the great teacher and master. In much of the stone-work the surface is not smoothed away to look like polished stone, but is left with the work of the chisel upon it.

METAL WORK.

There is in these courts a very fair display of well-designed and skilfully-executed metal-work, and in selecting a few specimens to sketch one feels that one omits many examples simply for lack of space, for the general excel-

lence of Hindoo metal-work is well known. All we can attempt to do here is to draw attention to some few specimens which we have selected, not only for their intrinsic beauty, but also as being types of large "schools" of work; for all Indian work easily divides itself into "schools," and the craftsmen educated in the various schools devote themselves to producing work within the limits of their knowledge and training. We see this well exemplified in the silver work from Cutch (figs. 1 and 9: see engraving). The pattern is left in relief, the background apparently being dug out to the depth of from $\frac{1}{8}$ in. to $\frac{1}{4}$ in. The pattern consists invariably of continuous scrollwork, as in fig. 9, or of symmetrically-arranged patterns, where the surface is divided up into panels, as in the water-cooler (fig. 1). The Hindoos are generally very happy in the shapes both of their pottery and metal-work,—a remark that cannot with truth be applied to the silverwork of the Colonies, and it is to be hoped that both the representatives of the firms exhibiting from the Colonies, as well as English craftsmen, will take to heart some of the lessons

taught by the display of Indian craftsmanship.

Fig. 2 is a rose-water sprinkler from Lucknow, and is both *repoussé* and chased. The general effect of this sprinkler is richness, and yet when we analyse the *motifs* of the decoration we find them simple and familiar in character. It is in their disposition and adaptation that the skill of the craftsman is shown, the *motifs* themselves being evidently common property,—a statement that applies with equal truth to most of the other work in the courts. Fig. 3 is a brass *Hastawa* from Jeypore, and is very quaint and piquant in shape. The body of the *Hastawa* is formed of a series of rounded ribs, while the top, bottom, and spout are square-sided. The decoration consists of engraved patterns.

Figs. 4, 5, and 6 are specimens of the well-known "Bidri" ware. The vessels are of iron, and the patterns of silver let into the iron. To increase the richness of the effect, the pattern in fig. 6 is chased or carved. Figs. 7 and 8 are from Madras, and are known generally as "mixed" metal work, the body being copper,



Metal-Work in the Indian Exhibition.

iron, or brass, and the patterns silver, copper, &c., either let in, as in fig. 7, or put on in relief, as in fig. 8. Fig. 10 is a shape frequently used by the Hindoos, and the surface is decorated in different ways; sometimes with patterns in slight relief, the background being removed; sometimes with patterns made by punching in a line so that the decoration has the appearance of being incised, as in fig. 10; sometimes with engraved patterns, and sometimes with *repoussé* work. When the pattern is incised the background is very often roughed over by means of punches. The flowing pattern in fig. 10 is very pleasing.

Fig. 11 is a specimen of Kopt work from Travancore. The pattern is in slight relief, the background being removed and blackened. The shape of this specimen is peculiarly elegant.

Fig. 12 is a specimen of Kashmir enamelled work. The enamels, which are transparent, are let into the background, the pattern being in brass. There are also a number of specimens of enamelled work from Lucknow, the colours generally employed being turquoise, deep blue, green, yellow, and madder brown. We have not figured any of the Benares brasswork because it is much more familiar in this country than the metal work of other states. The

Benares work is beginning to smack of the manufacturer.

Fig. 13 is a large brass cooking-pot from Lucknow, ornamented with a punched-in pattern. The decoration is peculiarly suitable, being very simple and bold in character. This decoration is executed quite freehand, and has a peculiar charm by reason of its unstudiedness. The Indian *repoussé* work is wrought, most of it, in the same way, the craftsmen designing the decoration as he goes, his eye being his only guide.

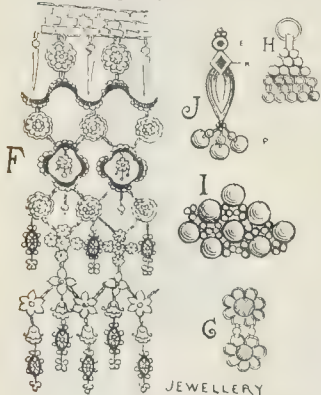
Fig. 14 shows a Hugli water-pot with two schemes of decoration shown on either side, A and B. The pattern is punched in, and then the surface between the lines, instead of the background, is roughened with punches. The price of such a pot is marked 7s. 6d.

Many of the *repoussé* plates evince great judgment on the part of the craftsmen in arranging simple patterns to the best advantage. Take the Lucknow dish (fig. 15) for instance. Nothing could be simpler than the *motifs* used in this plate, and certainly nothing could be more effective than it is, considering its price is 15s. So, too, with the other Lucknow plate, of much larger size, priced 30s., a segment of which is shown in fig. 16. The patterns in all Hindoo work may be said to be tradi-

tional, and they will, in all cases, be found to be such as are most readily produced by the worker with his materials. The patterns have, in fact, slowly grown (or been evolved) to their present form during the practice of the various crafts by generations of craftsmen, until they assume their recognised perfect form; for there must come a time in art work when the maximum of result with the minimum of labour is obtained, and when the elimination of all unnecessary and militating details can be carried no further. This is so with the familiar Greek *motifs*, and equally true of the Hindoo patterns.

Jewellery.—Jewellery in this country rarely now claims our attention by reason of its art qualities. The imitation of commonplace objects, such as chain cables, anchors, whips, *et hoc genus omne*, is about the highest flight of most gold and silver smiths. We constantly transgress the axiom of the Japanese, that "the value of metal work should not be found in the pot," for a large mass of modern jewellery is valueless except as valuable metal. The same objects wrought in iron would not be looked at twice. Some of the Burmese jewellery is very graceful and full of individuality. The jewellers there apparently recognise the beauty of effect to be obtained by

linking a number of small patterns together.* The necklace, fig. F, is composed of many hundreds of small patterns, as shown in the portion figured, and is very elegant and lacy. The amount of the precious metal used is comparatively small, for it is beaten and drawn out very thinly, and the necklace is the reverse of that familiar epithet, *massive*. Portions of



JEWELLERY

other objects of personal adornment are shown at G, H, and I. The introduction of gems is shown at J, which represents one pendant of a necklace composed of a number of such pieces. The letters E, R, and P refer to the several objects introduced, viz., emerald, ruby, and pearl.

The Travancore gold and silver lace is worthy of attention.

TEXTILES.

In this department there is much that is interesting as well as much that is displeasing to English tastes. There is not much in the way of embroidery that calls for special comment, nor are the gold brocades quite as satisfactory to us as to the rich Hindoo. There appears to be nothing between the simple cotton garments of the poor folk and the sumptuous apparel of the rich, and the one strikes us as being as much too elaborate as the other is deficient in beauty or interest.

Some of the carpets are good; those from Agra especially so. The chief beauty of a carpet is its colour; the pattern should be quite a secondary consideration, and in carpet-weaving some of the Hindoos appear to be quite as skilful as the Persians. It seemed worth while noting down the following four schemes of colour of four particularly well-arranged examples of colouring. No. 1 is a Thana carpet, the next two are from Agra, and the fourth from Mooltan Punjab:—

1. Purple brown ground, brown pink, yellow ochre, turquoise blue, deep Antwerp blue, scarlet vermilion, cream white, with a little grass green in centre.

2. Deep scarlet red ground, Indian yellow border, and in centre deep blue-black, pale-grey green, light blue, cobalt green-grey, cream, rose pink, raw amber. The general tone is red and yellow.

3. Indian yellow ground, turquoise grey border, deep blue-black, scarlet, purple-brown, sky-blue, white, pale-yellow, cold green. General colour, turquoise and orange.

4. White ground, scarlet vermilion, warm terre verte, black, deep blue, deep red-brown.

The colours are mentioned in the order of their predominance. A carpet should consist of a number of bright colours, individually pure, and in tone arranged so as to balance and harmonise with each other. All the most beautiful carpets are composed of the brightest and purest colours, and it was left to us to err in making carpets of earthy, neutral colours, at once dull and uninteresting. William Morris is one of the few English designers who seems able to design a carpet of marked individuality, and withal as beautiful as a fine Eastern one. Those who know Peterhouse, Cambridge, have been able to judge for themselves as to Morris's ability in both designing and weaving a really noble carpet. Whatever good mercantile carpets

* The necklets found by Dr. Schliemann at Troy are of a very similar character, being composed of a number of pieces linked together.

we make they are simply reproductions of Eastern ones, and it really seems as though the Persians and kindred nations had said the last word on the subject. We certainly in this country have not been able to advance the craft of carpet-weaving. Individually, the colours we employ are not as fine as those used in the East. Our dyes seem to lack the brilliancy and luminousness of these Hindoo dyes, seem to partake too much of our own grey climate. Well-arranged, harmonious colours give the same sort of satisfaction as finely-played chords in music. Owen Jones often speaks of the fine "bloom of colour" of an Eastern carpet, and that is, perhaps, the best expression we can use. A finely-woven carpet has a beautiful "bloom" about it, every colour keeping its place in the scheme.

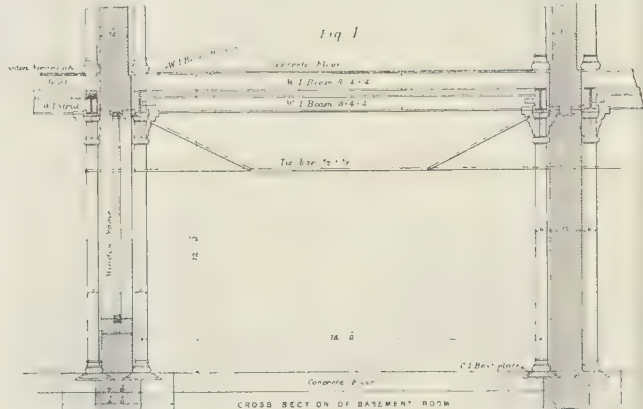
CONCRETE BUILDINGS.

In a paper contributed not long since to the Institution of Civil Engineers by Mr. Walter Smith, an Associate Member of the Institution, some interesting particulars were given of the New Government Buildings recently constructed at Simla in India. These structures are known as the "Secretariat" and the "Army Headquarters," and were composed chiefly of concrete. The points in favour of the use of this material in the case under notice were:—1. Possibility of having a lighter building than one of stone or brick, an important point when the site, as in this case, is on a hillside; 2. The greater rapidity with which the construction could be carried out; and 3.

The lime and surkhi were mixed together dry in the proportion of one part of the former to two parts of the latter for the concrete. It was found that 10 cubic feet of surkhi mixed dry with 5 cubic feet of lime gave 14 cubic feet of mixed material. In the manufacture of the concrete the lime was unslacked, and there was no grinding of the mortar wet; this mixture is referred to as "dry mortar." The lime after being ground dry and screened approached cement in its character, and was treated accordingly. The proportion for the concrete for the walls and arched vaulting was 45 cubic feet of dry mortar to 100 cubic feet of stone ballast, and for ordinary foundations 42 cubic feet of dry mortar to 100 cubic feet of stone ballast. The usual allowance of material for 100 cubic feet of rammed concrete was 117 cubic feet of stone ballast and 53 cubic feet of dry mortar for the walls and arches, and 117 cubic feet of stone ballast and 49 cubic feet of dry mortar for the foundations.

The mixing of the concrete was done by hand. The stone ballast was spread evenly on a table, 14 ft. by 10 ft., laid on a slight slope. A layer of dry mortar was then put on the ballast, and water was sprinkled gently over the whole from watering-cans with roses, great care being taken not to wash away the mortar. After this the mortar was incorporated by drawing a pick several times through the material and then turning it over with shovels.

The concrete was deposited in layers of 3 in., and then thoroughly rammed. Large stones and boulders were often embedded in the mass;



The plentiful supply of material for concrete as against the almost total absence of good building stone, or bricks at a reasonable cost.

The superstructure of the two buildings consists of a framework of iron with concrete walls and floors. A series of cast-iron columns with bracketed heads supports rolled beams carrying the iron joists for the floors, each room being contained between four groups of columns. The arrangement is shown in figs. 1 and 2. The larger of the two buildings, the Secretariat, is four stories high, while the Army Headquarters is a story less.

The foundations were composed entirely of concrete. Where good soil was to be found at no great depth below the ground they consisted of a series of piers carrying the groups of columns, with cross-walls between to support the superstructure. Where, however, the excavation was over 10 ft. in depth groined arches were thrown between the piers, thus forming a series of vaulted chambers.

The stone ballast, which formed the aggregate of the concrete, was chiefly limestone broken by hand to pass through a 1-inch ring. A Blake's stone-crusher had been tried for the purpose of breaking up the material, but proved unsuccessful. The lime was hydraulic, and was ground by engine power. Pound brick, known as surkhi, was also used, being ground up on the works. The lime after being ground was screened through a sieve of 250 meshes to the inch, except in wet weather, when a 144-mesh was used. The surkhi was screened through a sieve of 132 meshes for fine work, whilst $\frac{1}{2}$ in. to $\frac{3}{4}$ in. bar screens were used for ordinary work.

the saving thus made in the Army Headquarters building, below the level of the piers, amounted to 6 per cent. of the concrete used.

The method of constructing the piers was to mark out the shape of the footings in rough stone walling, lined on the inside with planks. As each footing was completed, and the concrete became sufficiently set, the planks were removed, and the space between the piers was filled up with earth, well rammed. The next footing was then made in a similar manner, and so on, until the springing of the arch was reached; earth was heaped up, well rammed, and moulded by the aid of templates into the shape required for the groining. The advantages of these earth centres were, firstly, cheapness, and, secondly, the ease with which the most complicated groining could be moulded. When this had been accomplished, and the earth was consolidated, the surface was plastered with cow-dung, above which again lime-plaster was placed. The concrete was then rammed on the centres up to the floor level, and, later on, the earth forming the centres was removed. With this method only twice did a trifling settlement occur, in both cases due to heavy rain.

In the superstructure the concrete work consisted of the walls between the cast-iron columns and the floors. The walls were 15 in. thick in the basement, 12 in. in the first floor, 10½ in. in the second, and 9 in. in the third floor. The offsets in the thickness were made on each side of the wall, at the level of each floor, as shown in fig. 1.

The material used for chimney-breasts con-

sisted of 15 cubic feet of lime to 100 cubic feet of clinker-ballast; this made very fine and close work. The mixing was done in the same way as for the foundations. The first operation in building the walls was to construct a framing of 1½ in. planking, as shown in fig. 2.

The fireplaces and mantelpieces were entirely of concrete, the composition being the same as for the chimney-breasts. In the Secretariat the mantelpieces were omitted when carrying up the walls, and were added at a later stage. Boxes giving the main shape of the mantelpiece were placed against the wall, and the

however, disturbed the concrete, and, as there was only 4 in. between the adjacent flues, it was a matter of some consequence. A core was next tried, which consisted of a four-sided tapering piece of wood for the inside, and four segments of a cylinder outside; so that when the concrete had set the centre-piece could be withdrawn and the sides would then collapse.

The floors of the buildings were made of concrete laid on curved corrugated iron, resting on the lower flanges of the cross-girders, as shown in fig. 3. The concrete was, for the sake of

surface being rendered with lime plaster. The floors thus formed were hard and good.

The estimated live-load for these floors was 100 lb. per square foot, the calculations being made with reference to the rolled-iron joists, and a factor of safety of 4 allowed. With respect to the strength of the concrete arches between the rolled beams, it appears from experiments by Mr. H. Irwin, M. Inst. C.E., that one of the arches of 6 ft. span and 6¼ in. rise, without the corrugated iron underneath, was weighted with 6,007 lb. in the centre, equal to a distributed load of 668 lb. per square foot, before cracking.

There were three staircases in the Secretariat, two of which were spiral, ascending to the top floor; the third was carried only to the first-floor. In the Army Headquarters there were two spiral staircases, and central approach steps outside. The latter were formed of an arch resting on two arches abutting against the building. To build the spiral staircases, a set of framing was completed for one story, being made of planks 1½ in. thick, held together by battens screwed on the outside. The concrete was rammed in this framing, and given plenty of time to set before any of the boxing was removed. Each step, which was 13 in. in the tread, and 7 in. in the riser, was a beam of concrete moulded in a frame connected with the side framing of the staircase. The steps were carried up with the walls, so that the whole was one monolithic mass. The proportions of mortar were the same as for the ordinary walls of the building, but the ballast was finer, the cubes being ½ in. to 2 in. The work was expensive, as the quantity of concrete was small, there being only 500 cubic feet in each story, while the framing contained 252 cubic feet of wood.

The deposition of concrete in the foundations of the Secretariat was commenced in the month of March, and the concrete in the superstructure was practically completed in December of the year following. The quantity of concrete used was:—For the foundations 108,816 cubic feet; for the walls 122,149 cubic feet; and for the floors 32,387 cubic feet; total, 263,352 cubic feet.

The Army Headquarters.—175,165 cubic feet of concrete were used in the foundations, 72,862 cubic feet in the walls, and 16,954 cubic feet in the floors; making a total of 265,081 cubic feet of concrete in all.

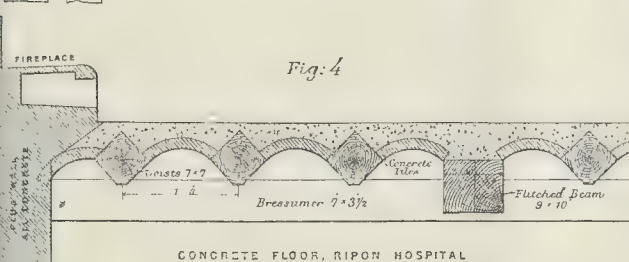
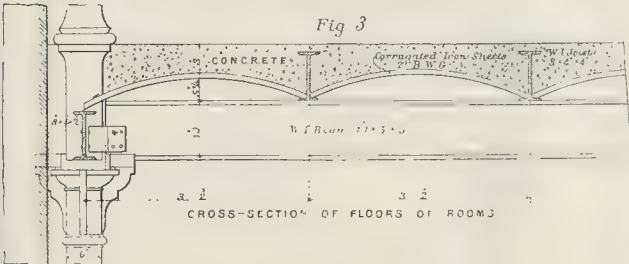
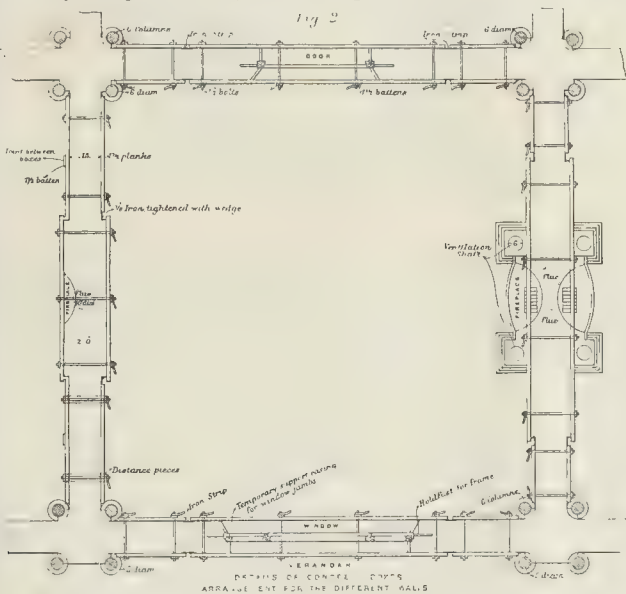
The work was considerably interfered with by frost and snow in winter and scarcity of water in the summer. To neutralise the effect of frost salt water was used for mixing the concrete apparently with success.

In the application of concrete to the building of Ripon Hospital, which is a half-timbered structure, planking was screwed on the two sides of the posts, sufficient opening being left on one side for inserting the concrete and ramming it. To avoid any crack between the concrete and the wood from the shrinking of the latter a narrow groove was cut in the sides of the posts into which the concrete went, and as a further precaution old nails were driven into the wood and imbedded in the concrete to form a bond. The usual thickness of concrete panels was 4½ in., including the plaster.

A somewhat novel kind of floor in the Ripon Hospital deserves notice. It consists of wooden joists 7 in. square, laid as shown in our illustration (fig. 4), and carrying curved tiles of concrete. Over the whole floor was spread a layer of concrete composed of hard-burned surkhi-ballast and lime in the proportion of 15 of lime to 100 of ballast, which, when well consolidated, was finished with a coat of ordinary lime plaster or Portland cement. The tiles were made in wooden moulds by beating with mallets, the proportions used being one part of dry mortar to two parts of fine stone ballast.

We are indebted to the Council of the Institution of Civil Engineers for permission to reproduce the illustrations from their Transactions.

The St. James's Dwellings, Beak-street, Regent-street.—The foundation-stone of these dwellings, which are being erected by the Vestry of St. James, Westminster, out of certain trust funds in their hands, will be laid on Monday afternoon by the Hon. Maude Stanley. The dwellings are intended for the accommodation of the labouring poor. Mr. H. H. Collins is the architect, and Mr. Mark Gentry the builder. We will give further particulars in our next.



concrete was then rammed in, the details of the moulding being afterwards added in lime plaster. In the Army Headquarters the fireplaces were constructed at the same time as the walls, and the chief features of the moulding were reproduced in concrete. The lower part of the flue was made by ramming the concrete round a core of stones and mud; but when the flue narrowed to 10 in. cores of wood were used. These cores at first were merely hollow cylinders having a slight taper. At every 2 ft. they were extracted by being twisted round, and gradually worked upwards. This,

lightness, of the same composition as that used in the chimney-breasts, namely 15 cubic feet of lime per 100 ft. of hard-burned surkhi ballast. For ramming, a 1 lb. mallet was used, as the ordinary heavy rammer was apt to bulge the sheets. In the case of 6 ft. spans used in the corridors, it was necessary to put temporary supports under the sheets until the concrete had set, to prevent sagging. The concrete was, at first, rammed only flush with the tops of the girders; and, later on, when the tops were to be finished off, about 1½ in. of fine surkhi ballast concrete was laid on and well consolidated, the

HERALDIC MOTTOES.

DERIVED to a great extent from such widely divergent sources as war or watch cries and the sentiments inspired by Christianity mottoes are ever a subject of deep interest to the student of heraldry, and the thought has often occurred to us when looking through the pages of "Burke and Debrett" and noting the noble thoughts there recorded on the innumerable scrolls of our aristocracy, suppose that these high and mighty ones lived or soted up to their family inscriptions, what a grand example they would set to the world at large.

Our ancestors delighted in punning and found a fine field for it in heraldry in general and mottoes in particular, and we owe much in this latter branch to this inclination, nor have our modern wits been negligent in a like spirit, and it would be hard to beat, or even to equal the "quid rides" that appeared on the carriage of a retired tobaccoist.

Sometimes a mere jingle of words, more or less harmonious, appeared to suffice, as the "Astra castra, numen lumen," of the Earl of Balcarras, and the "Pator Potior" of the Peytons.

Our "Honi soit qui mal y pense" dates from Edward III., with the institution of the far-famed Order of the Garter, and in this reign mottoes came into general use, the king having set the fashion by adopting several for himself.

Mottoes are not considered hereditary by the College of Arms, and a family may relinquish and change them at any time; but, as a general rule, they remain from generation to generation, and become as well known as the arms and crests they accompany. "Dieu et mon droit" is inseparable from the lions of England and has been so since the reign of Henry VI.; before then it was a war cry, and as such is said to have been first used by Richard Cœur-de-Lion at the battle of Gisors.

Some of our cities rejoice in noble and praiseworthy sayings, and we envy the faithful Worcester her "Civitas in bello in pace fidelis." The more modern and go-ahead town of Birmingham is content with the one expressive and appropriate word, "Forward."

Sometimes a spirit of defiance breathes from beneath the shield, such as the "Nemo me impune lacessit" of our Scotch brethren, in conjunction with their national thistle, and it forms a most appropriate combination.

The Dixies of Bosworth, Leicestershire, have laid down a hard and fast rule in their punning "Quod dixi dixi," while the Fortescues have cleverly introduced their name in "Forte scutum salus domum" and the Vernons are still happier in their double meaning "Vernon semper vires" alluded to in Scott's "Rob Roy."

Cussans records a most waggish motto that was devised for the merchant tailors of London, "Sit merita laus," but the merry ones did not adopt it, admirable though it was and worthy of Hood.

Many are the mottoes found in coats of arms bearing the cross, and alluding to it in a fervent spirit. We instance, "In hoc signo spes mea," for Taafé, and "Crux domi spiro spero," of the Nettervilles, as fair samples.

Sometimes these pithy sayings were engraved upon the swords of the warriors of the Middle Ages, and the great Earl of Shrewsbury bore on his blade the legend "Sum Talboti pro vincere inimicos meos."

For brevity and completeness perhaps nothing can excel the "Cave" of the family whose name it records with the injunction of caution.

The Fairfaxes have a very practical and semi-punning sentiment, "Fare, fac," which may be freely translated as a word and a blow.

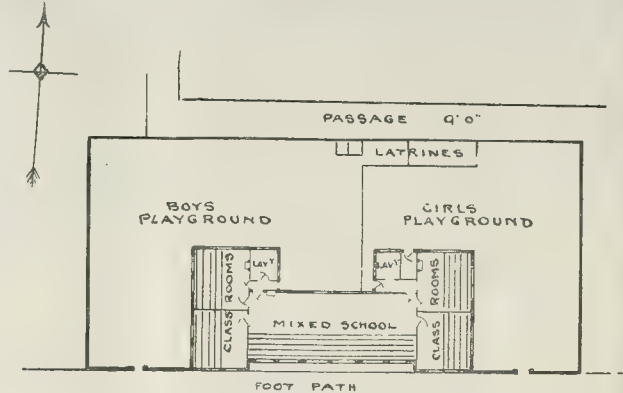
The Martins of Dorsetshire say, "He who looks at Martin's ape, Martin's ape shall look at him," having reference to their crest of the monkey.

Many an antiquary has been greatly puzzled over the "Strike Dakyns: the devil's in the hemp," owned by the Derbyshire Dakynses, and one of the enigmatical class remaining unsolved.

We know of nothing more simple and expressive of resignation than "Whyte God wylly" of the Treffrys, a Cornish family.

Lower records that Dr. Cox Macro, the learned Cambridge divine, consulting a friend on the choice of a motto, was pithily answered with "Cooks may crow."

"Age omne bonum" belongs to the Algood family as it ought.



Plan of Runcorn Board School.

The Spry family have for crest a serpent nowed, thereon a dove, and the motto "Soyes sage et simple," a most happy conjunction of arms and words.

The Clerks of Penicuik hold their property by a singular tenure, viz., that the proprietor must sit on a rock known as the Buckstane and give three blasts with a horn whenever the Sovereign shall come hunting on Borough Muir, and their motto records it and runs "Free for a blast" with a demi-huntsman sounding a horn as the crest.

Earl Rothes uses "Grip fast," the words employed by Barthol. Leslie when he saved Margaret, Queen of Scotland, from drowning and urged her to take a firm hold of him.

The clan Chattan of Caithness bore a cat-a-mountain, and their chief was known as "The Great Wild Cat" and their warning motto "Touch not the cat but with a glove" finds record in the "Fair Maid of Perth."

To the humorist and moralist alike mottoes appeal, and many an instructive half-hour may be spent in hunting for them through our peerages and county histories, and many will be the pleasant surprises and reminders that the reader will encounter in his searchings. Lower says, "Among mankind, mottoes must have been chosen to express the predominant feelings of piety, love, moral virtue, military courage, and family pride, as soon as those feelings manifested themselves; that is to say, in the earliest stages of social existence."

Illustrations.

VIEW IN THE COLONNADE OF THE TEMPLE OF VESTA, ROME.

THIS view is reproduced from one of the fine old set of engravings of Rome and its environs by Rossini, another of which, a view in the portico of the Pantheon, we gave a reproduction of some time ago. Both are from a collected set of the engravings belonging to Mr. Jas. Burchell, to whom we are indebted for kindly lending them for the purpose of photographing. Besides that the engraving is a fine one, the view taken within the portico, and looking out between the columns, is an unusual one, and has in this way a certain special pictorial and architectural interest.

The so-called Temple of Vesta (for the dedication is merely conjectural, though not improbable) represents the most attenuated example of the Corinthian order, as far as the column is concerned, which is known to us. The entablature has long since disappeared. Of the twenty columns one only is missing. Between the columns are seen, in the view, the Temple of Fortuna Virilis and the House of Rienzi.

CHURCH AND PRESBYTERY OF ST. MARY, HAMPSTEAD.

It is proposed to build this church and presbytery on the site of the existing chapel, to which the space occupied by several houses on either side will be added to secure more adequate ground for the proposed buildings.

The materials to be used are red bricks, with white stone dressings; the roof to be covered with green slates. It is not intended to have any clearstory, sufficient light being insured by the large east and west windows, and the large and lofty aisle windows. The greater part of the nave and aisles is to be laid with wood-block flooring, the remaining portions being tiled.

The nave roof is to be an open timber one with hammer-beam truss, and the aisle roof of a flatter pitch panelled. The baptistery under the tower will be vaulted and groined in stone. An organ-gallery is to be formed at the west end, the front of which will project with a bold cove; under this gallery an inner porch will be formed by a glazed screen. An interesting feature is a canopied recess provided at the west end of the south aisle for the reception of the altar tomb of the founder of the mission. The chancel will be separated from the two side chapels by oak screens. The architects are Messrs. Goldie, Child, & Goldie.

RESIDENCE AT CASTLE CAREY, SOMERSET.

This house is in course of erection on a commanding and elevated site, whence extensive views are obtained towards Burnham and Weymouth.

The walls are faced with Corsham stone in squared courses, with dressings of Ham Hill stone. All external walls are hollow, backed up with brick and local stone. There will be seven bedrooms and other rooms. The tower contains a smoking-room with very fine views.

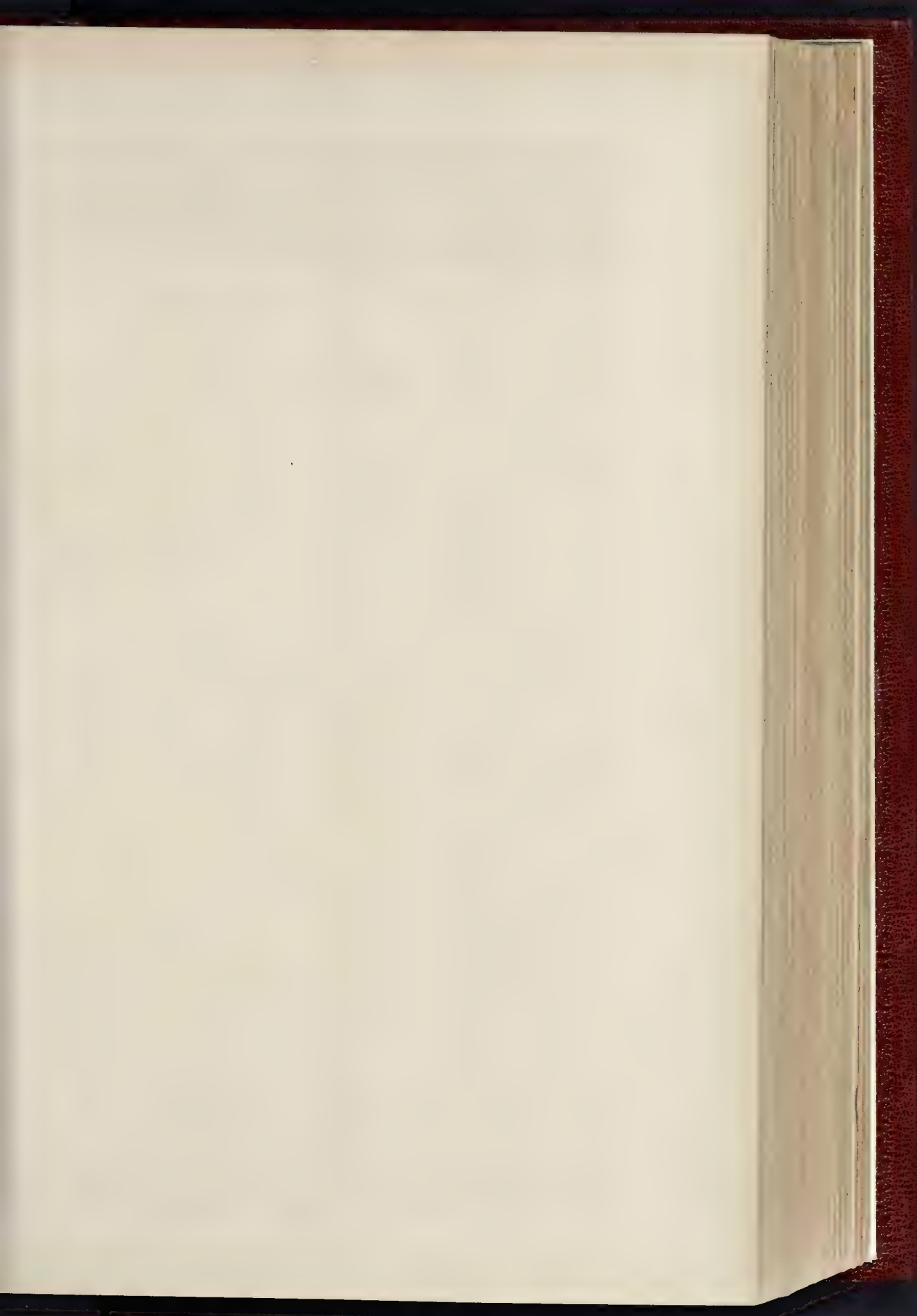
Mr. Charles Bell, F.R.I.B.A., of London, is the architect, and Messrs. Francis & Sons, of Castle Carey, are the builders.

NEW BOARD SCHOOLS, GREENWAY ROAD, RUNCORN, CHESHIRE.

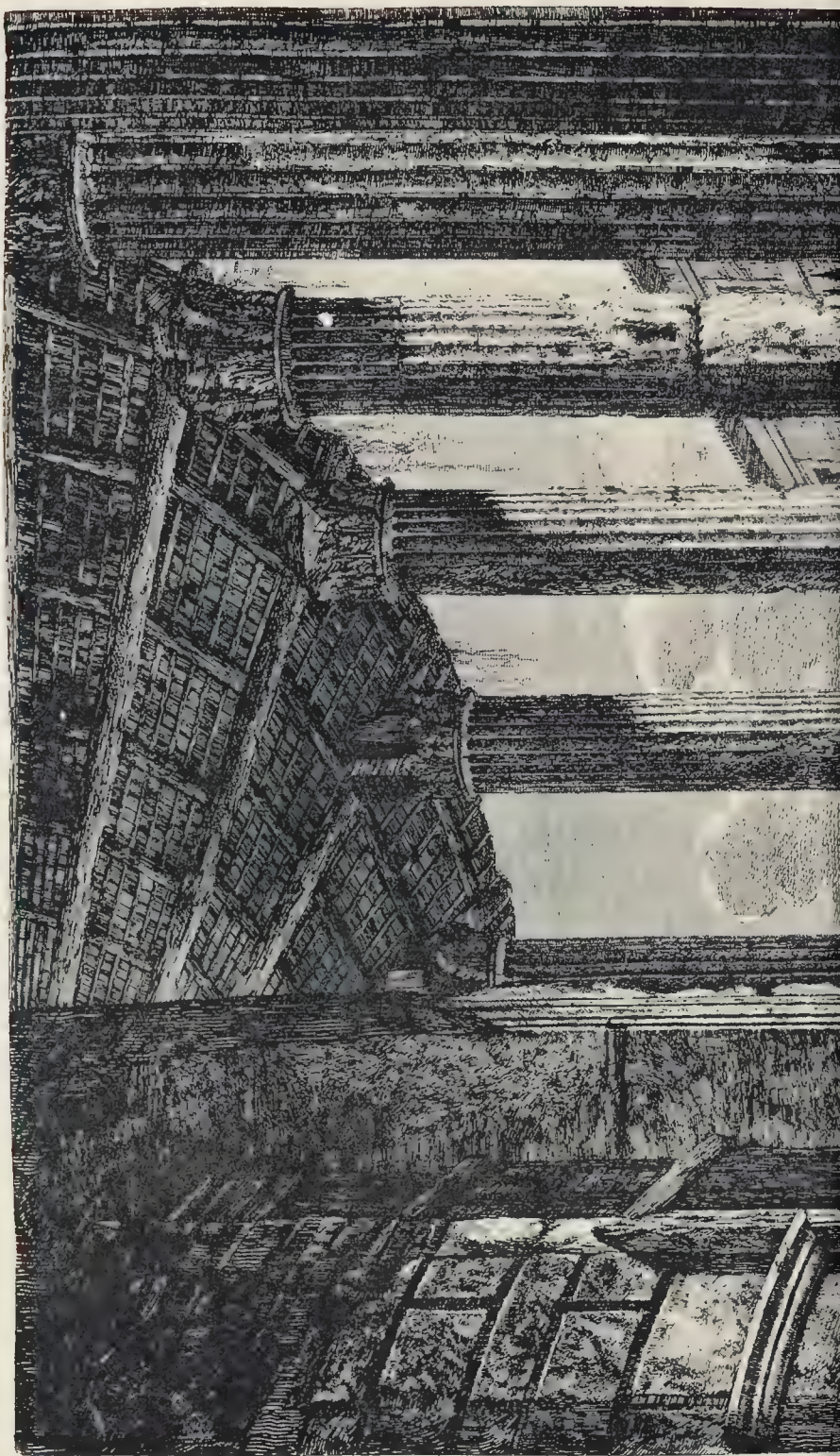
THESE schools were opened in January last, and are the first built by the Runcorn School Board. Accommodation is provided for 450 boys and girls on the ground and first floors, and the building is designed with a view to future extension. The rooms are warmed by hot-water pipes and open fireplaces. Ventilation is provided by means of "Ellison's" inlets and extractors. A tall glazed brick dado is carried round school and class rooms. The ground-floor is of solid wood blocks, laid by Mr. R. Lowe, of Farnworth. The exterior is of grey brick, with red brick dressings, jambs, strings, &c., and the gable and wall copings are of terra-cotta, from Mr. J. Thompson, of Northwich. The staircases, passages, and part of the playgrounds, are of patent "Granolithic" stone.

The latrines are fitted with Messrs. Bowes Scott & Read's patent self-flushing tanks.

The schools, of which a small plan is also subjoined, were designed by Messrs. F. & G. Holme, of Liverpool, architects to the Board. The contractors were Messrs. Brown & Son, Trafford-road, Salford, and Mr. J. Anderson acted as clerk of the works. The cost of the school was 3,112*l.*, or a little under 7*l.* per head. The desks, &c., which are of the "dual" description, were provided by Messrs. Redmayne & Mays, of Sheffield.



THE BUILDER, JUL. 24, 1884



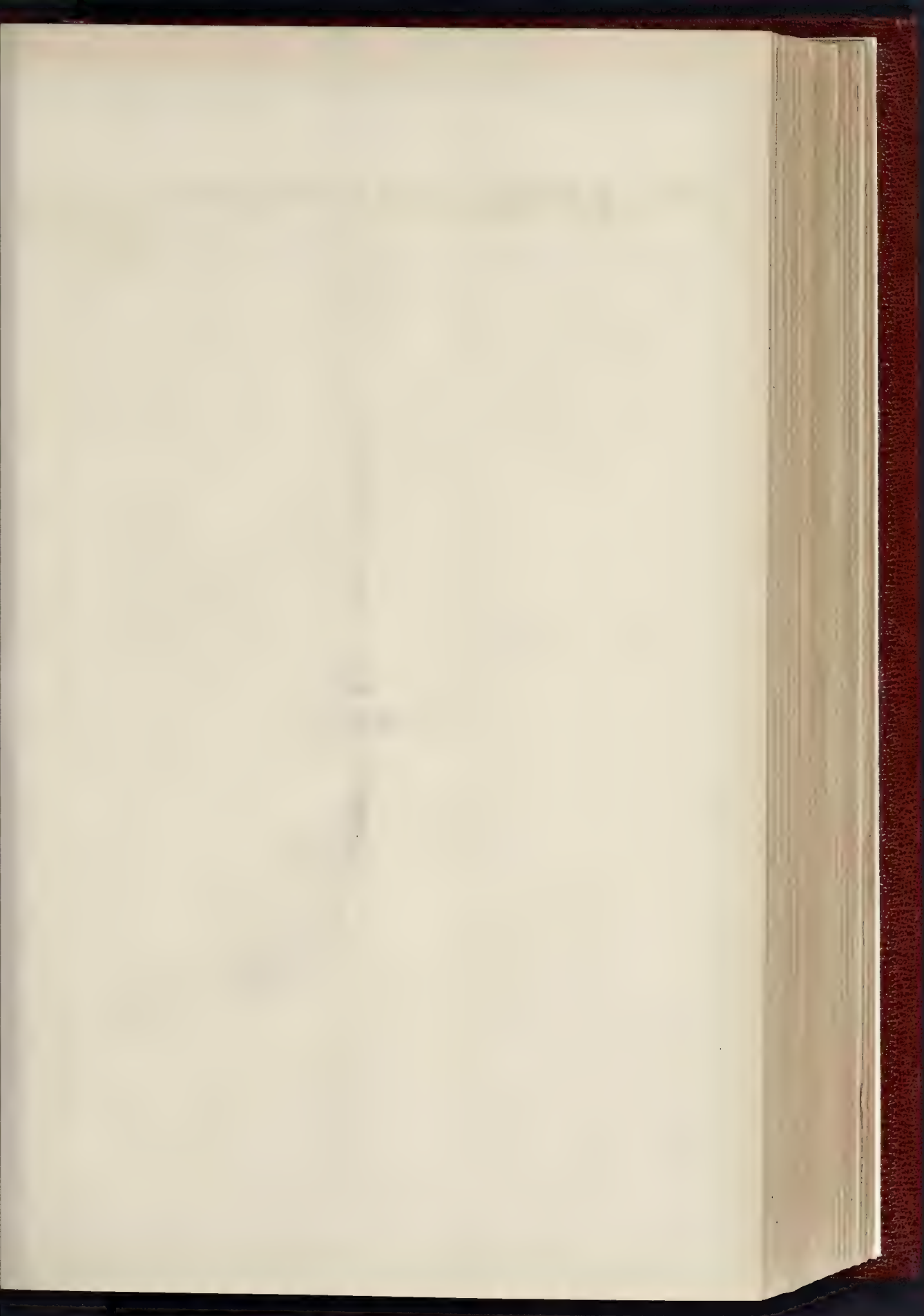


Temple of Fortuna Virilis

House of Remus

INTERIOR OF THE PORTICO OF THE TEMPLE OF VESTA AT ROME.

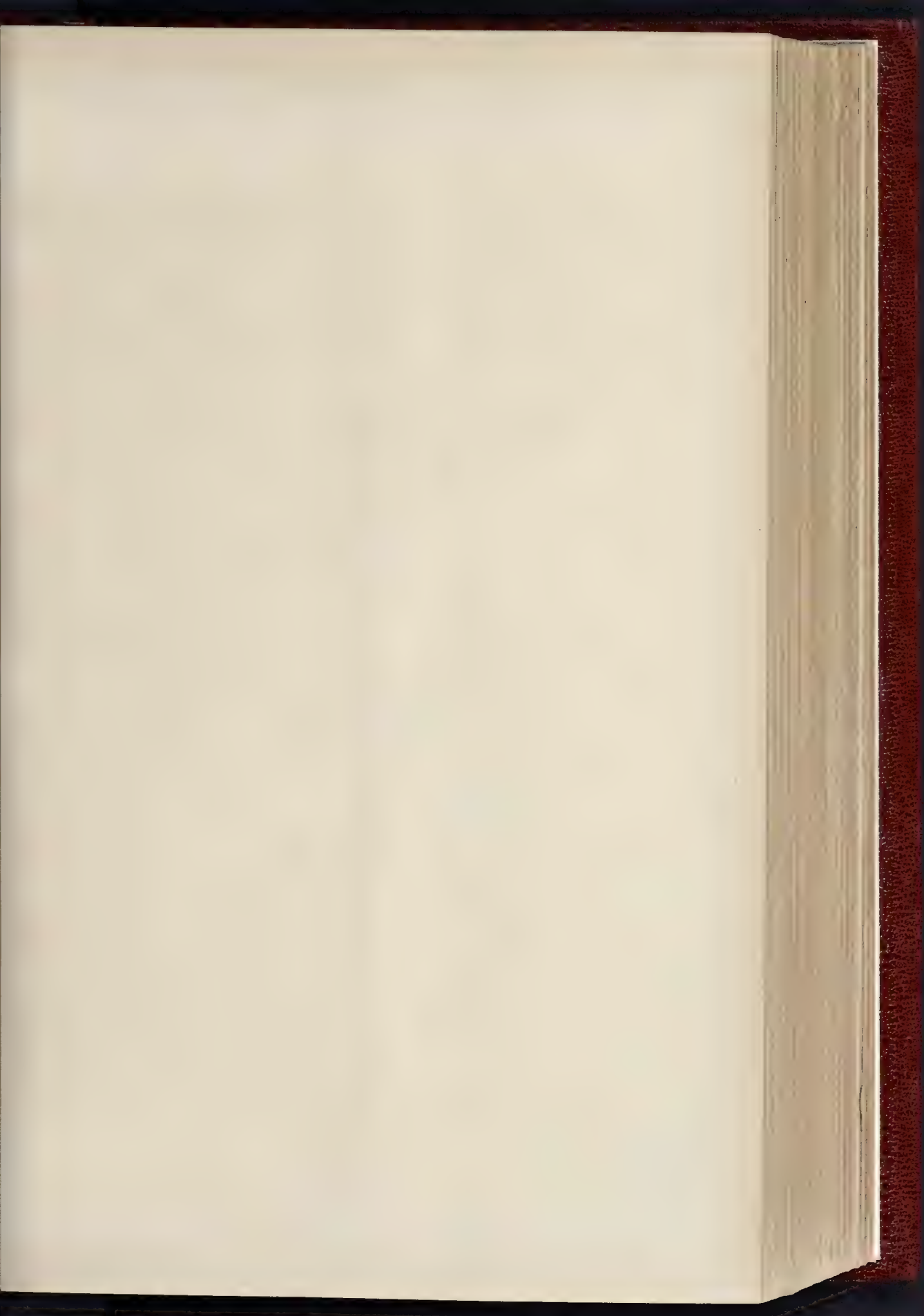
REPRODUCED FROM AN ENGRAVING BY ROSSINI.



HALF ELEVATION OF SCREEN FROM KOTAH.



SOME DETAILS OF STONE CARVING.



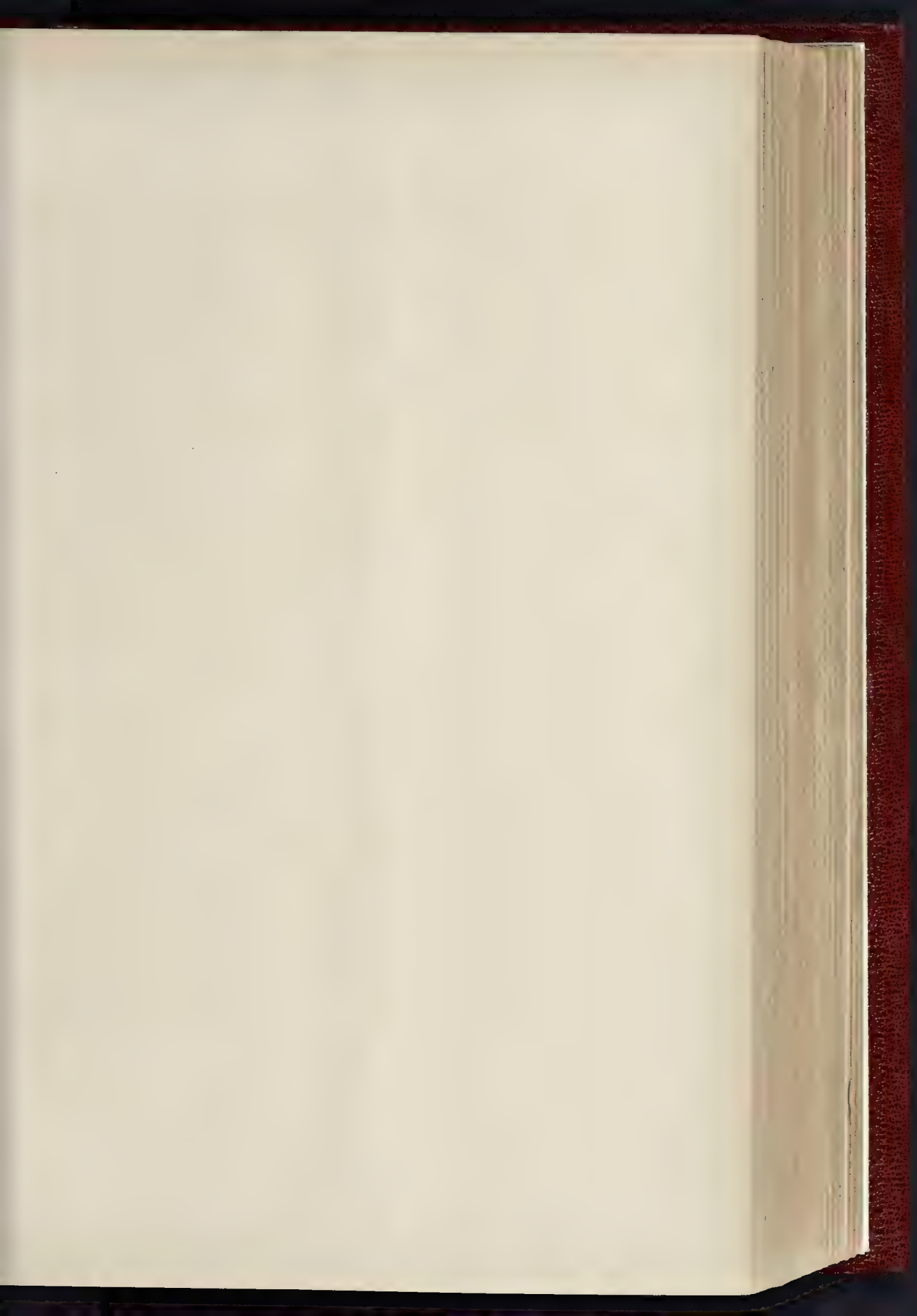
THE BUILDER, JULY 24, 1896.



Wynand & Sons Photo Litho

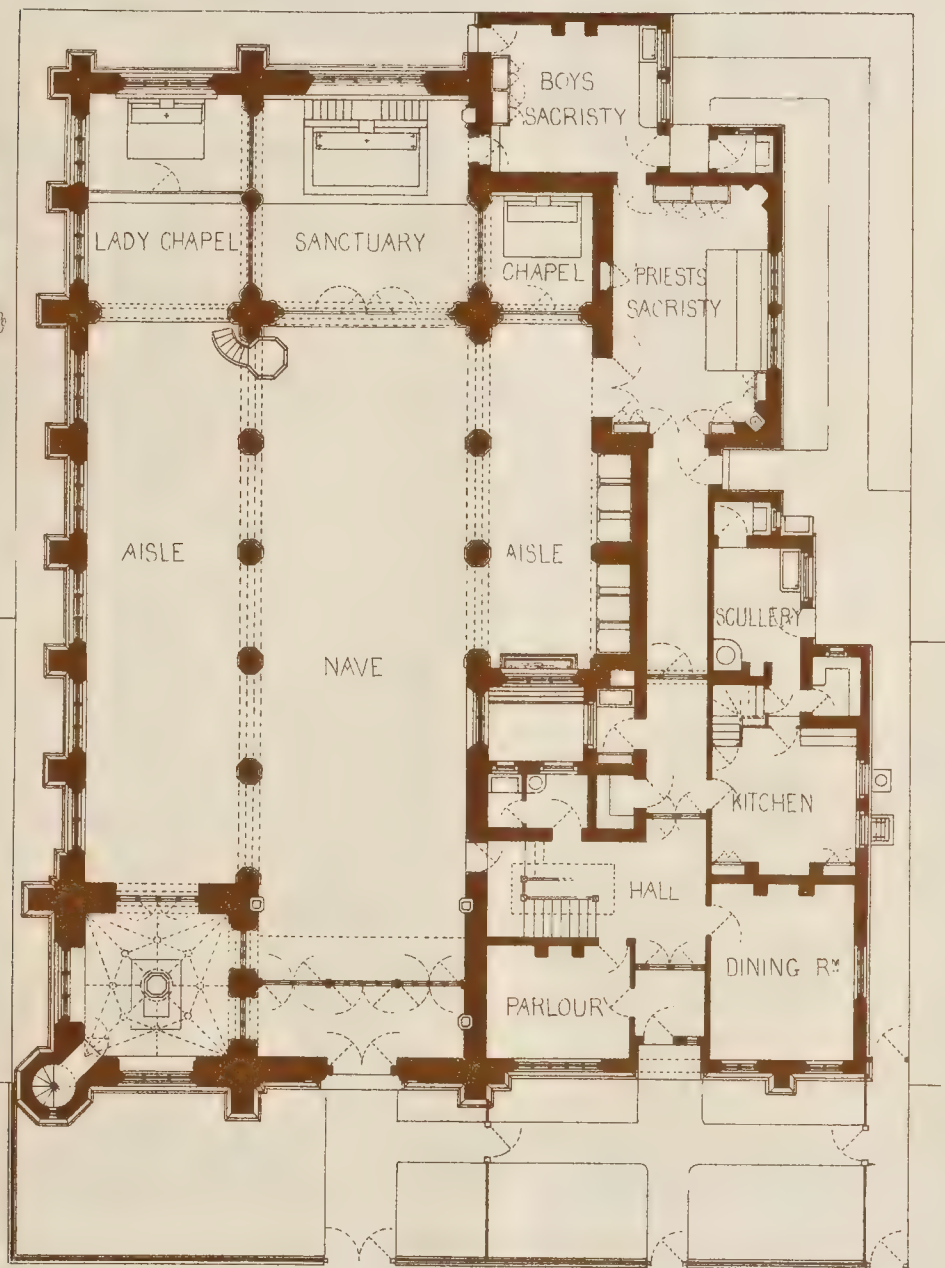
BOARD SCHOOL, RUNCORN, CHESHIRE.—MESSRS. F. & G. HOLME, ARCHITECTS

Oldman St London WC





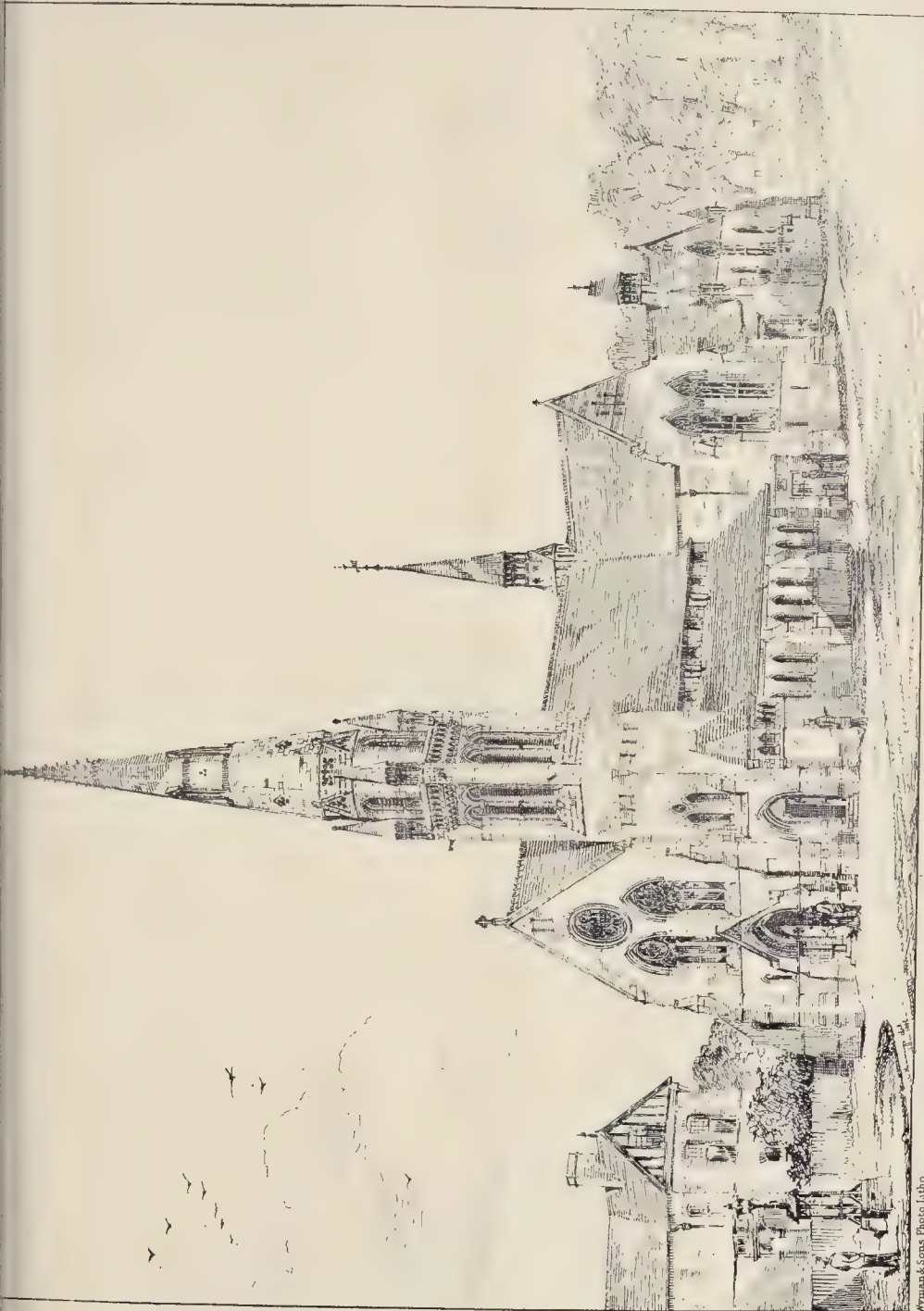
CHURCH OF ST. MARY, HAMPSTEAD



PLAN



1886 PHOTO. BIRAL. E. & F. 12 MAR. 1886. LANE. FANISH ST. LONDON E.

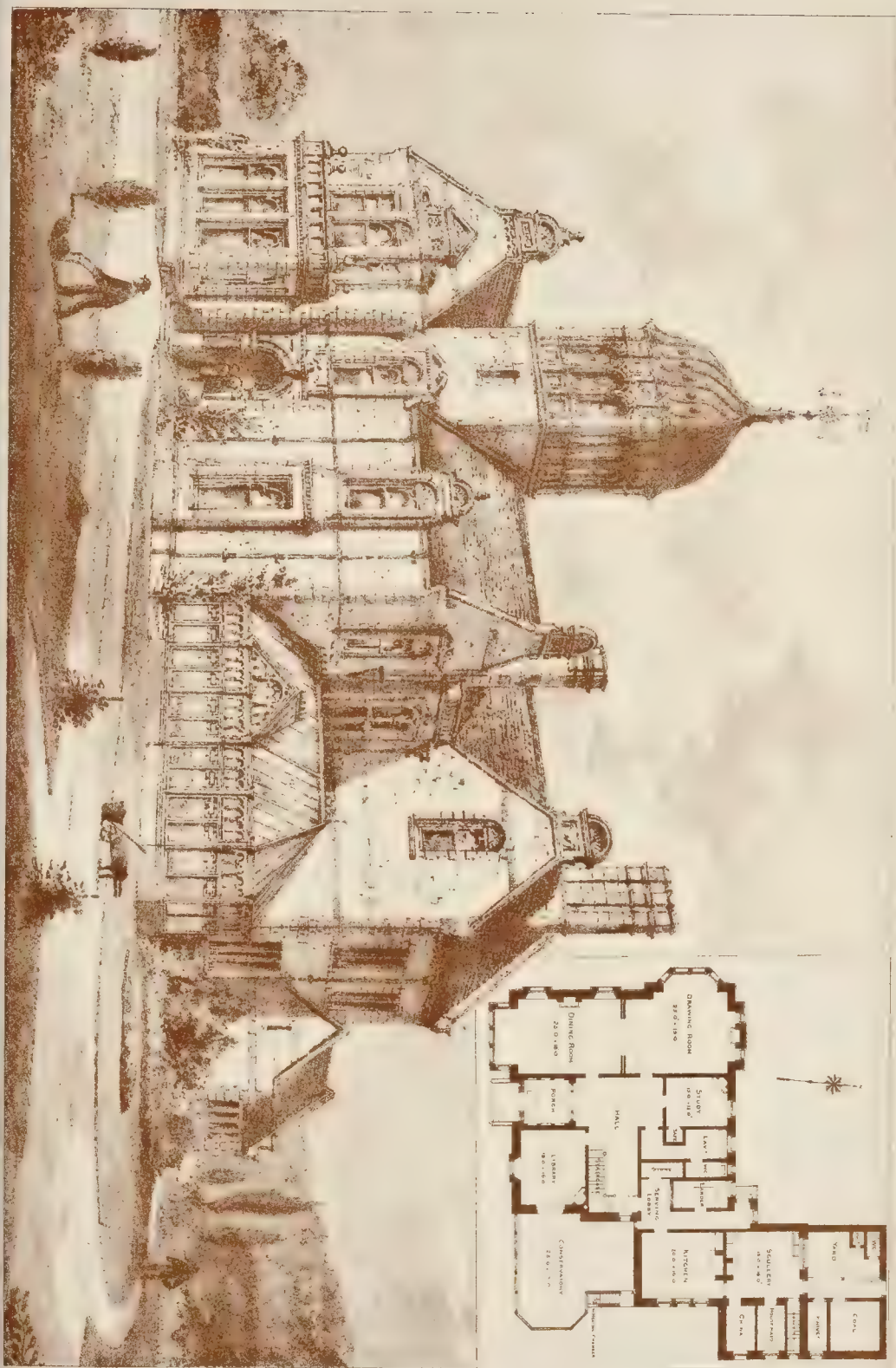


Wynank & Sons, Photo Litho

Ch. Queen St. London, W.C.

TRINITY PRESBYTERIAN CHURCH, WIMBLEDON.—MESSRS. POTTS, SULMAN, & HENNINGS, ARCHITECTS.

THE BUILDER, JULY 24, 1886.



TRINITY PRESBYTERIAN CHURCH,
WIMBLEDON.

The site for this church is in the Mansell-road, a few minutes' walk from the station. The hall shown in the rear has just been completed by Mr. Nightingale, of Lambeth, who took the contract at 1,225l., and it is proposed to proceed with the erection of vestries, classrooms, &c., at once, before the church proper is begun. In plan the church will consist of a nave 27 ft. wide, with side aisles separated by stone arcades. There is to be an end gallery over the front porch, reached by a staircase in the tower. Materials: red brick, Broseley tiles, and Bath stone. Accommodation will be provided for about 600 people in the church, and 900 in the hall, whilst the total cost is estimated at 6,000l. The drawing is a reduction from a pen-and-ink perspective by Mr. Hennings (Messrs. Potts, Sulman, & Hennings, of Furnival's Inn), and is now hung in the Academy (1,615).



A Sketch in Penshurst.

Sunderland Municipal Designs.—We regret that a mistake was made last week in lithographing the third premiated design for this building by Messrs. Doubleday & Caws, the small plans placed in the corner of the sheet being those belonging to the second premiated design, by Messrs. Grayson & Ould. The competition having been anonymous, there were no architects' names on the drawings, and owing to the small scale to which the plans were reduced, the discrepancy between plan and elevation escaped notice. We must apologise to both competitors.

ROTHENBURG-ON-THE-TAUBER.

The scarcity of English names in the hotel's list of visitors must be our plea for saying a few words about this charming old Bavarian town, which differs from most others in that there is to all intents and purposes nothing modern in it. Within an easy distance of Wurzburg, it is by no means difficult of access from England. It is perched on the edge of a deep ravine, at the foot of which runs the pretty shallow stream of the Tauber, which after meandering for many miles joins the Main. Besides an unusual number of old houses well worthy of examination, and an almost perfect city wall crowned with some thirty-four towers and ten gateways, all of most varied and picturesque design, it possesses no fewer than seven churches at the present time, having originally had more, one of which was sacrificed without any apparent reason only a few years since; a portion of the sedilia from this we saw lying upside down on the side of a road. The Lutherans, who predominate there, live in amity with the Roman Catholics, and enjoy the use of the Jakobs-Kirche, the largest in the town, and which contains three very interesting triptychs, that over the high altar having fine painted and gilt figure sculptures and shutters with good gold-ground pictures. There are two towers, dissimilar in treatment, and, of course, the story of master and apprentice comes in, with the difference here that the former is said to have thrown himself in dudgeon from his own tower. A street passes under its western end. The windows over the high altar, which stands under the chord of the vault, are of very beautiful old glass. The little Frauen Kirche, standing in the valley by the side of the Tauber, which is here crossed by a most interesting and unique viaduct, has many points worthy of study, notably an ingenious circular stair, half within and half without, at its west end, by which bellringer and organist have separate means for approaching their duties without meeting each other. The little stone bell-turret, of very graceful design, encloses but does not protect the bells from weather, and is finished with the usual quaint but exaggerated finial common to so many buildings here and all over Germany. The Franziskaner Kirche is full of interesting tombs, more or less injured. The Wolfgang Kirche is also ruinous, but its traceries are very suggestive. The Johannes Kirche, in the heart of the town, seems to have been secularised in the seventeenth century. It possesses its original roundels, of pleasant tints, in the north and south windows. The cemetery church, near the railway, has a most curious west gallery, carried on a post full of the German love of quaintness and intricacy combined.

The Rathhaus consists of two parts, the more ancient of the fourteenth century, and the modern of the seventeenth century. To this latter has been added a Classic colonnade, which rather assists than hurts the façade. The copper gurgoyles, eight in number, are most curious. The great chamber, the scene of Tilly's adventure with the burgesses, whose lives were saved by the draining by one of their party of a mighty "pokal" of the wine of the country, has often been described; it has a very curious ceiling, supported by beams tied up from above in an unusual manner; and the battle-pieces on the walls are worth attention. The "pokal" still remains an heirloom in the house of an old lady, the lineal descendant of the man who drained it; she showed it to us, but could not be induced to entrust it to the performers, who were on Whit Monday to personate the event for the good of the citizens. The population is at present about 7,000, but there is probably room in the town for nearly 40,000. The heraldic designs in churches and on houses are everywhere abundant and full of interest. The fountains are numerous and most picturesquely placed, besides furnishing, as they do, admirable drinking-water from the hills for the use of the inhabitants. There is also an interesting little museum of local antiquities near the Rathhaus. In the valley is the Kaiserstuhl, an isolated tower that has harboured more than one royal personage, being capable of being entirely surrounded by water in troublous times at the will of the occupant. There is also a curious relic of the Mediæval Jews in the ancient synagogue (now a granary), cemetery, and pool,—the latter, unfortunately, filled up. We may mention a curious local custom; a common sight on Fridays is the procession of the furniture and effects for the household of persons about to be married, the horses, drivers, and carriage being all decked with flowers, and the carriage conveying all sorts of impedimenta for both present and future uses of the family. It may be said that the quality of the architecture is eclipsed by many other cities, but what it lacks in this respect it certainly makes up in picturesque qualities.

Calshot Castle.—At the meeting of the Southampton Town Council on the 14th inst., the Town Clerk said he had been in communication with the War Office on a matter arising out of the last proceedings of the Council with regard to the contemplated removal of Calshot Castle, and the last communication, dated July 7th, he had received from the War Office was as follows:—"With reference to your letter, dated June 22nd, 1886, representing, by desire of the Mayor and Corporation of Southampton, the desirableness of retaining Calshot Castle in its present position as a landmark, and of keeping it from being surrounded by other buildings, or in any way added to or interfered with, I am directed by the Secretary of State for War to acquaint you, for the information of the Mayor and Corporation, that, considering the representations which have been made, no buildings or other works will be erected in proximity to the Castle, and the Castle will not be interfered with; and that it is not necessary to send up a deputation."

ARCHITECTURAL ASSOCIATION:

VISIT TO CHIDDINGSTONE AND
PENSURST PLACE.

The fourth vacation visit of the Architectural Association was made on Saturday, the 17th inst., in the morning, to Chiddingstone, and in the afternoon to Penshurst. The church contains a nave, north and south aisles, west tower, and chancel, with chantry on the north side. Two windows in the south aisle, of Early English character, are the earliest remains in the church; all the other windows appear to be insertions after the fire which occurred in 1626. A good deal of Classic feeling is introduced in the detail, especially in the south porch, the doorway to which has a semicircular arch, with Classic architrave spandrels and a square Tudor label over. The tower doorway is a good example of Early Perpendicular. There are some interesting half-timber houses in the village, which also came in for study.

In the afternoon the party went to Penshurst. Mr. S. W. Kershaw was unfortunately unable to be present, as arranged; his notes were therefore read by the secretary. The hall, with the fine open-timbered roof and traceried windows; the ball-room, which is the only room left with the original dado; and the dining-room, were studied, and the numerous cabinets and pictures, for which Penshurst is famous, carefully examined. The rooms on the private side of the house were also shown, and the fine vaulted room used as a servants' hall, which is said by some to have been the chapel. From the servants' hall the party passed into the gardens, which are laid out with formal yew hedges and set beds, walks, and grass plots; and several sketches were made of the charmingly picturesque exterior. After passing through the churchyard into the village, the cottages in the village near the churchyard were sketched, the group of cottages forming the entrance to the churchyard being one of the most picturesque studies in Kent. We give a reproduction of a sketch of these by Mr. F. G. Hooper, one of the party on the occasion.

THE MARCHANT ENGINE.

The Marchant Engine is one of the examples of the indomitable perseverance of an inventor. For very nearly twenty years, against all obstacles and with severe difficulties from pecuniary resources, experiment has succeeded experiment until at last a practical attainment is before the judgment of engineers. No doubt the professional mind, biased by ordinary ways and common theories, is indisposed to recognise any violent novelty, and consequently resists conviction; but in every line of scientific research what has been inaccessible at one time has been surmounted at another, and, after many attempts to scale the mountain, some simple rope has been found to enable the more daring or more persistent investigator to reach the summit with success. To return the steam into the boiler after use in the cylinder has long been a dream to many, but none have hitherto succeeded. To pump dry steam is seemingly impossible, hence the failures, for as much as it is compressed so much it will expand, and the churning action is repeated. If steam be com-

pressed into water it is always ready to spring back again into steam, but if at the same time there is a portion of air its difference of gravity will not permit it to be compressed into the water; it will remain always, no matter how much pressure be applied, separate as a cushion of air above the water. This air, however, is elastic and acts as a spring; therefore as much power as is put into it will always be returned at opportunity. If now steam, water, and air be compressed together in a cylinder and the compressing force be 101 lb. on the inch, the additional 1 lb. of pressure will overcome the pressure of 100 lb. in the boiler, and the force stored up in the air-spring will open the valve and eject the steam-water into the boiler. But the air will not follow, it remains. It is thus that the value of the steam is attained at both ends, first as power in the cylinders and then as feed back into the boiler.

Some three or four years ago an experimental engine was shown at Millwall, and, although disconnected in its primitive design, it nevertheless gave good results: a superior engine of more compact construction was shown at the late Inventions Exhibition. This engine is now at Messrs. Fraser's steam boiler works at Bromley-by-Bow, where a new boiler has been specially constructed for its service, and where public tests of its capacity have recently been made, and certified by the engineers who were present. The coal was carefully weighed and its application continuously overlooked, the furnace fire being maintained in a uniform condition. The effective work on the brake was indicated by a Salter's spring: the lever acting at a distance of 12 ft. from the centre of the fly-wheel shaft, namely on a circumference of 75.38 ft. in length, the average pull of the spring balance being 345 lb., the engine running 139 revolutions. The effective work was therefore 109½ horse-power. Welsh coal, "Soria's navigation," was used, and the quantity consumed in a two hours' trial was 110 lb. The effective power was, therefore, at the rate of half a pound (0.502 lb.) of coal per horse-power per hour. The average boiler pressure was 275 lb. per square inch, but the inventor would naturally prefer to work at higher pressures, say 500 lb. to the inch, if the engine was strong enough to withstand the wear and tear.

The vacuum in the surface condenser by the condensation of the one-third of the steam which supplies the water required for the operation was 17 inches. These results are eminently satisfactory, as might be expected from an engine which professedly embodies the solution of the important problem of returning to the boiler the latent heat of the steam which otherwise is wasted. An economy of 80 per cent. in fuel is claimed as the practical result. Another very great advantage must accrue from this system, namely, constantly clean boilers; for, as the same water is used over and over again, the residuum cannot be greater than the solid matter in the original water with which the boiler was filled, plus that in the few gallons of water required to make up for leakage. Practically, distilled water is continuously used; and those who have had boilers to deal with well know the vexations and damages caused by incrustations. A syndicate has been formed for carrying the invention commercially, and has its offices in John-street, Bedford-row; and Messrs. Blyth, Harper, & Co., of Mile-end have acquired a licence for manufacturing, and will shortly have at work a 5-h.p. horizontal engine, which is intended to demonstrate the adaptability of the system to engines of small power. Ten-horse power is usually spoken of as the replacement of the ordinary 1 h.p. could perfect caloric action be accomplished. The return of all the latent heat cannot, however, be effected, but the return of two-thirds is now being demonstrated, for which an economy of six times the work obtainable from any water feed is claimed.

Lectern, Loughborough.—Messrs. Thos. Potter & Sons, of Oxford-street and South Molton-street, have just made and placed in All Saints' Church, Loughborough, a brass eagle lectern. The base and pillar are circular but massive, and the eagle is modelled from nature. The base is supported by three lions, also modelled from nature. The lectern is a gift to the church in memory of the Rev. Henry Fearon, late Archdeacon of Leicester, and Rector of the parish, and an inscription is engraved on the base to that effect.

THE TIRYNS CONTROVERSY.

SIR,—I have just received a copy of the *Builder* of July 10th, and as in it I find an editorial allusion to the Tiryne controversy which recognises on my part some "personal feeling," and as in it I see Dr. Dörpfeld's paper for the first time, I beg that you will allow me space for a statement of my position. I have never seen Dr. Schliemann but once in my life, and had no other intercourse with him then than passing the compliments of the evening. Dr. Dörpfeld I have never seen or had any kind of question with until the present arose, nor have I ever had any cause for personal feeling against either, nor has any such feeling ever arisen. As to Dr. Dörpfeld's invitation to visit Tiryne in his letter to the *Times*, I have only to say that I was a thousand miles from Greece when it appeared, and that nothing prevented Dr. Dörpfeld from writing me personally while we were both in Athens, as everybody in the city knew where I was to be found, and a note would have found me and received a reply at once.

I am free to confess that I do not regard Dr. Schliemann's manner of treating his subjects as scientific, and the facility with which Dr. Dörpfeld adopted his Trojan conclusions and which recognised a brick building as the city of Priam, persuaded me (and in this persuasion "Tiryne" confirms me) that Dr. Dörpfeld, though an accomplished architect, was not a sound archaeologist, and that his observation of archaic and pre-historic work was altogether too limited to permit him to assume any authority in the matter. His reply to Mr. Penrose at the Hellenic Society (or to me if only so intended) establishes my conviction still more firmly. He states that I, in a letter, declared the "buildings at Tiryne" to have been "constructed in the Macedonian time by a Celtic tribe," but that in a second letter I had "corrected myself and declared the Palace of Tiryne to be Byzantine." This is utterly false and shows that he does not examine his premises with scientific discretion and exactitude, as he makes an accusation against me which he could have seen to be without foundation if he had examined my statement of the matter. All that I had said in my first letter with regard to the epoch of the "Palace of Tiryne" is this: "Mr. Penrose had no hesitation in declaring them later than the Macedonian invasion."

The question is enveloped in many words by Drs. Schliemann and Dörpfeld, but it is in reality very simple. They assume the ruins which they cleared up to be of the period of the foundation of Tiryne, or near that age. Now, if anything can be decided as to the foundation of Tiryne it is that it belongs to the period of Pelagic domination in the Peloponnese. It coincides in its most ancient parts with the work which is known as Pelagic in Italy, the Ionian Isles, Crete, and the greater part of Greece, in all technical characteristics. In all the ruins which are determinable as of this archaic period we find no evidence of cutting tools or of the saw, and so far as tradition goes we have no right to assume that they were known, for Euripides tells us that the walls of Mycenae were built with the measuring line and stone-axe, while we have the introduction of the stone-saw distinctly recorded as a novelty within the historic period of Greece. But there is good reason in the Egyptian records, taken with the ensemble of Greek tradition, for saying that this Pelagic period and dynasty to which we owe the walls and foundations of Mycenae and Tiryne cannot have been later than 1500 B.C., and may have been much earlier, and in the numerous remains of this period in Italy and the islands where the Pelagic empire appears to have sunk without developing into a succeeding civilisation, there is nowhere a sign of cut stone, sawn stone, or the drill used at Tiryne, while in the localities where the civil life was not interrupted, but invaders seem to have been absorbed by the invaded, as was the case in the Peloponnese and other parts of Greece, the ancient buildings were kept in use, added to, repaired, and copied, as was the case at Mycenae, Orchomenos, and numerous other localities in Greece. Yet Dr. Dörpfeld seeks to prove by the occurrence of the tubular drill and stone-saw in the ruins of Mycenae, which was an uninterruptedly inhabited city from its foundation to 468 B.C., that the stone-saw and tubular drill were coeval with the foundation of Tiryne! He says that "the well-known build-

ing of the heroic age, the Lion's Gate, and the dome-shaped sepulchres of Mycenae, &c., have nearly all been worked with the stone-saw." But this is precisely the point I dispute, and which Dr. Dörpfeld misstates. The original dome-shaped tomb in its entire construction does not show the stone-saw, but in the facade which has evidently been added, and is in no way engaged in the original work, the stone-saw is used as in the second tomb, which is as clearly a later work and an imitation. I maintain (and I have probably made examination of more prehistoric ruins of the Pelagic and other periods than Dr. Dörpfeld, from Fiesole to Crete) that in the ruin of a pre-Homeric age, much less of the Pelagic, can the mark of a stone-saw, or any such ruin as that at Tiryne, be found. If I want house-walls of the Pelagic period, I have traces of some at Zetos in Ithaca; if, after the later and heroic time, we shall find some Crete, notably at Olus. Dr. Dörpfeld quotes proofs of his contention, Eleusis, Olympia, Athens, and Troy, as well as Mycenae at Tiryne; but as to the former cities, there is no pretension that they were contemporary construction with the walls of Tiryne. The custom in Egypt and Mesopotamia proves nothing, for we have not the least indication that there was any intercourse with Egypt much before the time of Sesostris, and the introduction of letters into Greece probably marks the introduction of Mesopotamian invention. Mortar never is found in any Pelagic work, but in Olus the cement used for lineaments is found, but is not found in the wall of house or city. Dr. Dörpfeld talks of comfort in the outer wall of Tiryne. This is not the fact. Clay, had it ever been there, would have washed out in a single winter's rains.

There is no such complication as Dr. Dörpfeld would make. If in any unquestionable prehistoric city in Greece or Italy not in habitation since the archaic period, he can find walls of quarry stone bonded with clay bricks, baked or unbaked, and stones cut with the saw similar to those at Tiryne, and mortar, he will have right to refer to them as arguments, and I will yield the point. So far no such case is known, and if we are to build archaeological science, we must do so on known facts and not hypotheses. Both Dr. Schliemann and Dr. Dörpfeld instigate a great conflagration which has baked brick and burned lime, and so accounted for what saw, though Dr. Dörpfeld denies the bricks; but those who have seen either lime or brick kilns and remember the prolonged and intense heat required to calcine lime or bake a brick, will hardly believe that such a fire would have left the freshly-sawn faces and fractures of the "parastades," and the alabaster friezes uncut, and painted stucco in condition to be transported to the Museum of Athens.

I have no intention to ask you to give room for a refutation of Dr. Dörpfeld's paper, but I must distinctly protest in the interests of archaeological science against a line of argument followed by him. We wish to establish a canon of mural construction which to determine the age of a given wall. He attempts to confuse all determinations assuming the antiquity of certain things and then using them as proofs of the antiquity of other disturbed things. What right has he to assume that "kyanos" means blue Egyptian glass? And this assumption, which would destroy his own case, is the basis of our argument! So far from admitting, as Dr. Dörpfeld claims, that "the technical evidences adduced by him are overwhelming and that they rest on sure foundation," I am ready to show that they are utterly fallacious and the others very questionable, and this I hope to do at some future time and in another place, and meanwhile I protest against the hypothesis "personal" feeling or any motive other than scientific.

W. J. STILLMAN.

Rome, July 18th.

Wednesfield.—The memorial stones of a Wesleyan Chapel in High-street, Wednesfield, were laid on Monday last. The style of new building will be Decorated Gothic; materials used will be pressed bricks, with stone dressings, and pitch-pine timber, painted and varnished. The roof will be open-timber. The building will accommodate 400 persons. C. Bell, of London, is the architect; and Mr. Moss, of Stafford, the builder. The cost of building, including the site, is estimated at about 1,700l.

THE KENT ARCHÆOLOGICAL SOCIETY
AT ROCHESTER.

A CLOUDLESS sky and brilliant sunshine helped to welcome the members of the Kent Archaeological Society on their arrival at Rochester on the 21st of July. Flags of welcome were spread across the High-street, and the members assembled in goodly numbers, the place of meeting being an attractive one, and the programme offering an abundance of antiquarian treasures for inspection. After some routine business at the Guildhall, which was thrown open for the reception of the members, Mr. St. John Hope briefly described a large map of the city which he had prepared, on which was shown the course of the ancient walls which once enclosed it. A start was then made for the ruins of the Bridge Chapel dedicated to the Holy Trinity. The visitors found that this ancient building had been cleared of the modern walls and offices which until recently prevented its inspection. It now stands to view as a roofless ruin attached to the new Bridge Chamber recently constructed. The chapel was dedicated to the Holy Trinity, and stood at the foot of the mediæval bridge across the Medway, a building only recently removed. It is of late fourteenth-century work, having square-headed windows at the entrance and two pinnacles on the south side. When so many ancient buildings have been allowed to decay or have been demolished it is a matter of much congratulation that so much care has been taken to preserve this interesting little ruin.

After a brief inspection of the new Bridge Chamber, opposite which the parapet of the wall in front of the Medway has the balustrade of the old bridge, a perambulation of the city walls was commenced. The site of the poorly endowed church of St. Clement, closed in Henry VIII's time, was passed, and many a visit was made by the large party into the little cottages and houses on the line of the old wall to inspect fragments of it which still remain. The quaint old school close to the site of East Gate, founded by Sir Joseph Williamson, an irregular building of red brick in the Queen Anne style, was entered, and the party proceeded to inspect a fine bastion of the wall attached to a portion of the wall itself here in perfect condition. The old school, doubtless, from having been built on the site filled up of the city ditch, is twisted and bent in a curious manner. The fine old Elizabethan house Eastgate House, in the High-street, was then inspected, the party filling the building in every floor. The fine chimney-pieces and enriched ceiling in one of the rooms were examined by as many as could enter the rooms containing them, the remainder had to be content with the view of the singularly irregular outline of the exterior. It is now used as a workmen's club. The house, Nos. 142-4, High-street, are similar in style, and, being close to Eastgate House, the grouping of the quaint gables presents an interesting street view hardly to be excelled in England. Progress was then made for Restoration House. This well-known Elizabethan house was thrown open for the inspection of the party, and the building and its contents were greatly admired. The walls are of red brick, mantled with ivy, and the tapestry presented by Charles II. is still preserved. In the room in which the king slept on his progress to London at the time of his restoration, the present owner, Mr. Stephen Aveling, has painted a frieze of panels illustrating the story of Geraint and Enid. They appear as if covered with glass, but the effect has been produced by the application of about twenty coats of old varnish, which has not cracked or become discoloured. A shaft communicating with the top of the house, and also with the basement, opens from an angle of this room. It leads to a subterranean passage, which has been traced for a long distance. It is too small for a staircase, but a fugitive could have been lowered by a rope.*

The Cathedral was then inspected, but before this was done Mr. St. John Hope explained on a large plan the many singular alterations and additions that have been made to the structure from the time of Bishop Gundulph, who, on coming to the see, commenced the present building about 1060. Mr. Hope rendered a

somewhat lengthy description of the dates of the various parts, referring to the plan as he proceeded. He then referred to documentary history, and concluded by indicating the places of sepulture of the various bishops of the see. In the perambulation of the building, the curious ruined tower on the north side of the cathedral was carefully inspected. It is a detached building, erected in the plainest and earliest style of Norman work in England, remarkable for having been always detached, and not opening into transepts as at Exeter. It appears to have been erected before the demolition of the Saxon Church by Gundulph. Many Roman bricks are built up into its walls.

The further notes of the perambulation, together with the dates assigned to the various portions, will be referred to in our next.

THE BUILDERS' ACCIDENT INSURANCE
(LIMITED).

The fifth annual general meeting of this Company was held at the Registered Offices, 31 and 32, Bedford-street, Strand, on the 7th instant, Mr. Stanley G. Bird in the chair. The report of the directors and statement of accounts for the year ending the 31st May, 1886, were presented to the meeting.

The report was as follows:—

"In presenting their fifth annual report the directors have great satisfaction in stating that the company is in a sounder financial position than it has ever been in, in spite of the large number of accidents which they have had to deal with and the continued depression in trade.

The directors have in the course of the year had under consideration no less than 356 accidents, and they have thought it right to contest liability in ten cases, in seven of which they have been successful.

In the case of one accident, involving injuries to five workmen, the company were unsuccessful, and the amounts payable in this case, in addition to the consequent costs, constitute 1,180*l.* of the total of 3,281*l.* paid during the year.

The sum reserved in last year's accounts has not been affected by the claims, and the company have at the present time a larger amount in hand than last year, with an estimated liability considerably less.

The directors regret that there has not been that increase in the business which the northern committee expected would accrue from extending the company's policy to cover sub-contractors' workmen without any increased premium; but, notwithstanding this, and although there has been a falling off in the ordinary premiums, it has been more than counterbalanced by the additional premiums received for the risk to the public.

The accounts show that after reserving 2,023*l.* for unsettled claims and unexpired risks, their remains a sum of 1,206*l.* for future bonus to be paid to members of the past year on renewal of their insurance, and to meet other known liabilities.

It has been considered advisable to discontinue the working of the Bristol District Agency as a separate branch.

During the past session of Parliament two Bills to amend the Employers' Liability Act, introduced into the House of Commons, were referred to a select committee. The chairman gave evidence before that committee, and they have now made a report to the House which recommends that 'with certain amendments the Act should be renewed and made permanent.' Should any legislation embodying its terms be introduced into Parliament it will have the careful attention of your Board.

The following six directors retire from the Board, in accordance with the Articles of Association, viz.:—Messrs. Thos. Barnsley, J. T. Chappell, J. Howard Colls, Robert Dennett, Jas. Greenwood, and J. H. Marsden, all of whom are eligible and offer themselves for re-election."

The Chairman.—In presenting the report of the directors for the past year I may say that we do so with mingled feelings of regret and satisfaction,—of regret that the business has not increased to the extent we were led to hope might result from the issue of the new form of policy covering the risks for personal injuries caused to or by the workmen in the service of the insured, by or to sub-contractor's workmen engaged with them, as defined in the Company's policies. And we also hoped that as the Company became better known our business would have increased, but the general depression has had such a disastrous effect upon the building trade that it has been reflected upon this Company. When I tell you that over 10 per cent. of the premium received has been returned for unexpended wages, it is a sure criterion of the great depression in trade. As every care is taken by the secretary in obtaining these returns, you may be quite satisfied that the insurers are fully justified in asking for this *bond fide* rebate off the amount that has been paid for premium during the past year. Still, I think we ought to be thoroughly satisfied that we have been able to hold our own, and have a balance in hand notwithstanding these bad times and the exceptionally large amount that the company has had to pay for compensation and law costs. Due allowance has been made for any claims that may be made upon us either

in the way of debts or liabilities. At present we only insure our own trade and those trades connected with building, and do not go into other trades, where probably there might not be so many risks, and which would, therefore, be more profitable. The building trade is usually looked upon as a risky one. We know when we insure our own lives that we all have to pay extra premium; therefore I think that when we show that this company can insure its members at equally low rates to those charged by other companies we may congratulate ourselves. As you will notice in the report we propose to pay a bonus of 10 per cent.; if you agree to pass a resolution to that effect it will bring the rate of premium that we charge on renewal to about the minimum rate charged by other companies. Considering the mutual character of this company, and the short time it has been in existence, and the great cost of working a new company, I think we may consider this a source of satisfaction. You will see by the report that during the past session two Bills were introduced into Parliament for amending the Employers' Liability Act, and at the request of the Board of this Company and the Councils of the Institute of Builders, and the National Association, Mr. W. H. Cowlin and myself gave evidence before the Select Committee of the House of Commons. Certain provisions we did not oppose,—in fact, some of them we did not think at all objectionable; we, however, opposed the Bills, but I think the result will be that the Act will be made permanent with certain amendments, but it is quite clear from the tone of the report that has been made that those amendments will not be in favour of the builder. I think, therefore, you should take the matter into consideration, and the chances being that the risks run will be very much intensified, it behoves all members to support their own company by bringing to the notice of their brother builders the great risks they run and advise them to insure with this company, especially pointing out that it is a strictly mutual company and that any profit will be returned to insurers. I beg to move that the report and balance-sheet as audited and presented to the meeting be adopted.

The motion, having been seconded by Mr. F. J. Dove, was carried unanimously.

It was moved by Mr. H. H. Bartlett, seconded by Mr. Thomas Patrick, and resolved:—

"That a bonus of 10 per cent. upon last year's premiums be paid in the form of rebate to such members as renew their insurances, and that in cases where insurances have already been renewed since the 31st of May, 1886, the bonus be forthwith paid."

It was next moved by Mr. Wm. Densham, seconded by Mr. J. Franks, and resolved:—

"That the sum of five hundred pounds be apportioned for the remuneration of the directors for their services during the past year."

It was moved by Mr. Thos. Patrick, seconded by Mr. J. S. Jones, and resolved:—

"That the following six directors, who retire under the Articles of Association, and have signified their willingness to stand, be and they are hereby re-elected, viz.:—Mr. Thos. Barnsley, Mr. J. T. Chappell, Mr. J. Howard Colls, Mr. Robert Dennett, Mr. James Greenwood, and Mr. J. H. Marsden."

It was moved by Mr. Thos. Patrick, seconded by Mr. Wm. Southern, and resolved:—

"That Mr. Charles Fox be and he is hereby re-appointed auditor."

Finally, it was moved by Mr. F. J. Dove, seconded by Mr. Thos. Patrick, and resolved:—

"That the thanks of the meeting be tendered to the chairman for his able services during the past year, and in presiding over this meeting."

BUILDERS' BENEVOLENT INSTITUTION.

The thirty-ninth annual meeting of this Institution was held on Thursday afternoon last at Willis's Rooms, St. James's, Mr. George Plucknett, J.P., Treasurer, in the chair.

Major Bruton, the Secretary, read the annual report, which stated that the charity was pursuing its onward course and extending its usefulness, as from year to year more persons were compelled to seek the benefit of the income arising from it to support them in old age and misfortune. There were now thirty-six male and thirty-one female pensioners; five had died during the past year, and seven others had been elected. New subscribers were greatly needed, for since the widows of deceased pensioners had been placed on the funds of the Institution without election, and new applications had been admitted, the number of pensioners had gradually increased to the present total of sixty-seven, so that it required a considerable sum to be raised annually to

* For views of front elevation of Restoration House and of chimney-piece and staircase thereto, also for plan of the house, see *Builder*, August 22 of last year.

sustain them. The supporters of the charity were much pleased by the action of the Worshipful Company of Carpenters in placing their fine hall at the service of the Institution for the last annual dinner, as well as for their generous donation, and the Institution was greatly indebted to Mr. Arthur C. Lucas, J.P., for presiding on that occasion.

The report and accounts were adopted, on the motion of the Chairman, seconded by Mr. Thomas Stirling.

Votes of thanks were passed to the President for the past year (Mr. Arthur C. Lucas, J.P.), to the Vice-Presidents, to the Trustees (Mr. George Plucknett, J.P., Sir James C. Lawrence, Bart., Sir S. Morton Peto, Bart., and Mr. C. T. Lucas), and to the Treasurer (Mr. George Plucknett, who was again re-elected).

Votes of thanks were also accorded to the Committee, the retiring members of which were re-appointed, and Messrs. G. Williams, J. Lough, and C. Ansell added to their number; a similar compliment being paid to the auditors (Messrs. Ward, Bolding, and Duffield).

The Chairman proposed as President for the ensuing year Mr. Basil E. Peto, a son of Sir Morton Peto, Bart., adding that it was most satisfactory to find the sons following in their fathers' footsteps.

On the motion of Mr. Thomas Stirling, a hearty vote of thanks was passed to the chairman, who, in replying, dwelt upon the necessity of gaining subscribers among a large body of the trade who at present did little or nothing to help the Institution.

COMPETITIONS.

The East London Hospital for Children, Shadwell.—We hear that, with reference to the competition for the extension of this hospital, the Board has passed the following resolution:—

"That they consider the plans of 'Sunshine' the best of those submitted to them, and recommend that the authors be so informed; but that, as some alterations will be necessary, they may be required to make a new design to meet them; this, however, the Board should not bind themselves to accept."

The design "Sunshine" is by Mr. W. J. N. Millard and Mr. W. G. B. Lewis, who will, doubtless, be willing to make any reasonable alterations in it to meet the views of the Board, but it will be manifestly unfair if they are asked to do so without an assurance that they will be employed to carry out the work.

Plymouth Lunatic Asylum.—Fifteen designs have been sent in in this competition, and the Borough Justices have called in the assistance of Mr. C. H. Howell, the Consulting Architect to the Commissioners in Lunacy, to act as their professional adviser and assessor in the selection of the plans.

Proposed Town-hall, Stourbridge.—A special meeting of the Stourbridge Commissioners was held on the 16th inst. to receive a report of the committee appointed to confer with the Donors' Committee of the proposed Town-hall scheme. Mr. W. J. Turney presided. The report of the committee was read by Mr. C. H. Collis. This stated that instructions had been given to three local architects, Messrs. T. Grazebrook, T. Robinson, and J. M. Gettings, to prepare plans for a new Town-hall on either of the two sites, viz., that of the present Corn Exchange, or the south-west angle of the present Market-hall building. The Donors' Committee were prepared to spend 3,500l. in the erection of the Town-hall, to include architect's fees, heating, lighting, and other convenience excepting seating, the architect's charges not to exceed 5 per cent. on the outlay. The conditions requested to be observed were that the Town-hall should be capable of seating not less than 800 and not more than 1,000, exclusive of stage, and including the gallery; the stage to be at least 20 ft., but not more than 23 ft. deep from the footlights to the back, space to be reserved at the back for the stage organ, one small and two large rooms for artists at the rear of the stage, and ladies' cloak-room at the main entrance. The Committee now stated they were of opinion that further instructions should be given to the architects by the Board that it was contemplated or thought desirable to utilise the buildings to the best advantage by providing, in addition to the public hall, which should be the first consideration, the following buildings:—Corn Exchange, which might be utilised

for a drill hall, suite of offices, board-room, and fire-brigade station. If the architects were restricted the probability was that the plans would be unsatisfactory; but if the architects were allowed to deal with the whole site better results would be likely to be attained at a less expense. The committee, therefore, recommended the Board to invite the same architects to submit plans for the buildings named jointly with the public hall, and that the sub-committee be empowered to draw up the necessary instructions, with any restrictions that they might think were required. A lengthy discussion resulted in the report being simply received, and it was understood that before any decisive action was taken in regard to the matter due intimation would be given to the Commissioners.

OBITUARY.

Mr. David Stevenson, C.E., F.R.S.—The death took place, on Saturday last, at North Berwick, of Mr. David Stevenson, the well-known civil engineer. According to the *Scotsman*, he was the senior member of the firm of D. & T. Stevenson, engineers to the Board of Northern Light-houses, and the Fishery Board of Scotland for harbours. He has been practically laid aside from work during the past three years. Mr. Stevenson was the third son of the late Mr. Robert Stevenson, the engineer of the Bell Rock light-house, and was born at Edinburgh in January, 1815. Educated at the High School and University of Edinburgh, he, unlike his brother Alan, who was originally destined for the Church, elected from the first to follow his father's profession. Before entering on his apprenticeship, he was for some time in the workshops of one of the best practical millwright engineers of his day, where he acquired manipulative skill and the proper methods of working in different materials—a course he always advocated for those who intended to follow the profession of civil engineering. After serving a regular pupillage as a civil engineer, he was for some time engaged with Mr. Mackenzie, contractor on the Liverpool and Manchester Railway, and he gave a description of this important railway scheme to the Society of Arts more than fifty years ago, and was awarded their medal for his exposition. He then returned to Edinburgh, and, in conjunction with his father and his brother Alan, began practice as an engineer. During the year 1837 he made a three months' tour in Canada and the United States, the result of the inspection of the engineering works of those countries being published in a volume under the title of "Sketch of the Civil Engineering of North America," which was subsequently republished as one of Weale's Series of Engineering Works, as peculiarly applicable to new countries where engineering works on an extensive scale, in which timber forms a chief element, would yet be in full operation. Along with his brother, his advice was much sought in regard to the improvement of rivers and harbour and dock works. There are, indeed, very few rivers or harbours in Scotland with which he was not in some way professionally connected. His practice was not, however, confined to Scotland, and he was called on to report on the improvement of the rivers Dee, Lune, Ribble, and Wear in England, the Erne and Foyle in Ireland, while the Forth, Tay, and Nith were improved under his advice, and extensive works are now in progress on the estuary of the Clyde from the desires of the firm. His book on "Canal and River Engineering," giving the results of his experience in the treatment of rivers, will long remain a standard work on the subject of which it treats. Originally written at the request of his old friend, Mr. Adam Black, about thirty years ago, for the "Encyclopædia Britannica," it was shortly afterwards published as a separate treatise, and it is now in its third edition. In 1853, Mr. Stevenson succeeded his brother Alan as Engineer to the Northern Light-houses Board, and, along with his brother Thomas, he designed and executed no fewer than thirty light-houses, two of which,—on Dhuhaartach and the Chicken Rock,—are triumphs of engineering. In addition to the Scottish light-houses, the advice of the deceased's firm was taken by the Governments of India, New Zealand, Japan, and Newfoundland on light-house matters, and under their direction schemes for the lighting of the whole coasts of Japan and New Zealand were matured and are now being carried out. In

connection with the lighting of the coasts of Japan, where earthquakes are frequent, Mr. Stevenson devised the systematic arrangement to mitigate the effects of earthquake shocks of the somewhat delicate optical apparatus used in light-houses. It may also be mentioned that his firm designed and carried out the Edinburgh and Leith sewerage scheme, and the widening of the North Bridge. In addition to many papers, principally on engineering and cognate subjects, read before different societies, Mr. Stevenson found time, amid the exacting call of his profession, to write several books which have taken a permanent place in engineering literature, such as "The Application of Marine Surveying and Hydrometry to the Practice of Civil Engineering," "Reclamation and Protection of Agricultural Land," "The Principles and Practice of Canal and River Engineering." He also wrote several articles for the last and present edition of the "Encyclopædia Britannica," among which may be noted "Canal," "Cofferdam," "Diving," and "Dredging." He was also author of the "Life of Robert Stevenson," published in 1878. Mr. Stevenson was elected a Fellow of the Royal Society in 1844, and he subsequently acted as a member of Council and one of its Vice-Presidents. He was a member of the Council of the Institution of Civil Engineers. Mr. Stevenson leaves a family of two sons and four daughters.

Mr. A. C. Earp.—We regret to announce the death, at the early age of 31, and after a painful illness of some months' duration, of Mr. Arthur Clifford Earp, son of Mr. Thomas Earp, an partner in the well-known firm of Earp, Son, Hobbs, architectural sculptors, London and Manchester. The interment took place at Nunhead Cemetery on Thursday, the 15th inst., when a number of carvers and masons in the employ of the firm attended and bore the body to its last resting place.

ARCHÆOLOGICAL SOCIETIES.

Bradford Antiquarian Society.—On the 10th inst., about fifty members and friends of the Bradford Historical and Antiquarian Society had an excursion to Bolton Abbey. After tea the party visited Beamsley Hospital, a quaint pile of buildings on the Harrogate-road, built in 1592.

Royal Archaeological Institute.—The annual Congress of the Royal Archaeological Institute of Great Britain and Ireland is to be held this year at Chester, and the period fixed is from August 10th to 17th, the Congress being under the presidency of the Duke of Westminster, Lord Lieutenant of Cheshire. The programme of places to be visited during the sitting of the Congress includes Llangollen, Valle Crucis Abbey, Malpas Church, Chirk Castle, Wrexham Church, Offa's Dyke, Beeston Castle, Delamere Forest, Roman roads and entrenchments, Kelsall barrow, &c. Of course the restored cathedral at Chester, the town wall, and "the Rows" will form objects of interest to visitors during their stay. The Historical Section will be presided over by Mr. E. A. Freeman, who will deliver the opening address in that section on the first evening; the Bishop of Chester opens the Antiquarian Section on the second; and the Right Hon. A. J. B. Balfour opens the Archaeological Section on Thursday evening, the 12th.

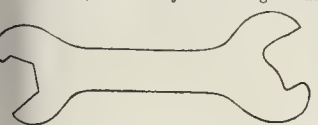
Somerset Archaeological Society.—The annual meeting of the Somersetshire Archaeological and Natural History Society will be held on August 3rd, 4th, and 5th, under the presidency of Mr. John Batten. The general meeting will be held at Yeovil on Tuesday, August 3rd. After the chief places of interest in the town have been visited, luncheon will be partaken of at the invitation of the President, at Aldon. In the evening a meeting will be held at the Town Hall, where several papers will be read. Round-hill Camp and the Frying Pan are down on the programme for inspection on Wednesday the second day, with Stoke-sub-Hamdon Church and Montacute House. On Thursday the church and Mediaeval house at Martock will be visited together with the church and Manor House at Tintinhull, where luncheon will be provided. Limington Church, Ashington Church, and Mudford Church also appear upon the programme for the concluding day.

Surrey Archaeological Society.—The annual excursion of this society will take place on Wednesday, the 28th inst., to Guildford, Tangier, Old Manor House, St. Martha's, and Thicket under the presidency of Mr. John May, Mayor of Guildford. The first meeting-pla-

will be the Royal Grammar School, Guildford, at 1:15 p.m., where Mr. D. Macleay Stevens will read a paper entitled "The Royal Grammar School, its Founders and History." The Castle, St. Mary's Church, Trinity Church, Mr. Bull's old house in High-street, Abbott's Hospital, the crypt under the Angel Hotel, and the crypt under the house opposite, will next be visited. Carriages will then convey the company to Shalford Mill House, which will be described by Mr. Ralph Nevill, F.S.A., thence the party will proceed to the old Manor House at Tangle, where the proprietor, Mr. Wickham Flower, will read a paper on the same; thence to St. Martha's, where Mr. H. F. Napper will offer some remarks on the Roman roads of the neighbourhood. From St. Martha's the company will return (via Titing) to Guildford Public Hall, to a collation at six p.m. This will be the final time the Society has visited Guildford since its formation, and we are not surprised from the fact of its being the county town and its containing so many objects of interest in and around it, that it should be a favourite rendezvous of the Society. For the benefit of the younger members who may have never visited the town, but intend to go, we would call their attention to a leading article published in the *Builder* of July 14th, 1855, entitled, "A Trip to Guildford."

A NEW SPANNER.

The object of this spanner, of the form of which we give an outline, is "to screw up or unscrew nuts, bolts, wood screws, &c., by a regular backward and forward motion, and to self-adjust itself on every square." It will be seen from the shape of the jaws how it is intended to act; the small jaw at the right-hand



end clips the angle of the bolt-head, and on moving the spanner backward the larger one slips round and the spanner is ready for another grip. The left-hand end acts in the same manner, the jaw with the return forming the lip. It is patented by Mr. Caleb Smith, jun., of Liverpool.

QUESTION OF TRADE MARK: "MONKS' PARK" STONE.

SUMSION V. PICTOR AND SONS.

THIS case has been again before the Chancery Division upon an application by the plaintiff for an order to discontinue the action.

The plaintiff in the action, Mr. Isaac Sumson, carries on business at Bath as a stone merchant, and the defendants are Messrs. Pictor & Sons, Bath stone merchants, Box, Wilts. The question in dispute in the action had reference to the use of the words "Monks' Park," as a description of the Bath stone raised from the quarries of the respective parties on the Monks' Park Estate, Corsham, belonging to Sir Gabriel Goldney, Bart., M.P. The plaintiff claimed in the action that he had the only quarry in Monks' Park, Corsham, that he alone was able to supply the genuine "Monks' Park" stone, that "Monks' Park" stone had acquired a high reputation, and was a mineral specially adapted for weight-bearing purposes, and for resisting carbonic acid gas and atmospheric influences, and was in great demand for large buildings; that he had registered a trade mark, of which the words "Monks' Park" formed a prominent part; that he had first adopted the words "Monks' Park" as applied to his stone, and that the defendants had no quarry at "Monks' Park," and that they had been selling stone as "Monks' Park" which was in fact not "Monks' Park" stone; and he claimed the exclusive right to the words "Monks' Park" as applied to Bath stone.

The defendants contended they had a right to use the words "Monks' Park," that they had 96 acres of the minerals of the Monks' Park Estate, whilst the plaintiff had only 30 acres, that the plaintiff had no exclusive right to work the minerals at "Monks' Park," or to use those words; that their minerals were within 300 yards of the plaintiff's; that they were working the same deposit of stone, and that it was in every way equal in quality to the plaintiff's. They also said they had not infringed the plaintiff's trade mark, and that they had been selling their stone for two years under the name of "Pictor's onks' Park," with the knowledge of the plaintiff.

Tangle Manor House will be found illustrated and described in the fourth volume of the society's "Collections," by the late Mr. Charles Baily, architect.

The plaintiff originally moved to restrain the defendants from selling, or offering for sale, any stone under the name "Monks' Park" or "Monks' Park Stone," other than stone obtained from the plaintiff's quarry, and to restrain them from using the words "Monks' Park" as the name or description of any of the defendants' stone, and also that the defendants might be restrained from infringing the plaintiff's registered trade mark. The motion was argued at considerable length, and was before Vice-Chancellor Bacon for several days, Mr. Horton Smith, Q.C., and Mr. Bradford (instructed by Messrs. Moger), then appearing for the plaintiff, and Mr. Miller, Q.C., and Mr. E. W. Byrnes (instructed by Mr. B. A. Dyer), for the defendants. Vice-Chancellor Bacon, in giving judgment, said the plaintiff's case utterly failed. The evidence of Sir Gabriel Goldney and others showed that the name of the whole estate in which both parties had quarries was "Monks' Park." The defendants had as much right to use that name as the plaintiff. They were working the same deposit of stone, held under the same landlord, under the same title. It was proved that the bed of stone under the Monks' Park Estate which the plaintiff quarried as well as the defendants was of the same kind and quality, being of the same bed. A mere grave and serious charge had been made against them, of palming off stones as "Monks' Park" stone when it was not so. That charge was unsupported by any evidence, and was entirely disproved. The evidence showed that the defendants had been selling and advertising largely their stone as "Monks' Park," and the plaintiff knew it. He (the Judge) refused the motion. He could not give costs at that stage, as it was an interlocutory motion, but when the costs had to be dealt with, there would be no difficulty in deciding who should pay them.

The plaintiff afterwards continued proceedings, and applied for a further affidavit of discovery by the defendants, but the application was refused by the Vice-Chancellor.

The plaintiff thereupon appealed, and the matter was argued before Lord Justice Cotton and Lindley, who dismissed the appeal with costs.

Upon the present application, an order was made that the action be discontinued, the plaintiff not to bring another action against the defendants in respect of the same subject matter, or relief sought, and it was also ordered that the plaintiff should pay to the defendants their costs of the action.—Communicated.

SUMMER SKETCHING.

SIR,—I have read with much pleasure the timely and useful article on "Sketching" in the last *Builder* [p. 81], and I shall be glad if you can spare me space for a few words to advocate a method of sketching which I found useful when I was a student, and which I believe other students, especially those beginning to sketch, may pursue with advantage. I refer to geometrical sketching, i.e., taking a feature of a building, and making, roughly, such sketch-drawings as would be needed had it to be rebuilt. To do this one must measure the main dimensions of the plan, and lay them down to scale at the bottom of the page, on the spot, and then draw up the lines of an elevation over this plan, and a section by the side of the elevation. The heights up to 8 ft. or 9 ft. can be measured readily; often when there are regular divisions, e.g., quoins, rustics, courses of bricks, stay bars, they can be got with accuracy to a very much greater height. What cannot be so reached must be drawn in proportion to that which has been ascertained, and in doing this a scale or two-foot rule allowed to hang perpendicularly between the eye and the object will be useful. When the general drawings are thus completed the profiles and enrichments should be sketched to a large size, and when practicable also to scale.

Among the recommendations of this method are the following: (1.) It necessitates a certain amount of careful and searching examination of the building or feature, so that by the time the drawings are made one understands something of how it has been designed, and, to quote the true words of William Burges, given in your article, how the effects have been produced. (2.) The beginner is working in a method rendered familiar to him by his office work, and consequently is more able to make satisfactory sketches than if he begins with perspective views. (3.) The drawings are valuable for reference, and, at any rate in Renaissance work, are more likely to be of use than perspective sketches.

Of course as the student gets on he will more and more relinquish this method for perspective, and then it may be useful to hint that where a really careful perspective drawing is intended, the camera lucida will be

* See *Builder* for Aug. 1, 1886, p. 170.

found to render the greatest possible assistance in obtaining the general outline and the main proportions, and the curves of foreshortened arches. It is not often advisable to make the whole of an outline with this instrument, but the use of it for the first half-hour smooths the way towards a good sketch wonderfully.

It is not every one who has *sans froid* enough to follow your advice and disregard street crowds. Those who would fain be left alone will find that if they can teach themselves to sketch standing, with the back to a wall, or, better still, to a doorway, they will be left unmolested for hours. The curious passer-by, finding that he cannot get a glimpse of the paper, soon passes on. When sketching seated in quiet back streets, I have found it useful, when the people had found me out and accumulated, to pack up and move off, go a little circuit and come back to my spot. The crowd has, of course, dispersed, and the street Arabs, believing that the possibilities of amusement in that particular street are exhausted, do not as a rule come back for a long time.

T. ROGER SMITH.

THE "IRON PROCESS" FOR SEWAGE.

SIR,—Allow me a few words of explanation with reference to your notice of the little pamphlet on "The Iron Process," in to-day's *Builder* [p. 111]. It is quite natural for a reviewer to assume that it would require either a long time or powerful machinery to incorporate a small quantity of iron with a large quantity of sewage. But the difficulty has been practically overcome by my process, as to which I can now speak of the practical application in five instances.

The invention consists, in the first place, of a method of maintaining the perfect solubility of iron in water, as to which the chemical difficulty has been long thought to be inseparable.

In the second place, the solution thus obtained is capable of easy dilution to any requisite extent, say to the proportion of a grain of metallic iron in ten gallons of water. And this is effected, in point of fact, in the sewers themselves, by the simple action of the daily flow. That the same action extends into the streams into which the effluent falls I have experimentally proved during the present week, in the case of a brook, which, at the distance of more than a mile from the influx of a sewer, was, last month, unapproachable from the foul smell, and which is now, after ten days' treatment, running perfectly sweet and clear.

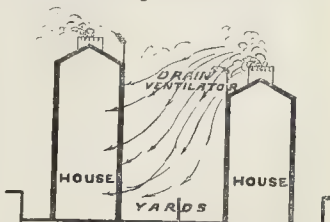
Holden's process, mentioned by the reviewer, is referred to on p. 5 of the first pamphlet, and the avoidance of costly works is mentioned on p. 14. Thanking you for the notice, I am sure that you will be glad to have the opportunity of adding this result of the logic of fact.

FRANCIS R. CONDER,
M. Inst. C.E.

Guildford, July 17, 1886.

DRAIN VENTILATORS.

SIR,—The now frequent ventilation of house-drains by the discharge of the impure air just above the roofs of dwellings, and the customary ventilation of our rooms mostly by means of the chimneys, induces me to draw your attention to the very great danger to health in all blocks of inhabited buildings where there are not frequent openings left down to the ground level from the street to the back premises, or, at any rate, by having frequent airways or shops with no building over them.



SECTION—

Every one is aware that when a back window is opened and the wind blows towards such window, the air comes in at it, and if all the back yards be enclosed by buildings such air must come either through the opposite houses or over their roofs; and if over their roofs, then it will bring down with it all the vitiated air from the drain ventilators and from the flues.

I saw this practically illustrated one warm morning at the backs of some houses in a street that is scarcely ever free from fever, &c., there being more than forty dwellings in one continuous row, with another row of forty dwellings at their back. One could here see the smoke turn down from the roofs

of the one row towards the yards and back windows of the other row along their whole length. How could it be otherwise? Unless there be frequent openings between the buildings it is impossible for it to be otherwise.

There are many blocks of buildings in that same neighbourhood where there are no openings whatever to the ground level between any of the buildings to allow the air to pass from the streets to the back yards and premises without thus going over the roofs.

R. FELIX CAMPBELL.

TRURO CATHEDRAL: CENTRAL TOWER LANTERN STAGE.

SIR,—By the great kindness of yourself and the editors of some of your contemporaries, I have been allowed to make an appeal for funds to carry out the above. I am sure that those of your numerous readers who have so kindly come forward to help, will be glad to hear that the effort has been so far successful that 1,831*l.* has now been raised in answer to my appeal.

Believing that if the work were started the additional 1,043*l.* still required would soon be forthcoming, the executive committee have given orders to commence, and we are now working the stones and the scaffolders are making the requisite preparations to enable us to commence setting them.

With very many thanks to you, sir, for your kind and valuable assistance.

ROBERT SWAIN,
Clerk of the Works.

PROVINCIAL NEWS.

Bath.—The late Sir T. W. Holburne has bequeathed the whole of his art treasures to the city of Bath to form the nucleus of the permanent museum to be erected in that town. The collection includes a gallery of pictures, and is especially rich in old Wedgwood ware, antique plate, china, majolica, bijouterie, &c. The trustees have appointed Mr. William Chaffers, the veteran antiquary and art expert, to arrange the catalogue and generally advise upon this valuable bequest.

Bridgwater.—At the meeting of the Bridgwater Town Council on the 15th inst., the Mayor said he thought the Council should consider the question of having an open-air swimming-bath provided for the town. He thought a large swimming-bath would be of great advantage, and if the town would give the water and the site, he knew several gentlemen would see there were none of the expenses of erection, &c., thrown on the rates. He suggested that Mr. Luffan, the surveyor, should be asked to prepare an estimate as to the cost. He thought the outlay would not be more than 200*l.* or 300*l.* After some discussion, the Borough Surveyor was instructed to prepare an estimate of the probable cost by the next meeting of the Council. Other towns would do well to copy the example of Bridgwater in seeking to provide cheap public swimming-baths.

Cooden (Sussex).—A cottage home for girls is about to be built at Cooden, Sussex, for Lady Clinton, from plans and under the superintendence of Mr. J. B. Wall, architect, London.

Grantham.—The large public bath for Grantham (constructed on the River Witham, near the Slate Mill) has just been opened. The origin of the movement was as follows:—The work commenced on March 22nd for the benefit of the unemployed workmen of the town. Ninety-three men have been employed in gangs of from thirty to forty. The bath has been made in a plantation, the property of the Corporation, by straightening portions of the east bank of the Witham near the Slate Mill, and by cutting away part of the island formed in the Victoria lake: the soil excavated has been used on the Grantham side to form a bank 8 ft. in height. The walls of the bath are of cement concrete, ranging from 5 ft. 6 in. to 9 ft. high, and 12 in. wide at the top, and from 1 ft. 9 in. to 2 ft. 6 in. wide at the bottom, with a batter of one in six upon the waterside. The floor is also of concrete. The quantity of cement used upon the work was seventy-two tons, supplied by the Rugby Portland Cement Co. and the Arlesley Lime and Portland Cement Co. A weir has been placed at the south end of the bath, at the same level as the old one, so that only top water can enter, and when the river is run down the level of the water in the bath will remain constant. At the bottom end a 16 in. sluice is fixed to discharge into the river below the old weir. A 9 in. sluice is fixed at the top end in case the scarcity of water should not fill the river sufficiently high to run over

the weir. On the east, or Harrowby, side of the bath there is a fence 7 ft. high, which is continued over the weirs at either end. The dimensions of the bath are:—Length 183 ft., width varying from 33 ft. to 72 ft., depth from 3 ft. at south end to a little over 6 ft. at the other; 40 ft. from the south end the depth is 3 ft. 6 in., and in the next 80 ft. the bottom falls 2 ft., and the lower 63 ft. varies from 5 ft. 6 in. to 6 ft. in depth. Water area a quarter of an acre; area of bath and enclosure half an acre. Dressing-sheds, a caretaker's hut, seats, pegs, life-buoys and ropes are also provided. The total cost has been about 300*l.*, but there are several matters of detail yet to complete. The whole work was designed and carried out by Mr. S. G. Gamble, A.M.I.C.E., Borough Surveyor, Grantham.

CHURCH-BUILDING NEWS.

Accrington.—The foundation-stone of the new Church of St. Peter, Scatcliffe, Accrington, was laid on the 17th inst., with Masonic ceremonies. Mr. Henry Ross, of Accrington, is the architect for the new building, and his plans comprise a nave, north and south aisles, chancel, organ-chamber, and vestries, and the interior of the new church will be lined with stone. The whole scheme will cost upwards of 6,000*l.* to complete.

Bridlington Quay.—Christ Church, Bridlington Quay, has been re-opened, after renovation. The old sittings have been replaced by modern seats, designed by Messrs. Smith & Brodick.

Bristol.—The foundation-stone of the new Church of St. Francis, Bedminster, was laid on the 10th inst. The site has been given by Sir Greville Smyth, Bart. The accepted contract for the foundations was that sent in by Mr. A. J. Beaven. The amount thus expended was 685*l.*, and this work was completed satisfactorily early in the spring of the year. Soon after this the Church Extension Society voted a further sum of 750*l.*, and it was then decided to proceed with the second instalment of the building. In plan the church consists of a wide and lofty nave, with north aisle the same height to the plate as the nave, chancel, organ-chamber, side chapel, vestries, &c. The principal entrance will be on the north side through a tower, which, at no distant date, it is hoped to erect. The materials are local stone for the walls, with Cattybrook bricks for all dressings and inside facework, the columns of the nave, window cills, and tracery being of Bath stone. The roofs, which are to be open-timbered (except the chancel, which will be boarded and divided into panels) are to be covered with Broseley tiles. Gangways and chancel floor tiled, and rolled cathedral glass in the windows. Heating and lighting will be an addition to the cost (about 500*l.*), including boundaries, as well as fittings of every kind. This church will accommodate 750 persons. Mr. John Bevan, of Bristol, is the architect.

Great Burstead (Essex).—At a meeting of the restoration committee held last week, the question of the immediate repair of the spire and tower was discussed, and it was resolved to ask the architect (Mr. Wood) to furnish the committee with various estimates. The architect had estimated the total cost of repairing the spire and tower thoroughly at from 1900*l.* to 2000*l.* Mr. Barnard was requested to see Mr. Cross, the builder, and arrange with him to commence the work as soon as possible.

Guernsey.—A Guernsey newspaper says that the restoration of the Town Church progresses well. A piece of marble mosaic paving has been laid down in the choir by Messrs. Heaton, Butler, & Bayne. It is estimated to cost 112*l.*, and is the gift of the family of Mr. John Le Motte, Lieutenant-Bailiff. The various works entrusted to Mr. Hems, of Exeter, are making satisfactory progress. The pulpit is chiefly composed of Caen stone, with five statuettes of that material. The figures are those of our Lord as the Good Shepherd, with the text, "Feed my sheep;" St. Peter, with the keys in one hand and a church in the other; St. Martin, giving alms to a beggar; St. Sampson and St. Magloire in episcopal vestments. The cornices and ornamental bosses are of fine Derbyshire alabaster. The whole pulpit is supported on a solid octagonal shaft of red Devonshire marble, surrounded by a circle of shafts of Purbeck marble.

Stainland (near Halifax).—It is proposed shortly to commence the erection of a new church at Stainland, the estimated cost of the building being 5,500*l.* The plans, which have been prepared by Mr. W. Swindon Barber, architect, Halifax, show a structure in the Perpendicular style, with a nave 81 ft. 6 in. long and 22 ft. wide; a north aisle, 81 ft. 6 in. long and 12 ft. wide; and a south aisle, 63 ft. 9 in. long by 12 ft. wide. The chancel will be 31 ft. long, and of equal width with the nave. On the north side will be the organ-chamber 19 ft. long and 12 ft. wide, with very wide arches opening into the choir and north aisle. On the south side of the choir are clergy and choristers' vestries, adjoining which will be the south porch. Under these vestries will be placed the heating apparatus. The altar will stand on a wide platform, and will be raised 7 ft. above the level of the floor of the nave. It is hoped that the choir screens and fittings may be executed in oak. There will be sitting accommodation for 582 persons, and it is proposed that the seats shall be heavy open benches. It is also proposed to line the walls with ash in place of plaster. The exterior will necessarily be plain. The most striking feature will be the battlemented tower, 13 ft. square at 70 ft. 6 in. high, with its octagonal staircase and imposing east elevation. The tower will provide accommodation for eight bells. Local stone will be used.

Woodford.—The foundation stone of the new Church of the Holy Trinity, Hermon Hill, Woodford, was laid on the 9th inst. The church is being erected to take the place of the iron church which was built four or five years since. It will consist of a nave, with north and south aisles, chancel, organ-chamber, a vestry. The porch, tower, and spire will lie at the north-west angle. The style of the work will be Norman Transitional. The nave will be five bays in length, the pillars being a massive circular form carrying arches of two orders. A clerestory of three lights is formed by each bay. The chancel arch is lofty and imposing, the inner rim being carried on corbels so as not to obstruct the view from the nave. The chancel is circular-ended. The heating arrangements are placed under the organ-chamber, and are approached from the outside. The exterior will be of stone, the windows being obtusely pointed, and very little removed from semi-circular form. The length of the nave will be 102 ft., and the width 62 ft. The total length of the church from east to west will be 153 ft. The tower and spire when completed will be 166 ft. high. The architect is Mr. James Fowler, of Louth, and the builder is Mr. S. Burton, Newcastle-on-Tyne. The amount of the contract is 4,500*l.*

The Student's Column.

STONE QUARRIES.—IV.

SOME PHYSICAL PROPERTIES OF IGNEOUS ROCKS.

BEFORE proceeding to describe in detail the granite quarries of the British Islands, it will be well, perhaps, to give a few particulars concerning the value of the term "granite," as used in the market, and we desire to be very explicit on this point.

The essential minerals of a granite are quartz, felspar, and mica, though it often contains in a small degree a few accessory minerals. To begin with, then, we must lay down the law that any rock which does not contain the three minerals referred to is not granite. If in addition to these it contains hornblende, it is not a syenite or a granite, but a hornblende granite; whilst if hornblende is present with only quartz and felspar, the rock is a syenite and not a granite. Yet spite of this, each of these mineral components is known,—generally speaking,—in the market as granite.

People who have to deal practically with the subject will find that, although this may seem useful, it is misleading in many respects, and has probably been productive of more erroneous judgment as to the value of granite,—properly so called,—than any other cause.

Ordinary workmen may call whatever they please granite; but the practical man should be more careful about it. We must not strenuously demur to results obtained from one of the kinds of rock, being compared with an index with all or any of the others, no matter

whether the result of the comparison is favourable or not. There cannot be a shadow of a doubt that this has been done, and that the practice is in full force at the present day. We cannot, of course, attribute the circulation of these unfair comparisons to the fault of those who make them, because they may not know the scientific values or the chemical and physical properties of the particular stones mentioned in their circulars, and so must take things as they stand. But there is no reason why those who have to select or buy the stones should not know the difference between them. The afternoon in a mineralogical museum, such as that at Jernyn-street or South Kensington (Natural History Department), aided by what we have before said on the subject, would go a long way to put the student in the right direction to determine the rocks under consideration. He would then be able to see why the apparent values of some of the extraordinary results referred to do not coincide with what is found in practice. In other words, he would find that stones, having widely different chemical and mineralogical constitutions and of variable structure, are lumped together and called "granites," a name to which they have no more claim than to sandstones or limestones.

If we obtain a list giving these varied rocks, all called granites,—we shall find that the specific gravities and crushing weights of each (arranged in a tabular form) are compared with one another, and as a general rule the stone particularly advocated is placed at the top, owing, of course, the highest crushing weight of any on the list, and so forth. Any stones that may have a higher crushing weight, or in fact any property that can be compared in figures that show a higher value, are not usually placed on the list,—whether signified or not, it is needless to inquire.

But there is not the slightest reason why they should be so particular in regard to these matters, which are often against their interest. The practical man immediately sees that there is something the matter, because he knows from experience that certain ones on the list, bearing a comparatively low crushing weight, are decidedly better for his purpose, even when strength is required, than those with higher results. He naturally begins to find fault with the theoretical value of the crushing weights, and finally disposes of them as of no practical value whatever. And on theoretical grounds, we shall see that he is quite right in doing so, for if the list from particular quarry states that the stones compared in it are granites and we find that they are not, but are stones of different characters, it is clear that the results are not strictly comparable.

Then, again, there is a class of stone-merchants who distinctly state the nature of each of the stones with which their own is compared, and although these stones are very different in character from each other, the merchants cannot be blamed, as they simply appeal to the intelligence of their clients. The prudent should know by this time that such sales have little or no practical value.

From the foregoing, some may feel inclined to think that we under-estimate the value of crushing weights; but, on the contrary, we think that they are useful when stones of approximately similar mineralogical composition are tested and the results compared. For instance, granite should be compared with granite, syenite with syenite, greenstone with greenstone, and so on.

Further than this. In the case of granite, there is a peculiar substance to deal with. If you place a piece of coarse porphyritic granite, say, from near Penzance,—side by side with a piece of very fine blue granite, such as that from Rubislaw quarries, Aberdeen, the difference in structure is very striking, so much so, that at first sight they do not appear like the same stones. We have before stated in these columns that experiments as to crushing on all cubes of stone, containing large crystals, are of no value. Applying this remark to the two granites under consideration, we see the results on a 6-in. cube of the porphyritic Penzance stone would be of no use. If machinery permitted it, and a very large block such were tested, it would be quite another matter.

This leads us to the conclusion that, in respect of granites, the crushing weights on 6-in.

cubes are useful only for comparison of the finer-grained varieties; and any one who is selecting stone should therefore know the grain of the rocks, the results of compression of which he is comparing.

In regard to aqueous rocks, the specific gravity is in some measure an index to their durability; but when we come to apply it to granites and stones of a like nature, it begins to lose its value in this respect. Its principal use in igneous rocks is in assisting to calculate the weight of a certain sized mass, so that it may be used by the engineer in estimating the strain on certain portions of large structures. It is very convenient also to know the specific gravity of granites intended for marine works, as,—other things being approximately equal,—the higher specific gravity granites are the best for these purposes.

The specific gravity of igneous rocks is frequently quoted in matters connected with road-metalling; but though this occasionally enables us to form some idea of the "resistance to crushing" under ordinary circumstances, for road-materials a knowledge of the specific gravity is practically useless, whilst whatever value it might have in assisting us to discover what pressure these materials are capable of resisting, is certainly lost. The results might be useful where the stone is to be built in a wall, and where the pressure is tolerably equal all the year round, but road metal is not subjected to such steady pressure. The pieces that form it are suddenly called upon to bear enormous weights, which are withdrawn as suddenly as they came, so that if the stones used for these purposes are not tough they soon snap. Care must be taken to distinguish the difference between the hardness of a stone and its toughness. Some people seem to think that hard stones are necessarily tough, but such is not the case. Many of the hardest stones in existence are very brittle. Toughness in granites, syenites, and the like is occasioned by the disposition and size of the crystals forming them, these crystals being more interlocked in the tougher varieties of these stones than in the others.

The student might well ask, then, why the "crushing weight" is not an index to toughness, seeing that the two things are both dependent on structure. In answer to this, we must again urge that the steady pressure of machinery on a plane surface must not be compared with that uncertain, uneven, grinding action to which road-metal is subjected.

In addition to being tough, however, road-metal must be made of durable minerals; for it is often subjected to very severe chemical tests. On some country roads, for example, the stones, after a rain, might be described as being literally in a chemical solution, which is trying its best to disintegrate the stone.

Although we have defined syenite as being made of quartz, felspar, and hornblende (excluding the few accessory minerals, for simplicity), we have not stated in what particular quantities these may exist, and this is an important factor in the inquiry. It will be found that the proportions vary considerably, and on this the differences in durability and specific gravity are largely dependent. There cannot be much doubt that in the syenites so commonly used as road metal, the rate of decomposition of the felspar is the principal source of the superiority of one kind over another.

The most durable syenite, then, is that which has the least felspar, and we may add, the least iron in that mineral. Syenites which contain an excess of felspar, generally have a low specific gravity, unless the hornblende is superabundant.

Those hornblende granites, in which the felspar has a tendency to occur in rather large crystals here and there, cannot be expected to make such good road metal as syenite, which does not exhibit this feature, is fine-grained, has comparatively little felspar, but much hornblende.

This brings us to the point, and enables us to see why it is so very essential to distinguish between rocks of different structure and mineralogical constitution, but which bear the same name in the market.

The owners of igneous rocks quarried for road-metal would do well to have the percentage of the minerals in their stones determined by Delesse's method, if they desire to give surveyors an idea of the respective merits of their materials.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

9,588, Window Fasteners. E. F. Haynes and T. F. Ford.

The fastener is made in two parts. A kind of rack is fixed on the side rail of the top window-sash, into this rack a spring catch forces a small bolt, the said catch being fastened upon the bottom sash. It allows the window to be opened some 6 in. or more.

9,738, Cows for Chimneys, &c. W. Gordon.

This invention provides simple and effective means for preventing the accidental removal by the wind of the rotating parts of hoods or cows usually fitted on ventilators for chimney or ventilating shafts, also to remove the common fault of chimney-sweepers neglecting to fix the revolving portion of ordinary cows. This cow is self-acting and self-fixing. The rotating cow is provided with a central stem or spindle fitted into a central tube secured by a framing on the stationary part of the chimney-shaft, the upper end of the tube forming by pressure an oil-can or receptacle for lubricants. A spring-catch fits over the disc when in place, and prevents the accidental withdrawal of the stem or of the cow, of which the stem forms a part.

4,433, Angle-Measuring Instrument and Level. G. Smith, E. & C. H. Warren.

This invention consists in an improved device for setting-out angles, whereby an exact horizontal or vertical line may be established and the relative horizontal positions of separate or distant objects accurately and clearly outlined. The appliance resembles somewhat a spirit-level, and it may be used as such, but it is pierced with an eye-tube covered with a slotted plate, with a mirror set at an angle of 45°. The plate is capable of longitudinal adjustment, and when any object is seen through the adjustable slotted plate, the relative angle with regard to the object to which the instrument is applied is also clearly ascertained.

78, Graining Tools. C. A. Watkins.

This relates to the tools used in imitating the straight broken lines representing the open grain of oak and the like. The lines are transferred on the work to be grained by means of a roller comprised of thin metal discs with portions cut from their edges, the discs being separate from each other and revolving loosely on an axis held in a frame of light metal. The colour is fed to the roller by a brush held against it as it rolls against the surface on which the graining is to be done. The brush is fixed to the roller by a small adjustable blade, and can be used in any position. A second feeding roller of wood or india rubber is also sometimes used.

NEW APPLICATIONS FOR PATENT.

July 9.—8,958, J. Richardson, Band Saws.—8,960, E. Airey, Preventing Draughts through Doors, &c.

July 10.—9,023, J. Walton and W. Edwards, Alarm Locks and Latches.

July 12.—9,050, T. Thornton, Door Check.—9,054, A. Ayers, Clamps.—9,075, A. Williams, Dust-bin.

July 13.—9,111, H. Buchan, Valve Apparatus for Water-closets.—9,143, J. Gough, Cleaning Chimneys.

July 15.—9,186, J. Nicholson, Step Ladders.—9,202, R. Woodhouse and S. Mitchell, Guards for Circular Saws.—9,225, J. Farlow, Workman's Daily Food Carrier.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,312, J. Mason, Windows.—6,565, J. Bean and W. Gaines, Closing and Preventing the Steaming of Doors.—6,582, S. Wright, Exhausting Syphons for Cisterns and Taps.—7,067, W. Smeaton, sen., Flushing Water-closets, &c.—7,068, W. Smeaton, sen., Flushing Water-closets, &c., and Preventing Waste of Water.—7,069, W. Smeaton, sen., Flushing Water-closets, &c., and Preventing Waste of Water.—7,387, J. and B. Craven, Moulding Bricks, Tiles, &c.—7,597, J. and J. Crombie, Concrete Floors, Pavements, &c.—8,699, R. Milbush, Wood-workers' Cramp.—8,546, D. Saunders, Hanging Sashes.—8,769, W. Ross, Combined Water-service and Waste-preventing Valves.—8,817, J. Partington, Metal Doors and Frames.—7,060, C. and F. Smith, Door-checks.—7,282, J. Jeffries, Pneumatic Door-checks.—7,465, J. Kaye, Automatically Latching and Bolting Doors.—7,468, C. Baldoek, Door Latch.—7,572, J. McConnell, Soldering.—7,683, J. Pawcett, Weather-bar for Doors and Windows.—8,113, R. Halliday, Scouring Glass to Frames or Sashes.—8,175, T. Howdill, Fitting Window-sashes and Sash-frames.—8,417, L. Dondy, Wall Decoration.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

8,433, D. Hall, Wood-working Machine for Stair-cases.—8,640, J. Richmond, Register Stoves.—10,544, M. Partington, Lime and Cement Kilns.—5,175, S. Bott, Cupboard Turns, &c.—8,365, G. Thornton, Preventing Noise in Closing Doors.—

* The Builder, vol. 1, p. 694.

† The Builder, vol. 1, p. 66.

11,133, H. Dawson, Ventilating Drains.—4,083, A. Emanuel, Double Waste-preventing and Regulating Valve.—4,290, R. Willoughby, Guards for Circular Saws, &c.—6,683, J. Purnell, Hydraulic Door Springs and Checks.—6,991, L. Nolke, Incandescent Windows or Vault Lights.—7,647, H. Dietrich, Tiles.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 12.	
By BORN & SON.	
Briston—Ground-rent of 4s. 1, term 13 years.....	43'0
95 to 117 odd, Hackford-road, 13 years, no ground-rent.....	920
By Messrs. WILKINSON.	
Shepherd's Bush—3, Maudslayi-street, and stabling, freehold.....	670
JULY 13.	
By BURTON & SONS.	
Covent Garden, Bow-street—The Marquis of Anglesea, public-house, freehold, and the reversion to 25, Russell-street.....	3,720
Packham-rye—No. 104, freehold residence.....	980
Kentish Town—26, Prince of Wales-crescent, freehold.....	460
By W. THOMPSON.	
Kenley Station, near—The Rose and Crown public-house and 4s. 3r. 4p., freehold.....	3,600
By A. RICHARDS.	
Smithfield—87 and 89, Long-lane, and 17, Middle-street, freehold.....	4,300
Edmonton—41 and 43, Upper Fore-street, freehold Ground-rent of 20l., reversion in 35 years.....	650
Stoke Newington—69, Green-lane, 98 years, ground-rent 2l. 12s. 6d.....	228
By FRANKS, PRICE, & FURBER.	
Camden-road—6, Rochester-square, 55 years, ground-rent 6l.....	480
The reversion to free-fourths of a Penbridge villa, Baywater, freehold, life aged 73 years.....	670
By DEBENHAM, TAYSON, & CO.	
City, Threadneedle-street—Ground-rent of 1,260l., reversion in 35 years.....	40,000
Ground-rent of 30 l., reversion in 35 years.....	10,000
23, 26, and 27, Leadenhall-street, freehold.....	44,300
By ROSS, CHAPMAN, & THORNTON.	
57, Fenchurch-street, 47 years, ground-rent 166l.....	5,300
By ROSS, CHAPMAN, & THORNTON.	
Pimlico—125, Lupus-street, 47 years, ground-rent 9l.....	1,360
30, Denbigh-street, 38 years, ground-rent 8l.....	550
30, Denbigh-street, 51 years, ground-rent 8l.....	630
JULY 14.	
By G. F. CALVERT.	
Islington—36 and 38, Chalfont-road, 49 years, ground-rent 10l.....	415
By RUSSELL & STEVENS.	
Regent-street—43, Great Marlborough-street, freehold.....	4,350
Mecklenburgh-square—No. 30, term 39 years, ground-rent, 42l.....	470
Westbourne Park—6, Ranelagh-road, 73 years, ground-rent 8l. 1s. 6d.....	500
Dorset-square—29, Milton-street, 34 years, ground-rent 10l.....	580
By BAXTER, PAYNE, & LEPPE.	
St. Mary Cray—The Bookery, and 8s. 2r. 15p., freehold.....	5,000
By WARD & CLARKE.	
Dalwich, Allevy-road—Acacia Villa, 57 years, ground-rent 4l. 1s. 4d.....	630
JULY 15.	
By ROWEN SMITH & CO.	
South Kensington—130, Fulham-road, 32 years, ground-rent 8l.....	610
Elm Cottage, adjoining, 22 years, ground-rent 5l. 6s.....	600
By GAGAN & BOND.	
Tunbridge Wells—A pair of freehold cottages.....	330
By T. W. FRY.	
Vauxhall—61, 64, and 65, Harleyford-road, 5 years, ground-rent 16l.....	375
By FARRINGTON, ELLIS, CLARKE, & CO.	
Tewkesbury, near—Northway House, and 35s. 2r. freehold.....	6,000
The Croft, and 4s. 0r. 14p., freehold.....	500
By SOUTHGATE, MORRIS, & CO.	
Cuckfield, Sussex—Two farms, about 253s. 2r. 11p., freehold.....	3,000
By RYKOLDS & EASON.	
Finchley, High-road—Five coppyhold cottages.....	255
An enclosure of freehold land, 3s. 1r. 30p.....	600
JULY 16.	
By MASTERSMAN, EVANS, & CO.	
Berkeley-square—63, Charles-street, 63 years, ground-rent 100l.....	3,120
Canonbury—82 and 84, Canonbury-road, 23 years, ground-rent 21l.....	735
By BAKER & SONS.	
Stoke Newington-road—No. 168, 91 years, ground-rent 20l.....	940
Southwark, near—The residence, Keyden Hall, and 71s. 1r. 18p., freehold.....	5,150
By ROBERT REID.	
Regent's Park—7, Osamburgh-street, 18 years, ground-rent 20l.....	85
Edgware-road—Improved ground-rents of 54l., term 35 years.....	930
Oxford-street—16, Grease-street, coppyhold.....	76
Pentonville—2, Amwell-street, 25 years, ground-rent 7l.....	285
Edgware-road—Ground-rent of 72l., term 35 years.....	19
Kentish Town—11, Malden-road, 63 years, ground-rent 8l.....	460
Hampstead—16, Lismore-crescent, 78 years, ground-rent 6l.....	24
By COLLETT & COLLETT.	
Westbourne Park—7 and 8, Golborne-gardens, 78 years, ground-rent 14l.....	400

Miscellaneous.

A Testimonial to H.R.H. The Prince of Wales.—In response to a general wish that steps should be taken to give expression to the appreciation which all those who are connected with the Colonial and Indian Exhibition feel for the deep interest which H.R.H. the Prince of Wales, Executive President of the Royal Commission, has evinced in the undertaking, a meeting was held on Wednesday, the 14th July, at the residence of Earl Granville, which was attended by Members of the Royal Commission, the Executive Commissioners for the Colonies and India, and others. Earl Granville having taken the chair, and having briefly explained the objects of the meeting, it was proposed by Lord Iddeleigh, seconded by Sir Charles Tupper, High Commissioner for Canada, and unanimously resolved:—

"That the eminent services of his Royal Highness the Prince of Wales, in the promotion of the Colonial and Indian Exhibition, ought to be marked in some fitting manner: That the members of the Royal and of the Colonial Commissions believe that the gentlemen who have been connected with the work, both in the Colonies and in India, would desire to share in the public appreciation of his Royal Highness's services; and accordingly considered that a piece of plate, commemorative of the Exhibition and of the great interest which his Royal Highness has practically evinced in its success, should be obtained for presentation to him."

By subsequent resolutions it was resolved to open a subscription list, and a number of noblemen and gentlemen were appointed to carry out the resolution. The amount of subscription by any one person is limited to two guineas.

A New Suburban Building Estate.—The facilities afforded by the Great Eastern Railway have led to the laying out of several estates near the metropolis for building purposes. One of these is the Oakleigh Park Estate, situated at Harold Wood, between Romford and Brentwood, and closely adjoining the Harold Wood Station of the Great Eastern line. The estate occupies an area of upwards of 12 acres, and is at present being laid out for building. Ten new roads intersecting the estate are now in course of construction. The land has been divided into about 350 plots, and the first sale, comprising 100 plots, took place in a marquee on the ground on Monday last, Messrs. Baker & Sons being the auctioneers. Mr. Baker observed that the plots he was about to offer ought to be worth not less than 2l. per foot frontage, but they were all to be sold absolutely without reserve. All the roads now in course of formation on the estate would be completed within six months. The drainage had already been effected, and the water company's mains had also been laid down. The first twenty lots, having frontages of 17 ft., were sold to one purchaser for 17l. each. Several shop plots, having also frontages of 17 ft., realised from 28l. to 50l. each. A hotel plot, near the approach to the railway station, having a frontage of 70 ft. and a depth of 100 ft., realised 260l., the purchasers being understood to be Messrs. Ind, Coope, & Co., brewers, of Romford. The remaining plots, having frontages varying from 17 ft. to 20 ft., were sold at prices averaging about 20l. each. The whole of the 100 lots having been disposed of, and there being a call for more to be offered, twenty-five additional plots were submitted, all of which were readily sold. The proceeds of the sale amounted to about 600l. per acre.

Stained-glass Windows.—Some stained-glass windows have recently been placed in the Congregational Church, Approach-road, Victoria Park, by Messrs. Marshall, Campbell Works, Stoke Newington, the subjects being "The Prodigal Son," "Christ Blessing Little Children," "The Good Shepherd," and "The Good Samaritan."

The New Coinage.—There is no sign of the new coinage at the Mint just yet; in fact, there is no sign of any coinage. The presses are under repair, and the public are shut out. It will be months before they begin to turn out the new pieces by the hundred thousand. People must not be too impatient: the new coins are not due till next year; and between this and then there is ever so much to be done. Mr. Boehm, we believe, has not yet finished his model of the Queen's head,—a model that will probably be made of clay. This done we are still but at the beginning of a long process. The model has to be transferred to steel dies of various sizes to suit the different denominations of the coin. Then each die,—the sovereign die, the shilling

die, and so on,—has to be duplicated many times over to admit of simultaneous operations when the coining begins. And all this is for one of the pieces only. There will probably be a reverse, as well as a new obverse, and for these we must exactly repeat the same operation design, transfer to steel dies in various sizes, multiplication of the dies. As yet the engraver have not broken ground on a single die, can they till the sculptor has done his work. Mr. Boehm's model blocks the way.—*Daily News.*

Dustbins.—With the advent of hot weather, complaints have appeared in the newspapers and applications made at the police-court about delay in removing solid refuse from dwelling-houses. The law, in this as in other sanitary matters, for the metropolis and the rest of England is contained in different statutes, but their provisions are practically the same. It is the duty of the local authority to clear the contents of the dustbin away, whose contents belong to them and not to the occupiers of the houses where they are produced. Rubbish is commercially valuable, and the local authorities or their contractors are able to make a profit out of it. Their rights are guarded by the law, which imposes a penalty on the holder if he obstructs the men who come to remove the rubbish, or if he removes it himself so as to prevent their making their profit. The local authority are bound, in return for their monopoly, to make proper arrangements for getting rid of the rubbish and for dealing with it so as to prevent a nuisance, but the provisions of the law for enforcing the performance of their duty appear to be inadequate. The law does not say how frequently the rubbish is to be removed, and gives the aggrieved holder but a very small remedy if it is left to accumulate on his premises. He is liable to a penalty of 5l. if he removes it himself; after he has found the accumulation to be a nuisance, he can only give the local authority notice to remove it. They then have a week, within which, if they like, or if the contractors are lazy, the accumulation refuse may increase, and what was at first merely an annoyance may develop into a pestilential nuisance. After the week has expired, if nothing has been done, the aggrieved householder may recover a penalty of 5s. a day, but we know of no case where it has been held that he can recover any recompense for the annoyance to which he has been exposed or the expense to which he may have been put. The complaints which have been made since that the law which gives at least a week to the scavenger is bound to attend to his work, a law which allows too great latitude. If new Parliament can attend to matters of a trifling nature, legislation which shall oblige those matters to be attended to sooner will seem desirable.—*The Sanitary Record.*

The Smoke Nuisance on the Thames.—The Council of the National Smoke Abatement Institution has for some time watched, with regret the failure of the Smoke Acts as regards steamers on the Thames, and has been in correspondence with the Home Secretary, and attention to the great and needless production of smoke on the river. A short time since Mr. Thompson's furnace was brought to the notice of the Council, and the engineer of the institution, Mr. D. C. Clark, C.E., was instructed to make a series of scientific tests of the apparatus. His report being favourable, the Council arranged a trial-trip on the 15th inst. The *Alexandra*, fitted with the furnace, ran up the Temple Pier to Richmond, lay there two hours, and then returned to Westminster. It is stated that during the whole of the run no product of combustion were visible at the top of the funnel, except for about one minute each time the furnace was stoked, when a little smoke was emitted. After the two hours at Richmond, when the fires had been allowed to get low, they were both stoked simultaneously with coal dust, which produced smoke for two minutes, but not of a dark shade. The owners of the tug, Messrs. Tough & Henderson, state that besides the practical abolition of smoke there is a saving of from 20 to 25 per cent. in the quantity of fuel burned, and that inferior coals can be used.

Raffety, Thornton, & Co., Limited.—The directors announce an interim dividend of the rate of 7 per cent. per annum, payable on the 5th of August next.

.....ton	21	0	21	7	6
.....Cochin	32	10	0	33	0
.....sylon	26	0	0	0	0
.....	0	0	0	0	0
.....	24	0	0	0	0
.....Kernel	0	0	0	0	0
.....pressed, English pale	22	10	0	0	0
.....brown	21	0	0	0	0
.....and refined	18	5	0	18	15
.....and Old	26	0	0	45	0
.....riating U.S.	0	0	0	10	0
.....Refined	8	0	0	13	0
PRIME—					
.....merican, in casks	1	5	4	0	0
.....Stockholm	0	15	0	0	0
.....barrel	10	6	0	11	6

HOLLOWAY.—For rebuilding the St. John's Institute, Upper Holloway, for the Rev. H. W. Dearden, Messrs. Woodthorpe & Hammond, architects. Quantities supplied:—

Asby & Horner	£2,930 0 0
Bras & Son	2,905 0 0
Higgs & Hill	2,834 0 0
L. H. & R. Roberts	2,654 0 0
Dove Bros.	5,635 0 0
Lawrence & Co.	2,575 0 0
J. Beale	2,400 0 0

KENSINGTON.—For the entire reconstruction of the underground drainage system, fittings, &c., and sundry repairs, No. 51, Earls Court-square, South Kensington, for Mr. David Martineau, under the superintendence of Messrs. Morley & Letts, surveyors, Earls Court-road:—

E. K. Wilson, Sussex-place (accepted) £281 19 2

[The entire work to be finished in eighteen days.]

KENSINGTON.—For sundry repairs at No. 27, Long ridge-road, Earls Court-road:— Messrs. Morley & Letts, surveyors, Earls Court-road:—

Bradford, Richmond (accepted) £140 0 0
--

KINTHURBY (Berks).—For additions and alterations to the Mill House, Kintbury, Berks, for Sir Richard Sutton, Bart. Mr. James H. Money, Newbury, Berks, architect. Proprietor finds bricks, tiles, sand, and gravel. No quantities:—

H. Brown, Kintbury	£354 19 0
Samuel Elliott, Newbury (accepted) ...	475 0 0

[J. S. Bance, Kintbury, too late.]

LEATHERHEAD (Surrey).—For erection of house, stables, &c., at Hawkhill, Felcham, near Leatherhead, for Mr. E. Blake. Messrs. Whitfield & Thomas, architects, Cooks-par-street. Quantities by Messrs. Evans & Deacon, Adchade-street:—

Goldard & Sons	£4,340 0 0
Hill Bros.	4,268 0 0
Maiden & Harper	4,056 0 0
Turtle & Appleton	3,945 0 0
Foster & Dickson, Rugby	3,925 0 0
Bottrill, Reading	3,910 0 0

LEE.—For building a house and shop, situate at No. 8, High-road, Lee, for Mr. F. W. Worthington. Mr. Walter J. Ebbetts, architect, Strand. Quantities supplied by Mr. T. E. Mundy:—

W. Holt, Croydon	£705 0 0
H. Baylis, Highbury	780 0 0
G. F. Havell, Lee	781 0 0
J. Bowdidge, Greenwich	749 0 0
Dorrell & Co., London	747 0 0
T. Powell, Lee	730 0 0
D. B. Kennard, Lee	720 0 0
Chas. Robson, Lewisham	693 0 0
Steel Bros., Dalston (accepted)	680 0 0
H. Barber, Lewisham	630 0 0

LONDON.—For providing a jeweller's shop front and interior fittings, at 35, Gray's Inn-road, for Mr. G. Pickett, Messrs. Isaac & Florence, architects:—

F. Sage & Co.	£283 0 0
Drew & Cadman	380 0 0
Yardley & Sons (accepted)	325 0 0

LONDON.—For fitting up premises, 3, Marlborough Mansions, S.W., as a fancy stationers', for Mr. Arthur Punt:—

Yardley & Sons (accepted)	£142 15 0
---------------------------------	-----------

LONDON.—For fitting up a cigar parlor, at 6, Marlborough Mansions, for Mr. Doughty, Messrs. Martin & Purchase, architects:—

Yardley & Sons (accepted)	£156 0 0
---------------------------------	----------

LONDON.—For fitting new buffet, and internal decorations, at St. Paul's Railway-station, for Messrs. Spiers & Pond, Limited:—

Yardley & Sons (accepted)	£1,073 0 0
---------------------------------	------------

LONDON.—For drainage and other works to No. 5, Greville-place, Kilburn Priory, for Mr. Frederick Sherry. Mr. Walter J. Ebbetts, architect, Strand:—

B. Y. Yerbury (accepted)	£190 0 0
--------------------------------	----------

LONDON.—For alterations and additions at No. 238, Brockley-road, Mr. J. B. Wall, architect, Walbrook:—

Kennard Bros.	£225 0 0
Chas. Good	240 0 0
W. Smith	238 0 0
M. Rodman, Brockley (accepted)	222 0 0

LONDON.—For works to houses, Britannia-street, City-road. Mr. J. B. Wall, architect, Walbrook:—

F. Head, Hackney (accepted)	£325 10 0
-----------------------------------	-----------

LYMINGTON.—For alterations and additions to the Angel Hotel, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects:—

Davis & Lambert, Bournemouth	£280 0 0
Jenkins & Son, Bournemouth	518 0 0
Parley & Leroy, Lymington	432 17 0
Rashley Bros., Lymington (accepted)	398 0 0

ORPINGTON (Kent).—For building residence at Orpington, Kent, for Mr. Wm. Vincson. Mr. G. St. Pierre Harris, architect, Basinghall-street. Quantities by Mr. C. Stanger, Finsbury-pavement:—

Dartnell	£2,384 0 0
P. Higgs	3,333 0 0
D. Payne	3,263 0 0
Taylor & Son	3,162 0 0
F. Wood	3,132 0 0
T. Knight	3,080 0 0
W. & F. Croaker	3,039 0 0
H. Somersford & Son	2,987 0 0

PARKSTONE-ON-SEA.—For making new road on the Chaddeney Glen Estate, for Mr. G. J. Piercy. Messrs. Kemp-Welch & Pinder, architects, and surveyors 17 0 0

Roads.	Catchpots.
E. Elliott	£10 0 0
Saunders & White	216 0 0
Candy & Lock	210 10 0
G. Troke	145 0 0
S. White	132 0 0
W. Gray	127 0 0
R. Watton Bournemouth (accepted)	113 0 0

POKESDOWN.—For alterations to the White Horse Inn, Pokesdown, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects:—

S. Taylor	£127 0 0
Davis & Lambert, Bournemouth (accepted)	122 10 0

PORTRICAW.—For building villa residence, coach-house, stable, &c., for Portcaw, for Mr. F. James, M.D. Mr. D. L. Harris, C.E., architect and surveyor, Cardiff. Quantities by Mr. D. L. Harris:—

J. L. Rees, Talbach	£1,842 17 5
D. C. Jones & Co., Gloucester	1,569 0 0
Chas. James, Portcaw	1,414 0 0
Evans Bros., Cardiff	1,188 0 0
John Davies, Aberavon (accepted)	1,156 0 0

READING.—For additions to Lower Redlands, Reading, for Mr. Herbert Sutton. Mr. G. W. Webb, architect, Friar-street, Reading:—

Higgs	£495 0 0
Margetts	412 0 0
Bottrill	380 0 0
Searle (accepted)	389 0 0

RINGWOOD.—For alterations and additions to the Railway Hotel, for Messrs. Eldridge, Pope, & Co. Messrs. Kemp-Welch & Pinder, architects, Bournemouth:—

R. Tuck Ringwood	£133 15 0
Tuck & Carley, Ringwood (accepted)	132 0 0

SNARESBROOK (Essex).—For alterations and repairs to Addison Villa, for Mr. A. N. Colson. Messrs. Hills & Fletcher, architects:—

Alexander, Bow	£320 0 0
Martin, Forest Gate	267 0 0
J. & F. Bace, Leytonstone	276 0 0
Deacon, Limehouse (accepted)	275 0 0

SUTTON (Surrey).—For alterations to house, Cheam-road, for Mr. O. Fenton. Mr. J. B. Wall, architect, Walbrook:—

T. D. Leng	£324 0 0
M. Erdman	293 0 0
W. Hickinbotham, Reding	213 13 0

SWAY.—For new church to the Church of St. Luke, Sway, near Lymington. Messrs. Kemp-Welch & Pinder, architects, Bournemouth:—

W. Hoare, Bournemouth	£791 0 0
F. Rees, Lymington	725 0 0
W. Franklin, Southampton	680 0 0
McWilliam & Son, Bournemouth	658 0 0
Jenkins & Son, Bournemouth	648 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

F. R. C.—C. P.—W. G.—E. F. R. (drawings received).—W. G. will see that it was a mistake. A. B. (ditto). All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline printing out books and addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications. Letters or communications (beyond mere news items) which have been published for other journals, are NOT DESIRED. All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND, Box Ground, Combe Down

Corsham Down, And Farleigh Down,

RANDELL, SAUNDERS, & CO., Limited, Corsham, Wilts. [Ad]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, WILTS. [Ad]

Doubling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doubling Quarry is respectfully solicited; and Architects and others are CAUTIONED against inferior stones, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMSON, No. 16, Craven-street, Strand, W.C. [Ad]

Doubling Free Stone For prices, &c., address S. & J. STAPLE, Quarry Owners, Stoke and Lime Merchants, Ilminster. (Ground or Lump), [Ad]

HAM HILL STONE, Quarry Owners, Stoke and Lime Merchants, Ilminster. (Ground or Lump), [Ad]

BLUE LIAS LIME Stoke - under - Halilminster. [Ad]

Asphalte.—The Seyssel and Metallic Limesphalte Company (Mr. H. Glenn), Office, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milking rooms, granaries, tun-rooms, and terraces. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

Asphalte. Seyssel, Patent Metallic Lava, and White Asphaltes. M. STODART & CO. Office, No. 90, Cannon-street, E.C. [Ad]

BRABY'S PATENT GLAZING.

GLASS SET FREE,

ALLOWING EXPANSION AND CONTRACTION, AND PRECLUDING BREAKAGE.

ABSOLUTELY WATERTIGHT. PAINTING AND PUTTY SUPERSEDED

OVER THREE MILLION FEET FIXED.

DRAWINGS AND PRICES ON APPLICATION.

- MODELS AND SECTIONS ON VIEW -

LONDON: 352 to 364, EUSTON ROAD. LIVERPOOL: 6 and 8, HATTON GARDEN. GLASGOW: 335, ARGYLE STREET.

ILLUSTRATIONS.

Selected Design for the Birmingham Law Courts.—Messrs. Aston Webb and E. Ingress Bell, Architects	162-163
Some of the Designs in the First Competition for the Birmingham Law Courts	168-171
The Central Tower of Gloucester Cathedral.—Sketched by Mr. W. H. Bidlake, M.A.	174
The North Choir Aisle, Westminster Abbey.—Sketched by Mr. W. H. Bidlake, M.A.	175

CONTENTS.

The Birmingham Law Courts Competition (with Plan)	161	Sketch in North Choir Aisle, Westminster Abbey	177	Drain Ventilators	192
The Architectural History of Cambridge (Illustrated).—L.	162	Further Notes on the Edinburgh Exhibition	177	Samuel v. Pictor	192
Death of Mr. W. May, of Poole	163	The Recent Meeting of the Lincoln Diocesan Architectural Society	177	The "Siphonals" Pipe Fasting	192
Notes	165	National Competition Prize Works, 1885: Science and Art	179	Church Building News	192
The Treasury House in the Tower	167	Department, South Kensington	179	Dissenting Church-Building News	192
The British Archaeological Association	167	The Kent Archaeological Society	179	The Student's Column: Stone Quarries.—V.	193
Selected Design for the Birmingham Law Courts (Illustrated) ..	160	The St. James's Dwellings, Westminster	180	Recent Patents	193
Birmingham Law Courts: Designs submitted in the First Competition	160	Water Softening at Henley-on-Thames	181	Recent Sales of Property	194
Gloucester Cathedral Tower	177	The Manchester Ship Canal	181	Miscellaneous	194
				Prices Current of Building Materials	195

The Birmingham Law Courts Competition.



HE designs of the five competitors whose plans were selected by Mr. Waterhouse out of the sketches submitted in the first competition have now been fully examined by the assessor, and he has adopted the one signed "Terra-cotta," the four others being signed "Viâ Unâ," "Sincerity," "Law and Order," and "Two Judges of Assize." The designs have been hung in a room in the Municipal Buildings for some days past, for comparison and observation. The sketch design which was made in the first instance by Mr. Waterhouse has been available for the guidance of competitors, at the cost of one guinea, and there is no doubt that all the five selected designs have been compiled with more or less reference to it. We subjoin on the next page the plan of the principal floor, as given in this sketch design, as the best way of giving an idea of the site and of the accommodation which competitors were required to arrange upon it, with whatever modifications might seem good to them; and we will now describe the main points and characteristics of the five designs selected for the second competition, taking them in the order of hanging.

"Terra-cotta."—This plan, which is the one recommended by Mr. Waterhouse for adoption, is the only one of all the five in which an important deviation is made from his original sketch-plan in the position of the great hall, which, to a certain extent, is the centre or key of the situation. Instead of placing the hall within the other buildings, and leaving a façade to Corporation-street of mere offices, the hall is turned with its longer side towards Corporation-street, and brought up to the front of the design, thus stamping the building at once as a public building, instead of leaving it with a main façade which might be only that of a row of chambers or offices. The authors have wisely avoided running the main lines of their plan parallel with Corporation-street, which is at an oblique angle with the other boundaries of the site. This kind of oblique arrangement always leaves awkward corners and angles in the interior of a building, and it is far better to cut the corners out of the site externally to the building, leaving the latter rectangular, than to get a symmetrical façade parallel to the street at the cost of spoiling the regularity of

the interior. It is essential that in a public building every one shall be able to find his way about easily, and this can never be the case where there are corridors meeting at various unexpected angles. In "Terra-cotta's" plan the lines of communication are arranged in a most simple manner. The public hall is entered at the centre of one side (as a matter of mere architectural effect this is a pity, as it is much more effective to enter such an apartment at the end than at the side); on the opposite side a broad corridor runs onward as the backbone of the plan, between two of the magistrates' courts, across the transverse "witnesses' corridor," and between the civil and criminal courts, which are placed as in Mr. Waterhouse's plan. From the left hand of the great hall runs the Coroner's corridor, and from the right hand end the Magistrates' corridor. After the transverse "witnesses' corridor" the plan expands a little, and the side corridors run up as "solicitors' corridors," with the barristers' corridor connecting them across the top of the plan. The author has saved a good deal of room by running the barristers' department into two stories, putting their robing-room under the reading-room, and three of the consultation-rooms above, which gives him some space to play with on the ground floor, but at the cost of rather curtailing the height and fair proportions of the reading-room. The position of the consultation-rooms is quite unobjectionable, as it is quiet and out of the way, and in accordance with the habits of the Bar, who expect to be waited on rather than to wait on others in consultation. The solicitors' corridors do not entirely bear out their title,—indeed, this kind of symmetrical division is rarely possible to carry out completely in a large plan; but the large "witnesses' corridor" does combine and concentrate the witnesses, both for the judges' and magistrates' courts, very completely. The ladies' room and the post and telegraph room form a one-story addition between the great hall and the street, and the first-class refreshment room is very well placed at the front angle of the building, within easy reach, but not prominent. Complete and uninterrupted communication is maintained all round the whole of the main lines of corridor traffic. The magistrates' offices are very compactly arranged around a small lobby of their own, and the two principal magistrates' courts share one of the side corridors between them, the third court opening on the opposite side corridor. This is an arrangement which, we understand, is criticised in Birmingham, the magistrates, especially, considering that the three magistrates' courts should be quite separate, and cut off from the corridors serving the judges' courts. This is all very well; but

it must be remembered that one of the instructions to architects was that the third magistrates' court was to be capable of being used as a judge's court, if required, in time of assize, and it appears to us that "Terra-cotta" has in reality very well placed this court so that it may be regarded as a portion of either class of courts: to place it quite equally conveniently for both uses would hardly be possible. The only decided want which we notice in the plan is that the judges have no separate private access to the courts, as they should have. There is a special "Judges' and Bar private entrance," well placed at the end of one of the corridors, opening out of Steelhouse-lane, close to the sheriff's room; but in large law-courts an entirely private entrance and passage for the judges is certainly a *desideratum*; most judges will think so, at any rate.

Of the design it cannot be questioned that in regard to originality and refinement it is by far the best of the five. It is difficult to define it exactly; it is better to refer our readers to the illustration published in this number. Its general effect is certainly Gothic, yet there is a great deal of detail in it which is not Gothic at all. The ends of the corridors at either end of the great hall, abutting on Corporation-street, are treated as apsidal ends and carried up above as octagonal turrets, making a good termination to the flank of the hall. The upper portion of the hall is lighted with mullioned windows with three-centred arches and a very rich double panelling and cornice over. The one-story building intervening between the hall and the street is also treated in a very rich and effective manner, with deep-set square-headed mullioned windows and a very picturesque gateway in centre, of a character that may be described as a mingling of Romanesque with Classic feeling. The whole design is picturesque without eccentricity or pretentiousness, and thoroughly municipal in character.

The ventilation is to be mechanical, the air being extracted from the upper portions of the courts by a steam fan in the basement, and the fresh air admitted through an opening and shaft in one of the towers, the shaft being of glazed bricks, and washable. The fresh air is intended to be introduced at the bottom of the courts, after passing through warmed chambers, and drawn out through foul-air ducts from the top. We would only observe, in regard to this, that in the case of public buildings where many are passing in and out during their use, the principle of propelling the air in by mechanical means is, in our opinion, better than extracting it; as the air in the interior is then under slight pressure, any tendency to in-draughts on the opening of doors is entirely obviated.

The author employs mechanical extraction (Blackman's air-propeller) for drawing out the foul air from the courts, fresh air being admitted into chambers in the basement and then passed through water-sprays, and through hot-water coils into the courts. The report states that there is medical testimony in favour of extraction rather than propulsion of air. What does medical testimony say to draughts and their effects? And they can never be so well avoided under extraction as under a propulsion system. Given a court with the air (as it is pretty sure to be) warmer than in the corridors, and a constant suction out of it going on by a mechanical extractor, and whenever a door is opened there *must* be a rush of colder air in, whereas by propulsion the air pumped in can be placed so as to produce no draughts that will affect any one, and when a door is opened any tendency to draught would be outward rather than inward.

"Law and Order."—This is also a Gothic design, later in style than the last named, and much more refined in character. The author places his main front parallel to Corporation-street, and has a big tower in the middle of it. The ground story is treated very pleasingly with small windows and plain unbroken masonry: the first floor is a *belle étage*, with large mullioned windows, rows of panelling above and below them, and statues between the windows: as a piece of effect, exceedingly good; but when we come to examine the plans, we find there is not the slightest pretence for a motive for this contrasted treatment of the two stories,—both these stories of windows light the same class of small rooms, witnesses' rooms, consultation-rooms, &c.,—so that this treatment of the front is a piece of pure and gratuitous scenery. The second floor has dormers with traceried heads. The effect of the design on elevation is (apart from the question of its falsity) a little thin and wiry, but in the very nicely sketched perspective this effect disappears, and it looks so pleasant and picturesque that we can only regret its immoral want of any relation to the internal arrangement. Generally speaking, the plan is a mere repetition of the sketch plan. The interior of the great hall in the section indicates an effective treatment with panelling below, then wall paintings, then statues, and, finally, a range of five windows, of Perpendicular type.

The author appears to have considered the question of warming and ventilating very fully. He proposes to propel air mechanically, according to the principle we have already recommended, drawing it from one main source, and propelling it by a fan into the courts and other parts of the building, raising its temperature slightly for general distribution, but warming each apartment separately by direct radiation. He proposes steam coils in all the upcast outlets in order to keep them always at a higher temperature than the rooms themselves; this, though not absolutely necessary where propulsion is employed (for when forcibly propelled at an inlet, the air *must* go out at the easiest outlet) is an assistance, prevents over-compression in the apartment, and ensures the air escaping in the direction and by the channel intended for it.

"Two Judges of Assize."—The plan is very nearly Mr. Waterhouse's in main arrangement; but the author places the two magistrates' courts end on to the side of the great hall, with the magistrates' room and a small entrance lobby between them, the third court and the coroner's court on the opposite side, with a lobby and the coroner's and stipendiary magistrates' rooms between; the third court being brought close up to the assize courts system. The corridor communication behind the magistrates' courts is kept unbroken. This arrangement of the minor courts is very good; perhaps the best among the whole of the plans. The elevation is original, but open to the charge of eccentricity; the ground floor is raised high, with a mezzanine between it and the basement; the ground-floor windows show single lights with entablatures, the centre one highest, all enclosed beneath a circular arch, the spaces over the lower entablatures being

filled up with sculptured figures. Above this we become Jacobeanesque, with engaged columns and mullioned windows between. The end of the corridor parallel to Corporation-street terminates in an apse, which rises in an octagon turret, rather than tower, of graceful design. In spite of a little oddity, there are both refinement and originality in the design; but it seems a little too scattered and broken up. There is a look of trying to do something picturesque, with no very fixed intention.

The authors append a heating engineer's report, proposing the ventilation and warming of the building from one central source through conduits in which hot-water pipes would be placed; the air to be propelled mechanically, the reporter observing rightly that under an extraction system every door or other opening may become an inlet. Apparently air is to be warmed wholesale before delivery into any of the rooms, which has the disadvantage that it cannot be accommodated to the special needs of each apartment under special circumstances; but, of course, there is more economy in this wholesale system, and it is more easily controlled and regulated. It is proposed to assist the upcast outlet shaft by heat from the furnace flues.

The authors of this last design preface their report with a "protest" against the restriction that the plans shall all be done in the competitor's own office and by their ordinary staff; this, they say, bears hard on "modest provincial offices" which cannot afford to keep the array of brilliant draughtsmen whom the successful London architect is supposed to keep constantly employed. We do not believe the authors have had opposed to them any firm in London possessing the kind of exceptional resources referred to; and the set of drawings produced by the "provincial office" in this case is quite as well finished as the others, as far as mere draughtsmanship goes; so let not the "Two Judges" attribute their defeat to the army of draughtsmen in a London office. The regulation was to our thinking a very healthy one, and we wish it were carried out in all competitions, when there would perhaps be more planning and designing (in the true sense) and less of mere draughtsmanship exhibited.

Amid the constant misuse of the competition system, and the failures of justice arising from unfair dealing or from sheer stupidity, it is pleasant to have to record of one important competition, at least, that it has been carried out with the most obvious and scrupulous fairness from beginning to end, and that, as appears to us, the best man has won.

Since the above notice was written, the design signed "Terra-cotta" has been officially accepted at a meeting of the Town Council on Tuesday, and the names of the authors of the five designs announced. They are as follows:—

"Terra-cotta."—Mr. Aston Webb and Mr. E. Ingress Bell (London).

"Viâ Unâ."—Messrs. Bateman & Hunt (Birmingham and London).

"Sincerity."—Messrs. Dunn & Hipkiss (Birmingham).

"Law and Order."—Messrs. John Burnett & Son (Glasgow).

"Two Judges of Assize."—Messrs. Maxwell & Tuke (Manchester).

Prizes, Architectural Association.—Messrs. T. C. Agutter, W. D. Gravel, and B. F. Fletcher have been awarded the first, second, and third prizes respectively in connexion with Mr. Henry Lovegrove's lectures at the Architectural Association.

Obituary.—On the 22nd ult. there was buried a builder who stood in the foremost rank in the West of England, namely, Mr. William May, of Poole. The deceased was a contractor of nearly fifty years' standing, and carried out a large number of buildings for Mr. Piers St. Aubyn, also for the late Mr. Street, R.A., Mr. White, Mr. Christian, Mr. Hayward of Exeter, and many others. He restored or built thirty-three churches and a great many vicarages, schools, &c.

THE ARCHITECTURAL HISTORY OF CAMBRIDGE. —II.*



HE great extent and importance of Trinity College, a member of which is said to have once benevolently referred to the members of the other colleges in the words "they, too, are God's creatures," naturally leads one to turn first to the record of the rise and progress of this great establishment, in looking at the separate architectural history of the colleges embodied in the work before us. The history of the site, as connected with the objects of the University, extends to a period long prior to the actual founding of Trinity College or to the date of any of the existing buildings. The account given by Willis, with supplementary notes by Mr. Clark, is of the greatest interest, and is the result of a great deal of laborious research, but it is impossible to touch on the details of the history here. It must suffice to observe that when Trinity College was actually founded by Henry VIII. in 1546 the site was occupied by two colleges, Michael House and King's Hall, and by seven hostels for students, namely Garret Hostel, King's Inn, St. Gregory's Hostel, St. Margaret's Hostel, Physwick Hostel, St. Katherine's Hostel, and Tyled or Tyler's Hostel; the rest of the site being common land belonging to the town of Cambridge. The question of the probable or possible history and sites of these various establishments is gone into at great length by Willis, on the data chiefly of old accounts, indentures, and conveyances; and the general aspect and arrangement of Trinity College shortly after its foundation are roughly conveyed to the eye in the reproduction of part of Lye's map of Cambridge (1574), the buildings being rudely indicated in the usual bird's-eye fashion of the old maps. We there see the site of the present great quadrangle occupied by an irregular group of buildings, including several of those already mentioned as previously existing on the site. The interesting point in the architectural history of the college is in its transformation from the irregular group of buildings into the two noble quadrangles which now form the main portion of this college, and this architectural transformation is mainly connected with the honoured name of one man, Thomas Neville, who became master of Trinity in 1593, and held that post for twenty-two years. The record of the estimation in which Neville was held affords an agreeable instance, one out of many, of the love of noble natures for noble building; and in relation to Neville Mr. Clark gives, in a foot-note, the testimony of Bishop Hacket about Neville, that "he never had his like in that Orb, I believe, for a splendid, courteous, and bountiful gentleman." From the "Memorials" of Trinity College, a volume dated 1614, and containing records of the principal benefactors of Michael House, King's Hall, and Trinity College, is quoted the record that when Neville first came to the college he was struck by the remarkable absence of beauty in the buildings and the want of regularity in the ranges of chambers. He obtained a grant from Queen Elizabeth for increasing the period of leasing land and rectories from ten years to twenty years, and forthwith set about "increasing the college with new buildings, arranged in quadrangular form, so that it could be said in all truth of him, as was said of Augustus Cæsar, when he came to Rome it was built of brick, when he left it was built of marble."

"When he had completed the great quadrangle, and brought it to a tasteful and decorous aspect, for fear that the deformity of the Hall, which through extreme old age had become almost ruinous, should cast, as it were, a shade over its splendour, he advanced 3,000*l.* for seven years out of his own purse, in order that a great hall might be erected, answerable to the beauty of the new building."

Lastly, as in the erection of these buildings, he had been promoter rather than author, and had brought these results to pass more by labour and

* The Architectural History of the University of Cambridge and of the Colleges of Cambridge and Eton. By the late Robert Willis, M.A., F.R.S., Jacksonian Professor in the University of Cambridge. Edited, with large additions, and brought up to the present time, by John Willis Clark, M.A., late Fellow of Trinity College, Cambridge. University Press, Cambridge, 1886. (See p. 116, ante.)

assiduity than by expenditure of his own money; he erected, at a vast cost, the whole of which was defrayed by himself, a building in the second court, adorned with beautiful columns, and elaborated with the most exquisite workmanship, so that he might connect his own name for ever with the extension of the college."

The buildings which were badly placed he caused to be pulled down, no Society for the Protection of Ancient Buildings then existing to offer interference with his schemes. It is absurd enough to look now at the fine result of Neville's energy and judgment, and to reflect that had he lived in the present day, and attempted exactly the same thing, he would have been represented as a Philistine destitute of taste or feeling.

Neville's first work on the large quadrangle was the completion of the range of chambers on the east side, next the southern range, including the Queen's Gate Tower (which is dated 1597); and in 1599 the range of chambers belonging to King's Hall, and which projected into the centre of what is now the great quadrangle, was removed, and the gate tower, the present one, raised in height. Some of the accounts quoted in reference to this work are of interest. The angle stones for the octagonal turrets seem to have been a special job:

"Item, laid out to John Symes and his laborers for the sawing, working, and setting up of the Canters that were made for the lightening of the greato Tower, and plastering the same on the inside . . . v. l. xviii."

A general decoration of the gate took place in 1614-15, in honour of the visit of James I. to Cambridge, whose statue, or, rather, the material for it, is the subject of a curious entry in the accounts:—

"Item, to Goodman Smyth, of Barrington, for mending of his Cart, broken with a great stone brought from thence for the king's statue . . . v. vi."

Other accounts connected with this work are of considerable interest as throwing light on the *modus operandi*.

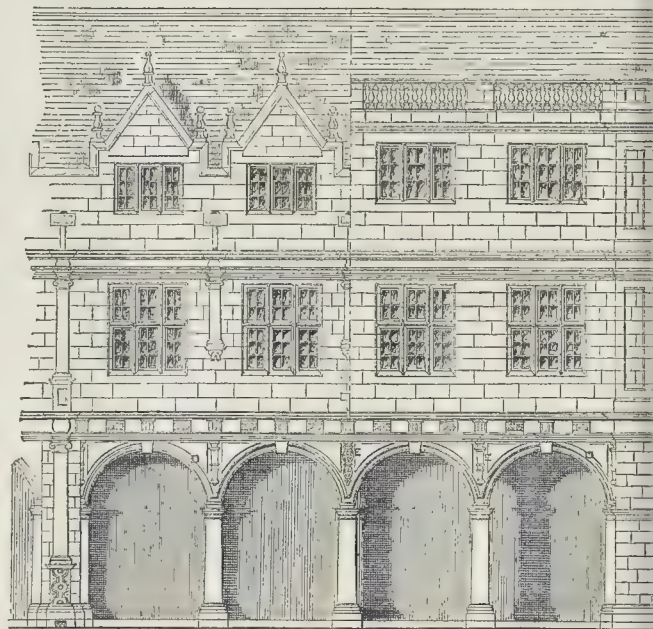
But we must devote a few words to Neville's Court, the second court of Trinity, which formed the master's own and special contribution to the architectural improvements of his college. Unfortunately, Willis observes, owing to the cost having been undertaken entirely by Neville himself, the accounts did not come into the college archives, and there is less information on this interesting subject than one could have wished. It is on record that Neville's architect for the new work in the main quadrangle was Ralph Symons, whose portrait in Emmanuel College is inscribed as "Edifices Rudolphi Symons, architecti sua matre peritissimi," "the most skilled architect of his time," so that it is evident that Neville did not think, like some building benefactors of our own day, that because he paid the money, and was master of the situation, he was to be "his own architect," but that, on the contrary, he employed the assistance of the man who was considered the best architect available. It is presumed that Symons designed the first portions of Neville's Court also, which consisted of the north and south wings, the library block being later. If so, the style of the building, as compared with that of the same architect's work in the great quadrangle, is a curious illustration of the change which was then quickly, though probably almost insensibly to those affected by it, coming over the face of English architecture. The accompanying engraving, reproduced by permission from the book, shows on the left side the original design for the Neville's Court buildings, the upper portion retaining Gothic feeling and detail, the lower showing the inroad of the Renaissance; the fact of the upper portion being finished Gothic while the ground story is Renaissance forming the oddest point in the transformation, as if the architect's remaining Gothic sympathies had returned upon him as the building went up. The right-hand portion of the drawing shows the Classicising of the upper portion in 1756, as now existing, and probably affording much healthier and more convenient rooms. The stone for the original building appears to have been badly selected, for the alterations by Essex in 1756

were first projected in consequence of the great decay of the stonework, on the north side especially, and the walls facing the quadrangle were, in fact, entirely rebuilt, with new stone where required for the caps, bases, and window dressings.

The library block which now forms the west side of Neville's Court is, as is well known, Wren's design, and a most interesting letter is given, unsigned, but as Mr. Clark says, from "internal evidence," obviously Wren's, on the reasons which governed the arrangement of the design. The following extract is worth giving:—

"I chose a double order rather than a single, because a single order must either have been mutilated in its members, or have been very expensive, and if performed would not have agreed with the lowliness of the porches, which would have been too dark, and the solids too grosse for the openings. I have given the appearance of arches as the Order required fair and lofty; but I have laid the floor of the Library upon the impostes, which

The same Ralph Symons, who has been spoken of as having been largely employed in the building of Trinity College, comes before us again in the history of St. John's College, where he was concerned in the design of the second court, and there is appended a facsimile of a curious specimen of architectural drawing of the period, the coloured elevation of a portion of the gateway and of the college buildings as prepared by Symons,—a drawing showing the elevation of a red brick building with a diagonal "check," so to speak, of grey bricks, and a roof tinted yellow, to indicate the tone of "Collyweston rag"; the most astonishing Broddingnagian finials are sketched in on the points of the dormers, and the whole is curiously illustrative of the naïf style of the architectural drawing of the period. Absurd as this elevation looks in chromolithography, however, in the rude style in which it was originally drawn, the buildings erected from it were not without



Original Design of Neville's Court.

Design as Modified by Essex in 1756.

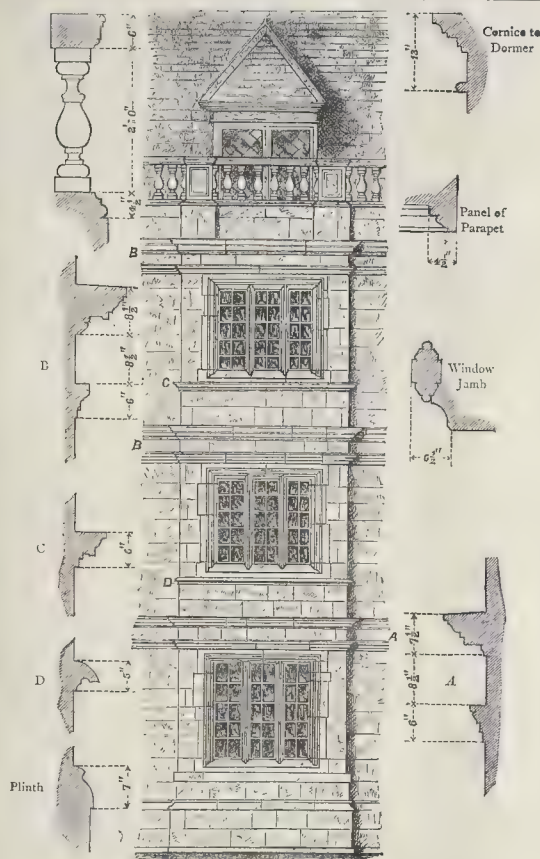
answer to the pillars in the cloister and the levels of the old floors, and have filled the arches with relieves of stone, of which I have seen the effect abroad in good building, and I assure you where porches are low, with flat ceilings, is infinitely more graceful than low arches would be, and is much more open and pleasant, nor need the mason fear the performance, because the arch discharges the weight, and I shall direct him in a firm manner of executing the designs. By this contrivance the windows of the Library rise high, and give place for the desks against the walls, and, being high, may be afforded to be large, and, being wide, may have stone mullions and the glass painted, which, after all inventions, is the only durable way in our climate for a public building, where care must be had that snow drive not in."

Wren, who gave his design entirely as a matter of friendship, adds, "I suppose you have good masons, how ever I would willingly take a farther pains to give all the mouldings in great. We are scrupulous in small matters and you must pardon us; the Architects are as great pedants as Critics or Heralds."

"By 'the mason,' Wren means the sculptor; so unpretending was our phraseology in those days,

quiet picturesqueness of their own, such a drawing certainly does not give much hint of. The details given about the execution of these plans and elevations, which were, in fact, signed contract drawings, are of some interest. The plans are drawn to a scale of the sixteenth of an inch to a foot, not quite precisely, but the principal measurements figured; in the representation of the walls the red brickwork is rubbed in with red chalk, and the ground crossing lines shown with pencil. The plans are drawn in outline, the preliminary lines being drawn, not with pencil, but by indenting them on the paper with a point.

The Chapel of Jesus College, the best piece of Medieval work in Cambridge, receives full illustration, though there is a slip, we observe in the title of the perspective view of the piscina (vol. ii., p. 136), which is erroneously entitled "Piscina, St. John's College Chapel," but as it occurs in the chapter on Jesus College the error pretty well explains itself. A measured elevation of the south wall of the



Clare Hall: Bay of West Range (East Side.)

chancel is given, and large size sections of the mouldings, also comparative plans of the four crossing piers, with notes by Willis of peculiarities, some of which have been obliterated by alterations since he wrote.

Among the colleges, none is more characteristic of Cambridge University architecture than Clare, which always struck us as presenting a peculiarly pleasing picture as seen across the lawn from the back of King's; and we are glad to find that Willis shared our predilections in this respect. When he lectured, as aforesaid, before the Architectural Congress in 1860, he described Clare as "one of the most beautiful buildings, from its situation and general outline, that he could point out in the University. It had a homogeneous appearance, more like a palace than a college"; but in spite of this unity of effect, it appears that it was by no means a design made and carried out at one time by one man, but was built piecemeal at periods, though not very distant, yet separated from each other by no less an event than the Parliamentary war, in which time the materials then collected for a portion of the rebuilding were seized for the behoof of the Parliamentary party, to strengthen the fortifications of Cambridge Castle, for which raid the college appears to have obtained some indemnity from Cromwell, after he was in the saddle. We give the engraving of one bay of the west range of Clare Hall, east side, as a reminder of the simple, dignified, and appropriate style of the architecture of this college. This portion was commenced about the beginning of 1640, or, at least, the west range first appears in the accounts at that time. The building of the whole quadrangle extended over a period of seventy-six years, and a curious instance is noted of the inexorable

influence of the changes of fashion in architecture. "The last portion of the building included the north half of the river front, which in design is a copy of the south. But during the interval between the building of the two halves the crossed mullion had been succeeded by the sash. The new windows were accordingly not only fitted with sashes, but mullions and transoms were cut out of the earlier portion. This is evident by inspection, for the jambs of these windows retain the marks of the insertion of the original transoms of the south half of the front, and on the north have never been fitted with them." There are many other such instances to be found in Cambridge, as, indeed, we have already noticed, of the almost insensible changes of architectural feeling and habit during the very progress of the building.

We must reluctantly quit this most interesting work, about which we would willingly linger even longer. We have merely given the reader a kind of hint of the amount of archaeological and architectural information it contains, and which gains an additional associated value through being clustered round the history of a place the name of which has been dear to a large proportion of educated English men for many generations past.

East Grinstead.—On the 20th inst. Mr. Thomas Codrington, M.Inst.C.E., Local Government Board Inspector, held an inquiry at East Grinstead into a proposal of the Urban Sanitary authority to raise a loan for the extension of the sewerage works to some outlying districts. Mr. Urban Smith, of the firm of Messrs. Smith & Austin, the Board's engineers, attended and explained the proposed scheme. There was no opposition to the loan

NOTES.



regret to learn that the Manchester Ship Canal has sustained a severe rebuff at the very outset of its career, sufficient money not having been subscribed to enable the construction (according to the Act of Parliament) to be proceeded with. The directors have, therefore, withdrawn the issue for the present. It was to be expected, perhaps, that Liverpool should be dead against it, and also some of the railways that serve that part of Lancashire, although, on the other hand, these very lines would have considerably benefited by the carriage of materials for the new canal. London, however, is equally apathetic, and the inference is that the time is not favourable for the introduction of any great speculative undertaking. A regrettable feature at the present moment is that a large amount of congested labour would have been relieved by the immediate employment of 20,000 men, while, in all probability, local enterprise would have been stimulated. We think, too, that a very wholesome check would have been given to the monopoly of the railways, which, by practically abolishing water carriage, except as an adjunct to their own systems, have done much injury to inland trade by preventing competition, which would have effectually dealt with the prohibitory and arbitrary rates now so prevalent. If a vigorous effort could be made by capitalists and manufacturers to resuscitate the canal system, all parties would be gainers, and English producers would be able to fight those of Belgium and Germany on more equal terms.

It is satisfactory to note that the opinion of the Birmingham Town Council in the selection of the Law Courts designs appears to have been practically unanimous, and the *Birmingham Daily Post*, in a judicious leader in its issue of Wednesday, expresses satisfaction with the result, and observes that points that are objected to in the plan are capable, if necessary, of modification; that "it would be an unexampled event if an architect, in planning a building of this kind, succeeded in putting on paper every particular exactly as his clients desired;" and that it is a cause of satisfaction that the result has given the town something more than a mere "plain and useful" building. The *Birmingham Gazette* of the same date hoists the townsman's flag very decidedly, and dwells on the greater satisfaction which would have been felt if a Birmingham architect had been selected. This is natural enough; but then the Birmingham architects should do better things. The particular design named by the *Gazette* is certainly, as far as design goes, the least meritorious of the five, nor can we for our part discover what are the merits in the plan sufficient to warrant its being placed third in the list. Apart from this particular case, the unfortunate fact is that native talent and native taste in architecture are not in the main at a high level in Birmingham, which in this respect compares unfavourably with any other of the English provincial towns of the same importance. The great block of the Municipal Buildings is in itself enough to weigh the scale against Birmingham very heavily. There are few recent instances of buildings of such a size and costliness so devoid of architectural genius or interest.

THE completion and opening in the near future of two light railways in Ireland comes at a favourable time, when we have reason to hope that the attention of the public and the new Government will be directed towards the establishment of an industrial policy in that unhappy country. We have long held that the ultimate solution of the Irish question lies in the recognition of the fact that the difficulty is one of an economic rather than of a political nature; for, after all possible resources of party legislation are exhausted, no contentment or settled disposition can there be if material prosperity does not exist as well. Among the many urgent economical requirements for Ireland, one of

the most important is cheap and easy communication, the present system of railways being on too heavy and cumbersome a scale to serve properly districts which are deficient in manufacturing population. The lines which will shortly be opened are of a 3-ft. gauge, and have cost only 4,000l. per mile. One of these, the West Carbery, in Co. Kildare, is fifteen miles in length, part of it being a tramway; the other, the Cavan, Leitrim, and Roscommon, is forty-nine miles long (fifteen and a half being tramway), and connects the Midland Great Western with the Great Northern of Ireland, filling up a considerable gap hitherto without any accommodation at all. Both these light railways have been constructed under the Act of 1863, and are granted the full rate of guarantee authorised by that Act, viz., 5 per cent per annum, towards which the Imperial Treasury contributes 2 per cent. We trust that the day will come when this inexpensive system will be spread like a net throughout the land, and especially on the west coast, where the carriage of fish alone to England should prove a mine of wealth.

THE proxy question is one which, though small in itself, is of a good deal of importance in regard to the management of public companies. Mr. Justice Kay has held that it is illegal to issue stamped proxies. This is done constantly, and it is one of the reasons why directors so often get their own way in opposition to the wishes of the really thoughtful and independent shareholders. There are many persons who know little about the management of a company who will sign a stamped proxy, to contain which a stamped envelope is also sent, but will not take the trouble to get a proxy stamped and to address an envelope. If a step is put to the present practice it will be of service to independent shareholders. If shareholders as a body took more thought as to the management of concerns in which they are interested, it would be better for all parties, and it is certain that proxies should not be given in the careless and haphazard manner which is now so common.

IT is one thing to obtain leave from the Court of Chancery to sell a mansion-house under the Settled Land Act; it is quite another to find a purchaser. Practically, the Houghton estates, of which a good deal has been heard lately, exemplify this, for the property, except about 5,000l. worth of small houses and pieces of land, was unsold. It does not, however, show that property is unsaleable, but that it is so at anything like remunerative prices. The effect of the Settled Land Act will thus be not only to enable settled land to be sold, but to lower the general sale value of land by throwing large properties on the market. While, therefore, the effect of this Act on English law is great, its influence on the value of property may be greater still.

PERHAPS there is no staple trade amongst all the British manufacturing industries which has shown a more continuous progress in the path of improvement than that of steel. The latest invention which is now before the public is one patented by Mr. G. F. Simonds for the forging of certain kinds of metal articles in one heating instead of several, as has hitherto been the mode of operation. This treatment is more especially adapted to circular objects, or those which are approximately circular in cross-section, such as balls for ball-bearings, spindles for textile machinery, railway-carriage axles, screw blanks, handles, &c. Not only is there naturally a great saving of expense in the doing away with so many heatings, but there is also a great gain in quality, for frequent re-heatings are apt to impair the steel; while, in the case of projectiles (the era of universal peace not having yet set in) there is considerable increase in the penetrating power. Balls (or bearings) are made harder, denser, and much more accurate than formerly, being, in fact, as nearly as possible perfect spheres.

SOME eminent sanitary experts have asserted that no smell, injurious to health or otherwise, arises from what is known as "compressed sludge." But the Chiswick Local Board, which is generally supposed to have in operation precipitation sewage works with all the latest improvements, seem likely to get into trouble over the accumulations of compressed sludge at its outfall works on the bank of the Thames. About two years ago, Messrs. Thorneycroft & Co., the torpedo-boat makers, adjoining the Chiswick pumping-station, obtained an injunction in the Court of Chancery restraining the Chiswick Local Board from continuing what was then alleged to be a nuisance arising from offensive and injurious smells emanating from the crude sludge which was allowed to accumulate in pits at these works. The Chiswick Board then made several improvements on their works, including the introduction of machinery for the compression of the crude sludge into dry portable innocuous cakes. The Chiswick Board was advised by well-known sanitary authorities that this compression of the objectionable sludge would put a stop to all offensive or injurious smells. Notwithstanding, Messrs. Thorneycroft & Co. have again warned the Chiswick Board that the accumulation of sludge, even in its compressed form, is creating a nuisance, and again threaten legal proceedings. The Chiswick Surveyor has been instructed meantime to cover the sludge over with earth, and to make arrangements for its removal from the works in barges.

M. LECHARTIER has been investigating the nature and cause of action of magnesia in structures built with cement, such as reservoirs, dams, and retaining walls, either exposed to air or water, all these structures having been built by competent engineers in different localities. The cements examined did not contain sulphate of lime in a harmful proportion; they had a proper density, and the sands used were of a good description. Nevertheless, in all cases the effects were the same, a slow destruction of the cement going on with time. The explanation of the facts arrived at by M. Lechartier is that the cements employed were really mixtures of Portland cement with magnesia, which behaved at first as an inert substance; but, little by little, the magnesia became hydrated, producing expansion of the mortar and deterioration of the works. Sainte-Claire Deville has shown that pure magnesia, without admixture of silica and alumina, can combine with water to form a hydrate of great hardness, but the formation is accompanied by increase of volume. Portland cement alone contains but a small proportion of magnesia. M. Lechartier observed that the increase of volume of the mortars takes place more rapidly when the water gains access more readily to the mass. Hence the basins of fountains, reservoir walls, &c., are affected in a comparatively short time.

THE Architectural Association Excursion, which will commence on the 9th and terminate on the 14th of August, will be made in Kent. The district, in comparison with those covered by former excursions, is rather richer in Domestic work, the most important houses to be visited being Penshurst Place, fourteenth, fifteenth, and sixteenth century work; Hever Castle, sixteenth century; Cobham, sixteenth and seventeenth century; Leeds Castle, thirteenth, fourteenth, and fifteenth century; Ightham Mote, fourteenth, fifteenth, and sixteenth century; Boughton Place, sixteenth century; the Bishop's Palace, Maidstone, fourteenth century; Restoration House, sixteenth century; East Gate House, sixteenth century; The Friars, thirteenth and seventeenth century. The ruins of Allington Castle, Tunbridge Castle, and Leybourne Castle all contain some architectural features worth examination. The villages of Aylesford, Birling, Cobham, Ightham, Larkfield, and Leeds are all picturesque, and contain many charming studies for the brush and pencil. The principal ecclesiastical buildings are Rochester Cathedral, the churches of Aylesford, Birling, Chiddingstone, Cobham,

Hollingbourne, Ightham, Leeds, Leybourne, Maidstone, East Malling, and Wrotham, and the Abbey remains at Town Malling.

THE *English Illustrated Magazine* for August gives a good article on Chester and its picturesque interest, by Mr. Alfred Rimmer, illustrated with sketches by Mr. H. Raiton. These are effective and well reproduced, but not quite accurate in detail always. For instance, in one view of a portion of the cathedral the centre tower, shown in the middle distance, is drawn with angle turrets showing the present character of termination, but with the low proportions of the old turrets before the restoration. It certainly looks better as drawn, only the representation is at variance with the facts; the great mistake in the restoration work having been the destruction of the former expression of the tower by raising abnormally high and narrow angle turrets.

THE ladies' monument to Professor Fawcett, in the Embankment Gardens, designed by Mr. Basil Champneys and executed by Mr. Frampton, includes an alto-relief bronze head of Fawcett in a circular medallion, in the centre of an architectural frame-work of bronze with some decorative details very nicely modelled. The head is a fair likeness, but seems to us more imaginative and less practical in expression and character than that of the man himself. The defect in Fawcett's countenance (and perhaps in his nature) was a certain hardness, and what might be called an unsympathetic element; it was an eminently political countenance, and in the side view the bust makes it look less political than poetical, which certainly was not Fawcett's character either outwardly or inwardly. Beneath the bronze panel is a fountain basin of polished granite, and the whole is affixed to a large architectural background of unpolished granite. The combination of this with the bronze is very good in general effect, but we feel an objection both to the niches at the side, which have no apparent object, and to the bits of bronze garlands or fillets affixed to the granite over them, which have a patched-up and rather trivial appearance.

THE Archaeological Society at Athens is preparing an energetic campaign for next autumn and winter. The excavations at Mycenæ left in part incomplete by Dr. Schliemann are to be resumed on the same plan by Dr. Tzountas, and at Epidaurus Dr. Stais is to carry on the work which yielded some time back such rich results under Dr. Kabbadias. These results, though from many points of view they were specially noteworthy, have not received from the archaeological world in general the attention they deserve, probably from the fact that they were published in the little known *Εφημερίς αρχαιολογική*. We may remind our readers that the sculptures already found belonged presumably to the east and west pediments of the great Temple of Æsculapius at Epidaurus. They consist mainly of torsos and fragmentary heads of Amazons, Greeks, and Centaurs. The subject of the battle between Greeks and Centaurs was specially appropriate to a Temple of Æsculapius, as the god learned his first skill in medicine from the old Centaur Cheiron. From the fragmentary state of the sculptures there is every reason to suppose that much remains still for Dr. Stais to discover, and we may hope also for a rich find of votive offerings, inscriptions, &c., like that which rewarded the excavators of the Asclepieion at Athens.

IN the *Art Journal* for August Mr. Leland's interesting and well-illustrated articles on modelling in clay are continued, and Mr. J. Bevington Atkinson contributes some notes on Bergamo in connexion with Colleoni, the hero of the famous equestrian statue. This is illustrated by views of two palaces and of the apse of Santa Maria Maggiore at Bergamo, the latter a powerful and effective little engraving.

WE have received a report of the Fulham Vestry Hall Committee, apparently on the results of their new competition, and their judgment on the designs they have now selected for consideration, but without giving the names of the competitors. All we have to say to the Vestry is that the whole matter has been highly discreditable to them, and that their conduct of the competition involves a gross injustice towards the competitors first selected.

THE TREASURY HOUSE IN THE TOWER.

FROM the blanchéd stones of the Conqueror's *Ars Palatina*,—whose brilliant annals of magnificence and chivalry are so often blackened by tales of suffering and crime,—nearly nine centuries look down in proud silence upon the fantastic tricks that just now are being played at its base. For our readers will recollect how Mr. Shaw-Lefevre, when in authority as First Commissioner of Her Majesty's Works and Public Buildings, devised a very pretty and expensive game of nine-pins at the Tower of London. The game proved to be a long one,—nor, indeed, is it yet finished,—there was an interlude by way of a quasi-aquatic garden party; just the kind of thing for our Indian and Colonial visitors, who had been *en evidence* at that time. The guests comprised several Members of Parliament, who came by water from the more ancient palace on the same riverside. The majority of the visitors doubtlessly were duly impressed in being entertained on the site of a once royal palace, and becomingly applauded a fanciful project for rebuilding some certain portions of that palace anew. A few, we can conceive, who could rightly estimate what was going on, must have felt a just apprehension that such crotchety proceedings savoured to no small degree of the zeal that overruns discretion.

Briefly stated, the scheme would appear to be as follows. To reconstruct so much of the ancient lines of defence as lay along the southern ballium of the Tower Inner Ward. It is necessary to explain that the Inner Ward, occupying about one-fifth of the entire *enceinte*, stood to the south and east of the central keep. It had been set apart, according to custom, as a residence for the castle lord and his suite. Here, too, the Court of King's Bench formerly sat: that of Common Pleas in the Outer Ward. With Broad-Arrow Tower at its north-eastern corner, it had for its two northern salient points the long since demolished Cole or Cold Harbour (west) and Wardrobe (east) Towers. The former of these stood just north of the now garrison main guard-house, being similar in plan to the existing Middle and Byeward Towers, having two drum towers flanking a gateway. Wardrobe Tower, cylindrical in shape, figures, together with Cold Harbour, in a survey of 1553. From these project southwards two curtains to Hall (since Wakefield or Record) and Julius Cæsar's (Salt-petre or Salt) Towers. These latter, again, were connected by two revetments that met about midway, and inclined at an angle of say 150 degrees at Lanthorn Tower. Immediately southwards of the White Tower, and adjoining thereto, was the castellated Jewel House, an early strong home of the regalia which about sixteen years ago was removed into Wakefield Tower. Next south of this lay, east and west, the King's Hall or Banqueting House, dating from a time anterior to that of the festivities which were held therein to celebrate the nuptials of Eleanor of Provence with Henry III. An elevation of the Hall may be seen in one of the earliest known views of the Tower. In the British Museum is preserved a poem written here by Charles, Duke of Orleans, who, taken prisoner at Agincourt, was regally incarcerated by King Henry V. The MS. is illuminated with a picture representing the royal captive as engaged upon his work in the White Tower, and shows in defiance of all trammels of perspective the four side-windows of the Hall. The palace apartments next eastwards of Hall Tower were assigned to the sovereign.—Lanthorn Tower serving for his private bedchamber and closet; and here Henry III. painted his own chamber with Antiochus's story. Between Lanthorn and Salt Towers was the Queen's Gallery, abutting upon or replacing the embattled curtain. This, together with the outer Privy Garden that extended to Cradle and Well Towers, clearly

appears in W. Haiward and J. Gascoyne's plan of 1597. The Queen's Buildings ranged northwards up the steeply-rising ground towards Wardrobe Tower. In King Henry's minute survey of 1532, Lanthorn is styled New Tower, and the now Wakefield as "the tower where the king's records lie." In the survey of 1537 the Great Hall is already marked as "decayed." As a matter of fact this Palace of our Angevin and Plantagenet kings fell into disuse and neglect in Queen Elizabeth's reign. Either she or her successor upon the throne removed the Great Hall altogether. Other demolitions followed. Cromwell did much in this direction: James II. did more. Ultimately the whole area was taken for ordnance and store offices. Having suffered by fire in 1788, Lanthorn Tower was finally razed to the ground in the ensuing year. It has lately been re-edified, and upon its pristine foundations. Amongst the foundations of the Ordnance Stores as now laid bare are clearly to be seen those, in stone, of the earlier structures. An exterior plinth facing southwards can be plainly traced for some distance, and in exact alignment with the course of the former curtain wall. Here, too, should be noticed, nearly opposite to the new gateway which is being pierced through the Outer Ward ballium, a beautifully-laid course of flint upon a massive fragment of the older masonry.

As we have previously shown,* there remain voluminous official records of the constant and costly repairs which, for a long period, were executed in these and other parts (including the Mint) of the Tower. Nevertheless, it is a singular circumstance that as regards the earlier records, one of the very few entries which can be localised with precision relates to Wakefield Tower, and to the predecessor of the structure with which we are here more particularly concerned. The Liberate Roll has an entry under date March 2nd, 1238, 22 Hen. III., which is thus repeated in the corresponding Pipe Roll:—"Et in cameris Regis in turri Lond. reparandis et chemine Cameri Regine perficiendis et uno spiro de bordis bono et decenti faciendi inter cameram et capellam nove turris eiusdem turris prope aulam Regis versus tamisiam, xvi. li., iij. s., viij. d. per breve." &c. The new turret here mentioned is Wakefield Tower, and its chapel is the recess that was used as an oratory,—the same recess wherein was found the body of Henry VI., and of which we shall again speak below.

For a space of 600 years the kings of England used their citadel as a refuge when in awe of, or actually at war with, their subjects; when in ease or in triumph as a home and a prison. But whilst always a fortress, the Tower possessed another character which is recalled to us by the quarters that still represent the Irish Mint, and the building next to Wakefield Tower, which is in course of being destroyed. The establishment of the coinage within the Tower precincts is supposed to date from Edward I.'s reign. There the Mint remained until the beginning of this century, the machinery being still employed which had been set up in the year 1663. The Appropriation Act of the 22nd of July, 1806, provided for the erection of a new Mint, with improved machinery, on the new site at Little Tower-hill. According to Gwynne's plan, 1766, that was the site of the old Victualling Offices, since converted into the Government Tobacco Warehouses. Martin or Jewel Tower (*antique* Brick or Barbridge Tower, Survey 1532) had long been a residence for the Keeper of the Crown Jewels. The regalia would appear to have been sent here in 1253, and the Royal Treasury to have been finally settled here by King Henry III. But it is to be noted that whilst the regalia and treasure were originally deposited in New Temple, King John kept some of his money at the Tower; he sent 4,000 marks thither in 1212. Three years later the Bishop of Winchester was his treasurer at the Tower. In 1218, de Fawkenburgh being treasurer, the treasure and royal jewels were stored at both these places. From the Kalendar of the Exchequer, vol. iii., we find 14 Edward III. certain jewels described as being "en la Blanche Tour deinz la tour de Londres." Again, 18 Edward III. are cited "Claves interioris camere juxta aulam nigram in Turro Lond' ubi jocalia Regis privata reponuntur"; and under 30 *idem* we hear of the "Tresorie

deinz la hante Toure de Londres." Mr. G. T. Clarke has surmised there were in later days two strong-places; for he quotes * an entry of 20 James I., "His Majesty's Secret Jewel House in the Tower." The jewels were taken from the Jewel House beside the White Tower into the Martin Tower circa 1645. The later Jewel House was then built for their safer custody; they have since been deposited in Wakefield Tower. It would seem though that the Treasury House took its name from some purposes connected with the Mint. It is mentioned by name, and on this spot, in Lord Dartmouth's survey made between 1681 and 1689. It is prefigured also in C. Lemprère's plan of 1726, as engraved by J. Baire, and published by the Society of Antiquaries January 1, 1815. But the present fabric, being of brick, cased with flint, rubble, and squared stones, and having windows with stone mullions, quoins, and vousoirs, bears a date 1737. There are two rooms on each floor; on the first floor is a doorway, now blocked up, giving access to Wakefield Tower. The passage communicates with the oratory already mentioned, and which, illuminated by a modern three-light window, is made in the thickness of the wall. The oratory may be identified by visitors as being the recess in Wakefield Tower wherein are displayed the insignia of the Order of the Thistle. When this latter served as a storehouse for the Records a part of the papers were kept in the Treasury House, which was fitted up with shelves and cupboards for that purpose. The upper floors, originally two in number, are gained by a novel staircase. In the Crowle Pennant are some interesting water-colours by C. Tomkins (1801) of this and Wakefield Tower in their character of depositories for the Records. In his view, taken from the south, of the Treasury House the legend "Record Office" is inscribed beneath the royal coat of arms, bearing Queen Elizabeth's motto "Semper Eadem," yet above the door. We understand that the doorway, together with its heraldic achievement, will be preserved for a while *in situ*. The present third floor, altogether of brick, but with windows corresponding to those beneath, has been added since the date of C. Tomkins's picture. A little door at the top opens on to the roof of Wakefield Tower, whence another doorway communicates with Garden, popularly known as Bloody, Tower; and so on to Raleigh's Walk and the Queen's House beyond.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION.

THE annual meetings of this Association having been held for many years in the southern or western portions of the country, it was determined this year to hold the congress in some northern district. An invitation having been received from the Mayor and Corporation of Darlington, it was accordingly resolved to hold the meeting in that town. Its advantages as a centre for the many objects of interest in the locality cannot be overrated, and consequently a very attractive programme of places to be visited has been prepared by the local committees, Mr. J. P. Pritchett being honorary local secretary for the district around the town, and the Rev. Dr. Hooppell for that around Bishop Auckland, which will be visited by the Association.

Monday, July 26th.—A large number of members assembled at Darlington to-day to commence the proceedings. Unfortunately the weather was most unpropitious, the rain falling heavily, from early morning until the day came to a close, without cessation. The programme, however, was adhered to, visits being made in the course of the morning to the curious churches at Haughton-le-Skerne and Aycliffe. The former is a building of early foundation, having a western tower of very plain workmanship with Early Norman features; the latter possesses several curious fragments of Saxon crosses. The objects of interest in both these buildings were pointed out by Mr. Hylton Longstaffe. After a necessary interval of rest due to the inclemency of the weather, the members and their friends in greatly increased numbers assembled at four o'clock in the reference-room of the Darlington Free Library, which has been kindly placed at the service of the

* The Builder, December 30, 1882, and January 6, 1883.

† This must not be confounded with St. Martin's, near Middle Tower, or with the present Brick Tower.

* Paper on the "Military Architecture of the Tower," read July, 1886, at a Congress of the Archaeological Institute of Great Britain and Ireland.

Association by the local authorities. The reception by the Mayor and Corporation to inaugurate the meeting was then proceeded with, the Mayor cordially bidding the members a hearty welcome to Darlington.

The President of the Congress, the Bishop of Durham, then delivered his inaugural address, of which the following includes the parts most directly referring to architectural study:— I know no part of the country where there are more objects of interest for the archaeologist than the county of Durham and its immediate neighbourhood—the area which you have undertaken to explore this year. Moreover, it has a special attraction for the antiquary, in the fact that the earliest ages yield the richest harvest. These northern counties had no small hand in the making of England. The ancient kingdom of Northumbria was for some generations the focus of light and learning; the centre of civilisation and order in this island. The present county and diocese of Durham is the nucleus of the old Northumbrian kingdom. Following the practice of several of my predecessors, I shall adopt a rough chronological order in the few remarks which I have to make. You must forgive me, however, if I say nothing of primeval man; nothing of the earliest race which inhabited what is now England.

I shall be content to take the Roman occupation as my starting-point. Now, I consider that the archaeological remains are especially eloquent here. It is a recognised maxim in political economy that the most valuable legends of economic science are to be learned on the frontier of cultivation. The corresponding rule seems to hold with the history of races and empires. If you would appreciate the true greatness of England, and of the English race, you should go not to Manchester, or Liverpool, or Glasgow, not even the great Metropolis itself, but to India, Australia, and America for its most striking manifestations. In like manner, Roman greatness is best measured and appreciated on the Roman frontier. When we consider what recent scientific discovery and invention have done for ourselves, how largely we are indebted to steam and electricity, and how crippled we should feel ourselves if we were restricted once more to the means of travel and communication which satisfied our great grandfathers we shall be filled with admiration at the achievements of the Romans seventeen centuries earlier in the remote provinces of the Empire, distant hundreds and even thousands of miles from the centre of government. Hadrian's Wall, through great tracts, traverses very sparsely-inhabited country districts with only here and there a homestead at wide intervals. But the remains show that in the time of the Roman occupation it must have gathered about it, throughout its whole length, a larger and varied population, very much larger than has inhabited the district at any time since, and that this population was furnished with all the chief appliances of Roman civilisation.

We claim it not the least merit of archaeology that it counterbalances the vagaries and redresses the injustices of literature. Probably there were no two sovereigns to whom Rome owed so great obligations, none who did so much to preserve her from early decay, as Hadrian and Antoninus Pius. To both these great emperors literature has been cruelly unjust. The historical record of these two long and illustrious reigns,—of the former more especially,—is miserably scanty; yet their fame is written across this island, from sea to sea, in imperishable characters of stone.

The Roman Wall is a speaking monument to the policy of Hadrian. Of this wall itself I need say nothing. I believe that it is your intention to visit it, and full justice has been done to the subject by an eminent local antiquary. But the proximity of this Roman wall has scored Durham with roads and dotted it with stations. Thus Watling-street,—our Watling-street,—enters Durham at Pierce-bridge, where it is traceable in the modern road for miles, straight as an arrow, and traverses the whole country from south to north in three giant strides, each footprint being marked by a Roman camp,—Binchester, Lanchester, Ebchester. All these three stations are full of interest, and all would repay investigation, if you had the time. The first of them I see you intend to visit, and you will be in safe hands there also. Another great road, beginning at St. David's, and passing through Birmingham and York, entered the county of

Durham (probably at Pountney Bridge), and crossing the Wear, terminated in the North at the Tyne. But these two main arteries by no means exhausted the road system of the Romans in this county. Local names in abundance testify to this fact. Chester-le-Street, Stainton, and Leamside may serve as examples of many such names which indicate the Roman occupation.

But I must not delay longer on the first epoch. The Roman occupation ceased early in the fifth century. The native British were not permitted to build unmolested on the foundations of Roman civilisation. A whirlwind and a deluge of foreign invasion swept over the land, carrying everything before it. Hence there is an absolute discontinuity between the Roman and the Saxon era. It is in this second,—the Saxon,—epoch that we boast our possession of antiquarian treasures such as no other county in England can show. When I spoke of Northumbria as the chief agent in the making of England, it was to the beginning of this period that I especially referred. The light which afterwards spread over Europe through Alcuin, and ushered in the dawn of a new civilisation, was kindled in Northumbria by Hilda and Benedict Biscop and Bede from the spark transmitted from Iona. The remains of the twin monasteries of Benedict Biscop, St. Peter, Monkwearmouth, and St. Paul's, Jarrow, still exist, "plain for all folk to see."

The scepticism as to any genuine remains of Saxon architecture, by which former generations of archaeologists sought to compensate for hasty and over-sanguine theories in other directions, has passed away. Few, if any, will doubt that we now have at both these places remains of the original structures, and, happily, these are dated edifices. The actual dedication-stone of Jarrow, the younger of the two by about ten years, is extant. It declares that the Church of St. Paul, on the 9th of the Kalends of May (April 24), in the fifteenth year of Eofrid the King, and in the fourth of Ceolfrid the Abbot, and under God's guidance, the founder of the said church, i.e. A.D. 684. The remarkable fact is that, though the Romans were so eminent as builders, they left no disciples behind them in these parts. The twin churches of St. Peter and St. Paul were modest and humble structures indeed, compared with the mighty piles reared for civil and military purposes by the Romans. Yet Benedict Biscop was obliged to import masons from the Continent to erect them, as afterwards he imported glaziers to fill the windows. The language in which Bede describes this incident is highly instructive to the antiquary. Benedict Biscop, he tells us, brought from France, "*Cementarios qui lapideam sibi ecclesiam juxta Romanorum quem semper amabat, morem facerent*,"—masons who should erect a stone church after the manner of the Romans, which he always loved. Thus the incident marks an epoch, and the notice which records it has both a retrospective and a prospective reference. As retrospective, it shows that the churches hitherto built in these parts were wooden structures, as we know to have been the case with the earliest, Lindisfarne Church, built by St. Finan, about twenty years earlier, "entirely of hewn oak and thatched with reeds." This early style Bede calls the Scottish, i.e. the Irish, which is thus distinguished from the Roman. As prospective, the notice points forward to a great future for the architectural style thus initiated in England, for here in these twin churches of Benedict Biscop, as Dr. Freeman has reminded us, we have the primitive Romanesque, the first beginning of that modification of Roman architecture, with its typical circular arch, which, in its later English form, is commonly called Norman. But, prospectively, this incident is significant not only to the antiquary and the architect, but to the ecclesiastical historian as well. The twin monasteries of St. Peter and St. Paul were named after the two great Basilicas of the city of Rome. Benedict Biscop paid several visits to Rome in connexion with their building. The style of architecture was Roman. This was the first intermingling,—momentous in its consequences,—of two separate streams of Christian teaching and influence in the Northumbrian Church.

A third building, which ranks at least as high as these in architectural interest, is the ancient Saxon church of Escomb, to which also a visit is projected. I said deliberately "architectural" interest, for, unlike Monkwearmouth and Jarrow, it is absolutely without a history. Parly for

this reason, and partly owing to its somewhat retired situation, its true character remained unrecognised till a very few years ago. It will interest you, perhaps, to hear that the other day I stumbled on a report made by a rural dean to my predecessor, in which he states that the old church is "in a sad state of decay, and would be better removed, if it could be done." Happily it escaped demolition. The solidity of the masonry would have rendered this a very difficult task; and, meanwhile, its venerable age has been recognised. It has since been carefully repaired, and is safe henceforward. An eminent archaeologist has truly described it as "a church Saxon from end to end." Unlike the twin churches of Benedict Biscop, its pristine character has not been obscured by any later changes or additions. So far as I am entitled to form an opinion, I see no reason why it should not be of nearly the same antiquity. About a quarter of a century after the building of the Jarrow church, Naiton, the Pictish king, wrote to request Ceolfrid, the abbot of the two monasteries, to send him builders (architects) that they might build among his own people a church of stone after the manner of the Romans, and these builders accordingly were sent. It is clear, then, that Benedict Biscop had reared a school of experienced masons, and we cannot doubt that their services would be in requisition in his own neighbourhood between the Tyne and the Tees. The remaining church of Escomb, therefore, may be regarded as only one example of several such buildings which once were standing in the county of Durham. If it had been demolished thirty years ago no record at all would have remained of this exceptionally important specimen of its age and style. But this structure is highly interesting from another point of view. It is built entirely of Roman stones conveyed thither from the neighbouring Roman station of Vinovia. An inscribed stone with the letters *LEG. VI.* (the legion which had its headquarters at York), turned upside down, is a sermon in itself. I delight to regard it as emblematic of the attitude which the Christian Church held towards the preceding Roman civilisation,—at once incorporating it and overthrowing it.

I have now arrived at the Norman period, and how can I do otherwise than take you up to once to Durham? If Monkwearmouth and Jarrow and Escomb have shown you the beginnings of English Romanesque, here, at a distance of a few miles, you have its climax and latest efforts. Durham exhibits a complete series of Norman work in its most typical and splendid forms. The series commences with the chapel in the castle, and it ends with the Galilee of Pudsey. The first reminds us in its rude sculptures of Saxon work: the last is already on the very verge of Early Pointed. Of Durham Cathedral I am afraid to speak, lest I should appear to exaggerate. Taking into account not the building only, but its surroundings, I venture to think that it has no rival at home or abroad,—a splendid architectural jewel in a perfect natural setting.

The Monastery of Durham is another point to which I desire to direct your attention. The cathedrals of the old foundation were, as you know, the homes of corporations of secular priests. The cathedrals of the new, or Henry VIII.'s foundation, were monastic institutions, the homes of regular clergy. Now, it seems to me that the most perfect type of the former, for the study of the archaeologist, is Wells, where the ancient buildings are so largely preserved; while the most perfect type of the latter is Durham. No old monastic buildings in England, so far as I am aware, are so complete. Almost all the principal elements of the monastery remain substantially as they were of old. I would gladly have lingered over the Early English and subsequent work in the cathedral. I could have wished also to conduct you through the other churches of the city,—almost all of them exhibiting interesting features of an early date. But I must now hurry rapidly to a conclusion. The ancient churches in the rural districts of Durham are not thickly scattered over the ground, as they are, for instance, in the eastern counties. The population in ancient times must have been very sparse, and the parishes were consequently very extensive. Six or seven parishes would have spanned the whole county from north to south, or from east to west. There are now some 240 parishes in Durham. Of these, about two-thirds have been constituted during the

present century, and (with few exceptions) during the last forty years. But, while the old churches are comparatively few, it is quite the exception to find one which has not features of real interest for the antiquary.

Time would fail me to trace the development of Pointed architecture, as exemplified in the churches in this country. I would only say generally that we have a much richer series of examples in the early stages than in the later, and that the decline is gradual as time advances. Our finest examples belong to the Early English or First Pointed, while the Perpendicular is the worst represented of all. We have not, so far as I remember, a single purely Perpendicular church of any considerable pretensions. Of castles, we can boast several striking examples,—Raby and Brancepeth, Lumley and Hylton, and Barnard, not to mention Durham, of which I have spoken already. You will visit the first and the last; and it would be difficult to single out two more imposing structures of their kind than these.

On its conclusion, the Rev. Prebendary Scarth, on behalf of the Association, returned thanks to the Bishop for his address, referring in graceful terms to the interest which the bishop has ever shown in antiquarian pursuits, and instancing their value as evidences of the spread of the Christian faith in early times. Notwithstanding the continued downpour, which was now heavier if possible than it had been during the early part of the day, the party followed the bishop to the parish church to listen to an address which was delivered by Mr. Pritchett within the building. Darlington Church is one of the finest, if not the finest, church in the county, the cathedral being excepted. It is cruciform in plan, having a tower and stone spire at the crossing. The body of the fabric is of pure Early English work, the chancel being the earliest portion; the building having many evidences that it was begun at the east end and continued onwards to the west, there being slight differences of style between the western and the eastern parts. The tower and spire are of Flowing Decorated work, while there are many windows in the south and north aisles of the nave of the same date. At this period the low walls of the aisles, which supported high-pitched roofs, were raised and flat roofs substituted. The work is of great purity and elegance, the mouldings being very effective and the ornamentation good, the effect being greatly heightened by the retention of the high leaved roofs to the nave, transepts, and chancel. The erection of the tower and spire having caused the arches to settle, there are some curious evidences of the expedients adopted to counteract the effect. Thus, we find openings walled up, and various works of addition to the piers, while a stone rood screen was built at the entrance of the chancel into which access was gained under an arch of massive ribs. This still remains, and the modern organ is erected upon it, projecting too much for good effect westwards and eastwards. The choir stalls remain in the chancel, the church having been Collegiate. This is an instance of a church used by two bodies, the nave having been originally the parish church. The piers and arches are much plainer than those elsewhere, probably on this account, and the piers are on each side, of different patterns. The body of the church was restored by Sir G. Scott, the chancel by Mr. Pritchett. Some fragments of Saxon interlaced stones, portions of crosses, &c., found during the works, were examined by the visitors with much interest. There are, doubtless, portions of the building which preceded the present one. The church is dedicated to St. Cuthbert. A hasty glance in passing and no more was given to the curious red-brick seventeenth century house which stands on the north side of the churchyard.

A dinner was held in the evening at the Trevelyan Arms, the Bishop of Durham being in the chair, supported by the Mayor of Darlington, Mr. Fry, M.P., Mr. Brinton, M.P., Rev. Canon Scott-Robertson, Rev. Prebendary Scarth, and a goodly number of the local inhabitants.

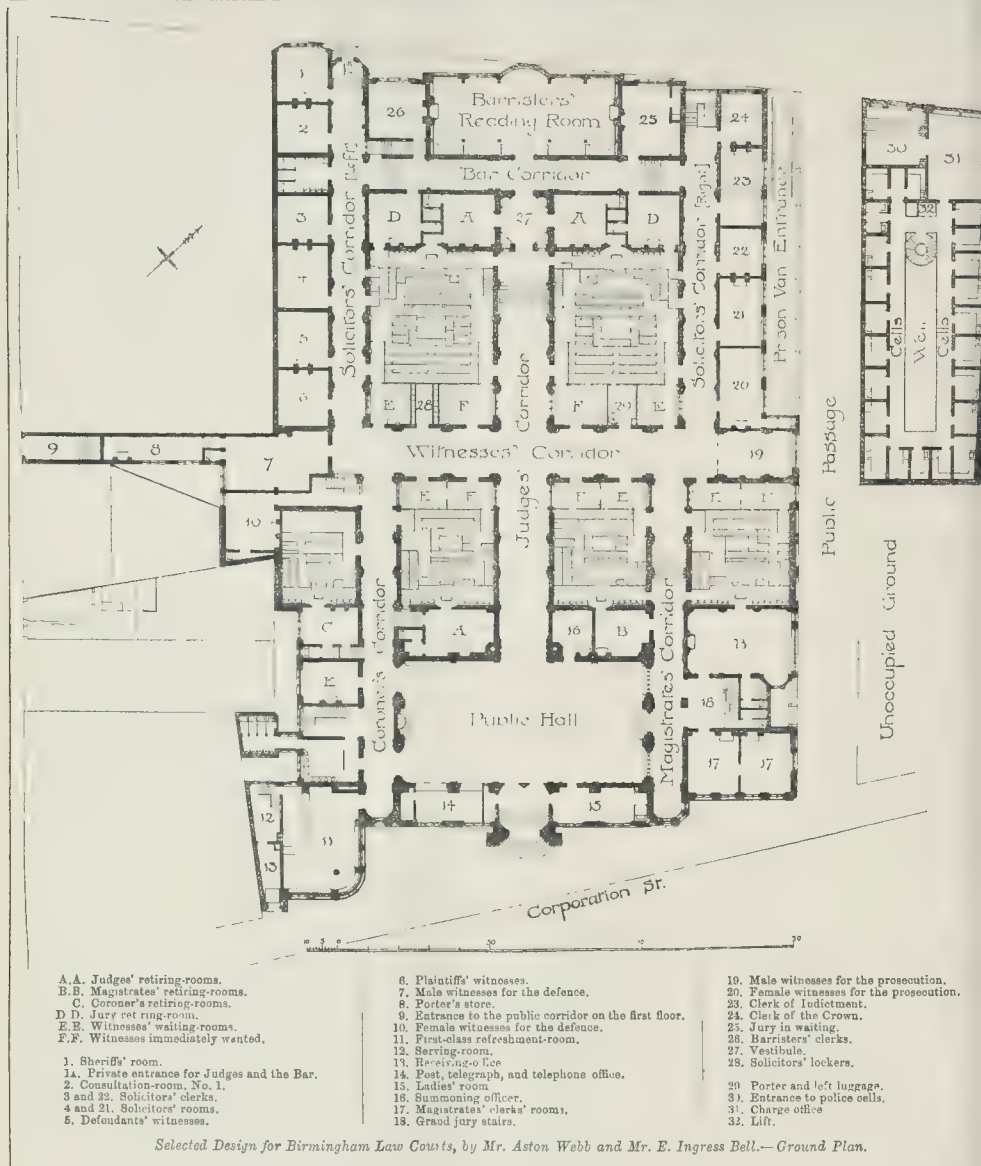
Tuesday, July 27th.—The weather was more propitious, a cause for congratulation, since the day was devoted to a survey of the beauties of Durham Cathedral. One day only will be devoted to the capital of the county, since a congress was held there in 1866. The view of the cathedral, grandly towering above the river Wear, was seen to great advantage, as the rain clouds were gradually clearing off the landscape.

The visitors lingered on the fine ancient bridge which gives access to the city from the railway station, in contemplation of the view up the river,—the cathedral and castle forming a majestic group of buildings. Passing along the well-wooded walk on the east bank of the river, the ascent was made from below the walls of the Galilee, and along the cloisters, at once into the choir of the cathedral for morning service. The time of service was altered sufficiently to allow for the arrival of the visitors. On the conclusion of morning prayer, the Dean of Durham bade the party welcome, and related the history of the foundation of the present fabric. He was followed by Mr. C. Hodgson Fowler, who proceeded to render a lucid description of the architectural glories of the building, pointing out the reasons for belief that the work was begun at the east end, and pursued westward, the entire design being the work of one mind, although the differences of detail are sufficient to show that some length of time must have elapsed before the completion of the west end of the nave, the vaulting being the last portion erected. While the north transept has round arches, moulded only, the nave has pointed arches ornamented with the zigzag ornament. The change of detail is very apparent where the first bays of the nave join the others, the zigzag ornament not appearing in any of the eastern parts. The line of the old Norman apse was pointed out, as was also the western Galilee, with its light pillars and arches of elaborate Norman work without the intervention of any pointed arches, although the building was the work or erected in the time of Bishop Pudsey, 1154–1159. An earlier date was, however, given by Mr. Fowler for the erection of the pointed vaulting of the nave. Passing into the retro-choir, the position of St. Cuthbert's shrine was pointed out, as well as the mode of approach and exit of the pilgrims. The chapel of the Nine Altars was then described, and the small variations of design indicate that, while the general conception and the main bulk of the work are due to Bishop Poor, yet a long period must have intervened before its completion. The conventional buildings were then inspected, and many regrets were expressed by the party at the ruthless demolition of the fine Norman Chapter House in the last century. The portion remaining attests the beauty of the whole fabric. In the dormitory, which at Durham extends at right angles to the west front, instead of as usual in a line with the transept, a vast number of objects of the highest antiquarian interest are preserved. The Rev. Canon Greenwell undertook the description of the greatest number of these. He pointed out the unique collection of stones covered with elaborate patterns, derived from several churches in the locality, found during the process of repair. The style of ornamentation is similar to what is found in the Saxon MSS. of the seventh and following centuries, and he described the style as Irish, the work of Christian times, derived from Iona and Lindisfarne. Their consideration is certainly a new page in the history of art. These are preserved in the library various relics from the tomb of St. Cuthbert, found when it was opened by Dr. Raine. Here is the pectoral cross, part of some Eastern or Sicilian stuff, forming part of the saint's robe, and many others. In another case, with other precious MSS., is one written by the Venerable Bede.

Mr. Fowler escorted the party to the Castle, where, after luncheon had been partaken of, the Norman gallery, the extremely Early Norman chapel, and the later chapel, enlarged by Bishop Cousins, were examined. The old east end of this building, it is apparent, had been taken down by this bishop, lengthened one bay, and the end rebuilt again. The Rev. Dr. Hooppell then led the party into the museum on the castle green, where he described the Roman remains found during the recent excavations at Binchester (Vinovium). These consist of pottery of all classes, and many curious relics in metal. The proceedings at Durham were brought to a close by a reception given by the Dean. The whole of the old buildings of the Deanery were thrown open for inspection. The party returned to Darlington in time to be present at the conversations given by Mr. Theodore Fry, M.P. for the borough, and Mrs. Fry, at their residence, Woodburn, adjoining the town.

Wednesday, the 28th, was devoted to the inspection of some of the finest remains in the

north of England, having additional interest from the beauty of their local surroundings. The day was extremely fine, and the party was large. A short visit was made to Coniscliffe Church in passing, and its fine site inspected. It is one of the few churches in Durham which possesses a spire. Proceeding onwards to Pierce Bridge the few remaining traces of the Roman station were pointed out by the Rev. Prebendary Scarth, and its relation to the straight Roman road coming up from Yorkshire was explained. The road crossed the Tees not far from the station and the present bridge; the banks of the river being high at this point, the position of the bridge called forth some discussion. Gainford Church was afterwards inspected and described by Sir James A. Picton, F.S.A., and Mr. Loftus Brock, F.S.A. The building is a good specimen of a Durham church, mostly in the prevalent Early English style, having tall cylindrical shafts and lancet windows, the tower being open to the aisles and nave, the former going up to the west front. There is in the rectory gardens a large number of stones with interlaced patterns, of pre-Norman date, the style of ornamentation being similar to that of the Irish MSS. The Rev. Prebendary Scarth pointed out part of a Roman altar dedicated to Jupiter Dolychenus, the patron of ironworkers, which was found during the restoration of the church in 1864, having been used as part of one of the shafts of the tower arch, cut to a circular form, which partially obliterated the inscription. It is now kept under cover in the rectory garden. Staindrop Church was next visited, and here the party was met by the vicar, the Rev. H. C. Lipscombe, who read a paper descriptive of the history of the building. The work shows clearly how the church grew from a small nave and chancel in very early times to the present ample structure. The work is mainly of Early English date, but on the widening of the aisles in the fourteenth century they were rebuilt with good Flowing Decorated windows. The tower is Early English, capped by a belfry of Decorated date, which takes the place of a former spire. It starts from the face of the old corbel table, and is larger, therefore, than the tower beneath it, presenting an appearance more curious than beautiful. There are some very remarkable monuments within the church, modern as well as ancient. Mr. Brock pointed out a Saxon sun-dial, built up as old material in the walling, over the chancel arch. There are a few interlaced patterns on other stones on the north side. Progress was then made for Raby Castle, which was thrown open for inspection by permission of His Grace the Duke of Cleveland. This fine castellated pile and the beautiful park in which it stands were seen to great advantage owing to the fineness of the day. After luncheon in the great entrance-hall, the party inspected all the ancient portions of the building, under the guidance of the Rev. Prebendary Scarth. After the perambulation, the Rev. J. F. Hodgson read a paper in the Great Hall, on the history of the fabric, almost all of which dates from the fourteenth century. He ridiculed the freely-received statements that 700 Barons ever dined in Nevill's Hall, showing that there were never 700 Barons in existence. The remains of the old Minstrels' Gallery are incorporated in the present end wall. The lecture was illustrated by old views and prints showing the aspect of the building in the last century. The paintings, Hiram Power's "Greek Slave," the excellent series of family portraits, and the beautiful china having been inspected, the party took their departure, and proceeded to Barnard Castle, fine views of the country over Teesdale into Yorkshire being visible all the way. The ruins of the castle were inspected, and the singular flat-vaulted ceiling of the keep inspected. The keep is a circular tower built of excellent coursed masonry, and it stands in the line of the curtain wall of the inner court, close to the edge of the lofty banks of the river Tees. The approach to the town from the south is effectively commanded by the castle, the fine old bridge of approach being at a much lower level. The unrivalled scenery of the river was seen at its best. After a short inspection of the parish church, or rather chapel, which was described by Sir J. Picton, progress was made for the ruins of Egglestone Abbey, which stands on a bold knoll above the Tees, in one of its most beautiful portions. Elevated as it is, it seems to be low from the higher road along which the



visitors travelled. The ruins are of great interest, and consist of part of a cruciform church without aisles, and the entire eastern range of monastic buildings, now in a state of great dilapidation, but still roofed in. The windows of the church are admirable examples of elegant design, with a moderate amount of workmanship in relation to the effect produced. The pencil of many a student might be devoted with considerable benefit to the elucidation of these remains. The church was rebuilt in the thirteenth century; a small portion of the earlier twelfth-century work remains on the north side, while a fourteenth century staircase turret has been added on the south. At some later period, the walls of the church were raised a few feet, for no very apparent reason, above the old corbel tables. The proceedings were brought to a close by a visit to the Roman station at Greta Bridge, under the guidance of the Rev. Prebendary Scarth, and a somewhat hasty visit to Rokeby Park, where, perhaps, the best portion of the lovely scenery of the Tees Valley the

junction of the Tees and the Greta, was inspected. The return journey to Darlington was made at a late hour.

We will resume our notes of the meeting next week.

Illustrations.

SELECTED DESIGN FOR THE BIRMINGHAM LAW COURTS.

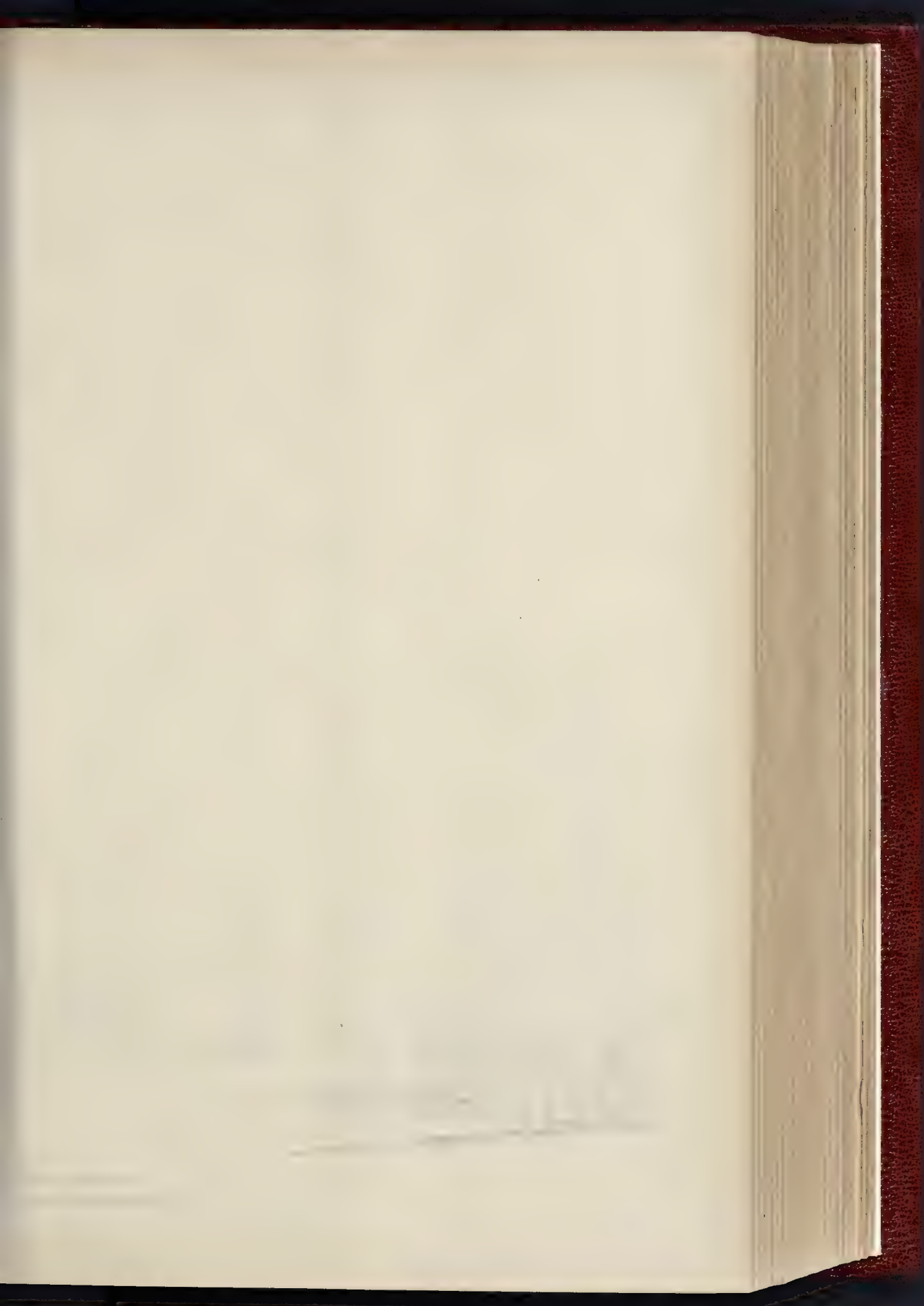
WE give this week the perspective view of the design by Mr. Aston Webb and Mr. Ingress Bell, which has been selected for execution (with perhaps some slight modification) by the Birmingham Town Council, acting under the advice of Mr. Waterhouse. We have fully commented on the design in our article in another column.

We append the plan of the ground floor, which includes the main departments of the building.

BIRMINGHAM LAW COURTS.

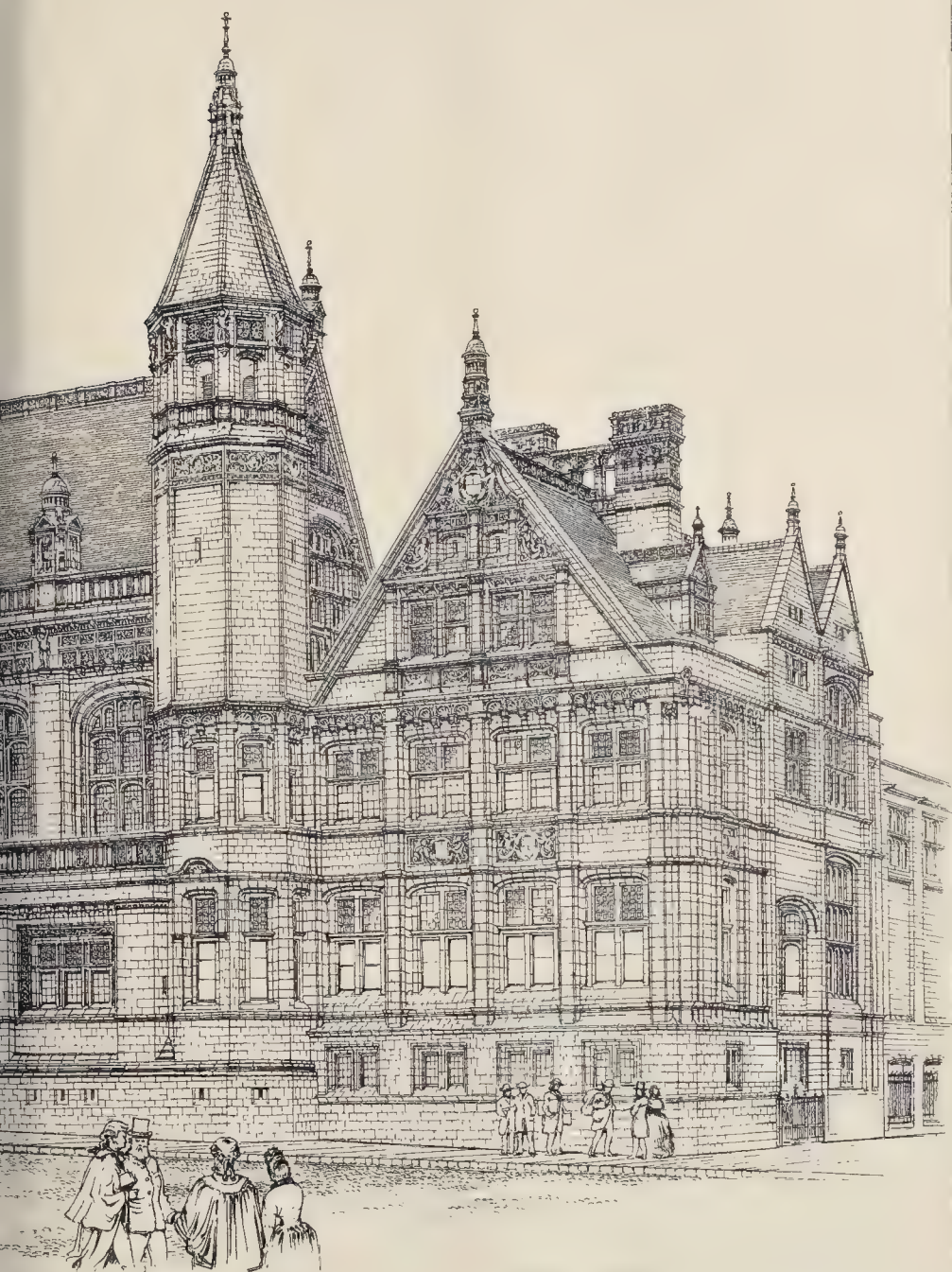
DESIGNS SUBMITTED IN THE FIRST COMPETITION.

CONCURRENTLY with the selected design we give two sheets of designs which were submitted in the first or "sketch" competition, but not included among the selected five. Geo. Corson's elevation shows a Romanesque design, that by Mr. G. F. Roper a very elegant Jacobean one; that by Mr. Stone a Classical Italian design, with some novelty and originality in the treatment of the central dome and end pavilions. On another sheet we give designs by Mr. W. T. Foulkes and Mr. A. B. Broad, accompanied by plans. Mr. Broad, it will be seen, has adopted the same position for his large Hall as in the selected design, bringing it up to the front. The plan is a novel one in other respects. Mr. Foulkes's plan is very nearly that of Mr. Waterhouse, only he reverses the positions of the magistracy courts and the third or Stipendiary Magistrate's Court, and he has contrived to keep his com-



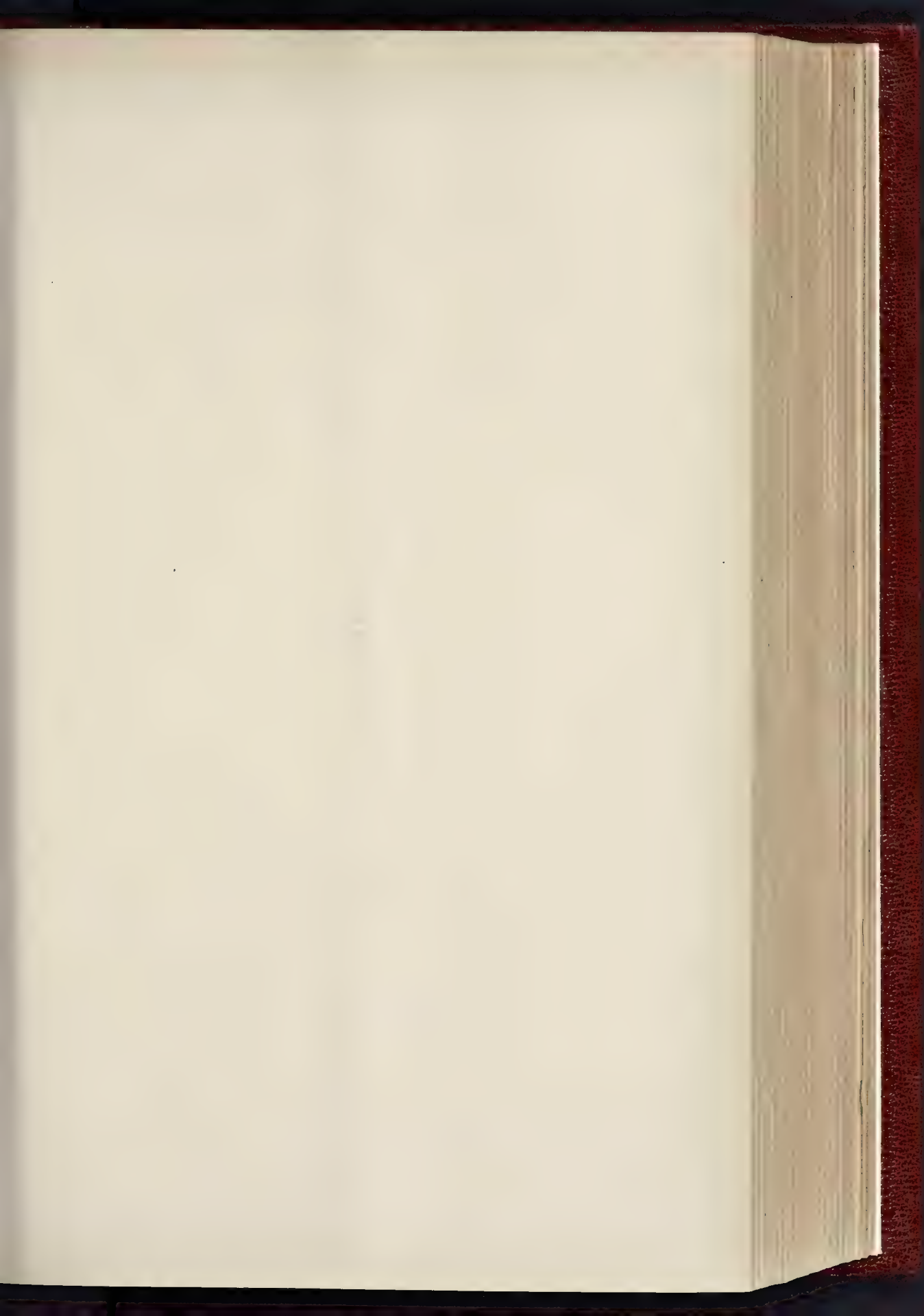


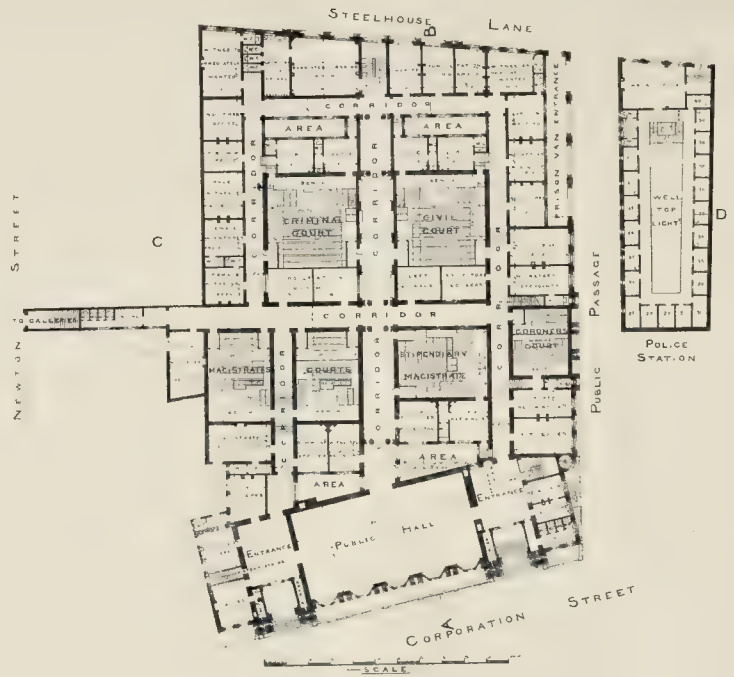
SELECTED DESIGN FOR
MR. ASTON WEBB F.R.I.B.A. AND



BIRMINGHAM LAW COURTS.
JESS BELL F.R.I.B.A., ARCHITECTS.

PHOTO. THO. SPRADJE & CO. DEL. MANTON, AND CARRINGTON, LONDON E.C.





PLAN OF DESIGN BY MR. A. BROAD.



PLAN OF DESIGN BY MR. W. T. FOULKES.

THE BIRMINGHAM LAW COURTS COMPETITION.

SOME PLANS IN THE FIRST COMPETITION.

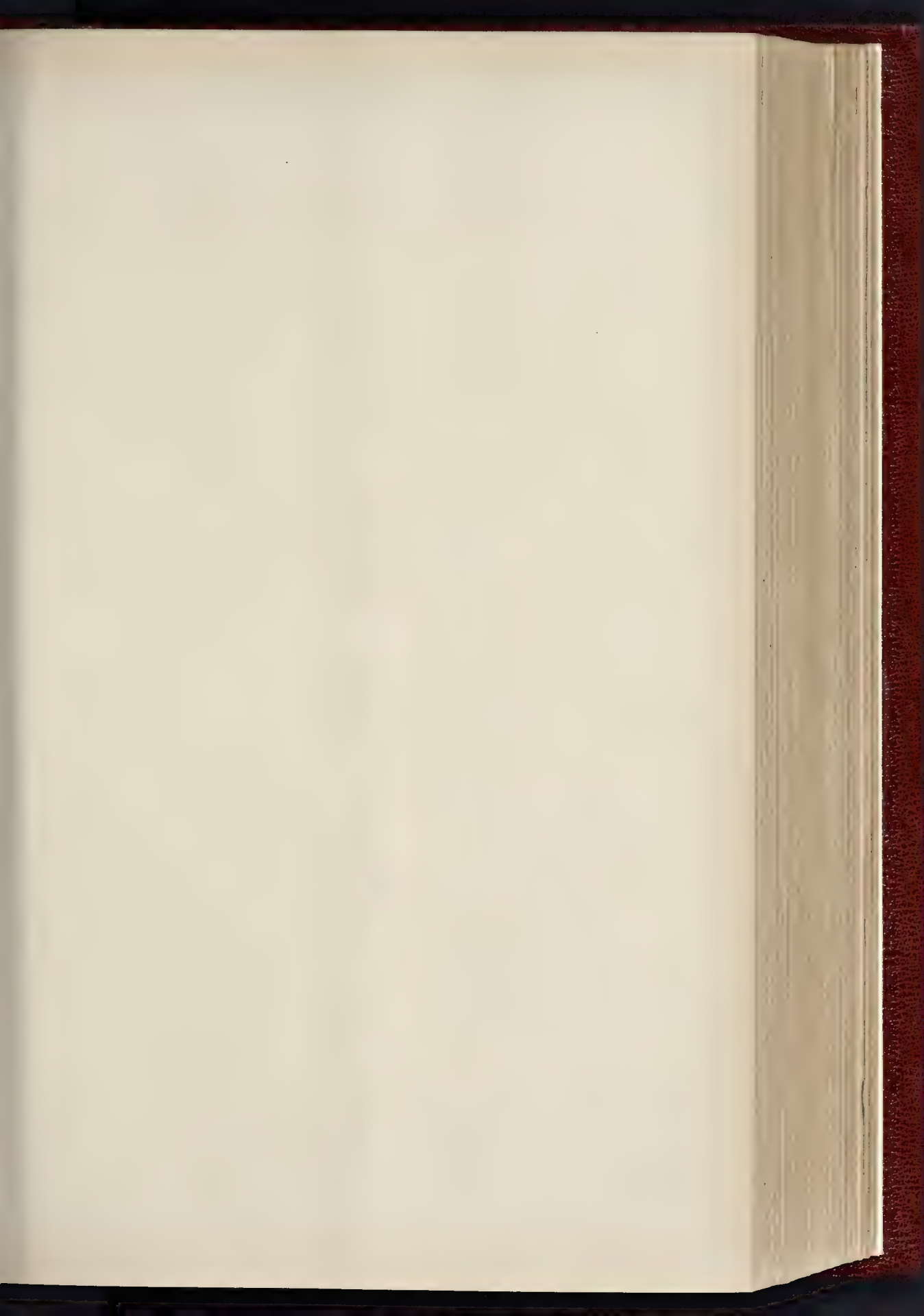
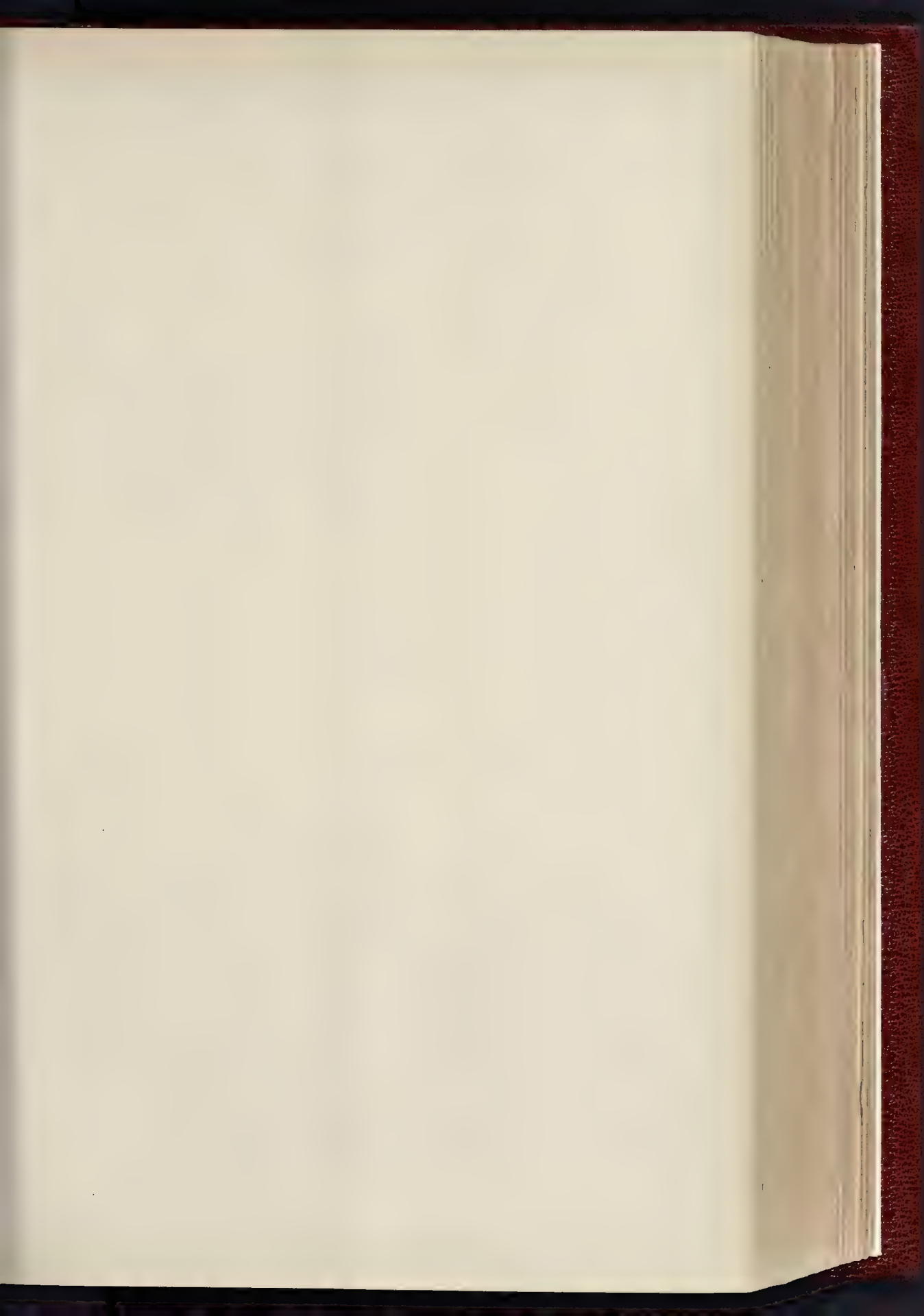




PHOTO SPRACE & CO. LONDON.

THE CENTRAL TOWER OF GLOUCESTER CATHEDRAL.—SKETCHED BY MR. W. H. BIDLAKE M.A.

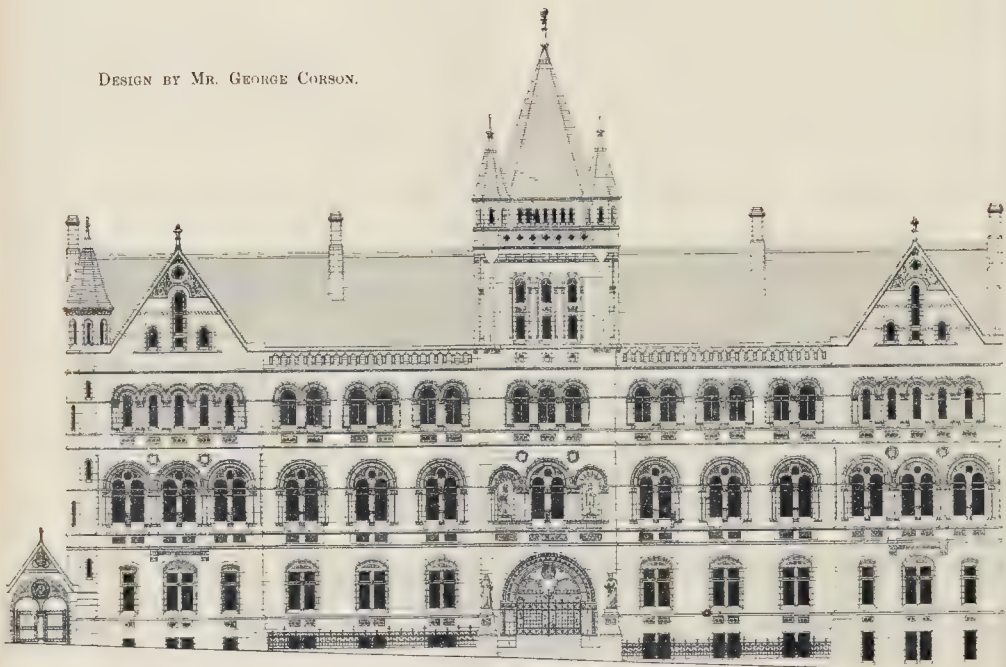


DESIGN BY MR. PERCY G. STONE, A.R.I.B.A.



CORPORATION STREET

DESIGN BY MR. GEORGE CORSON.

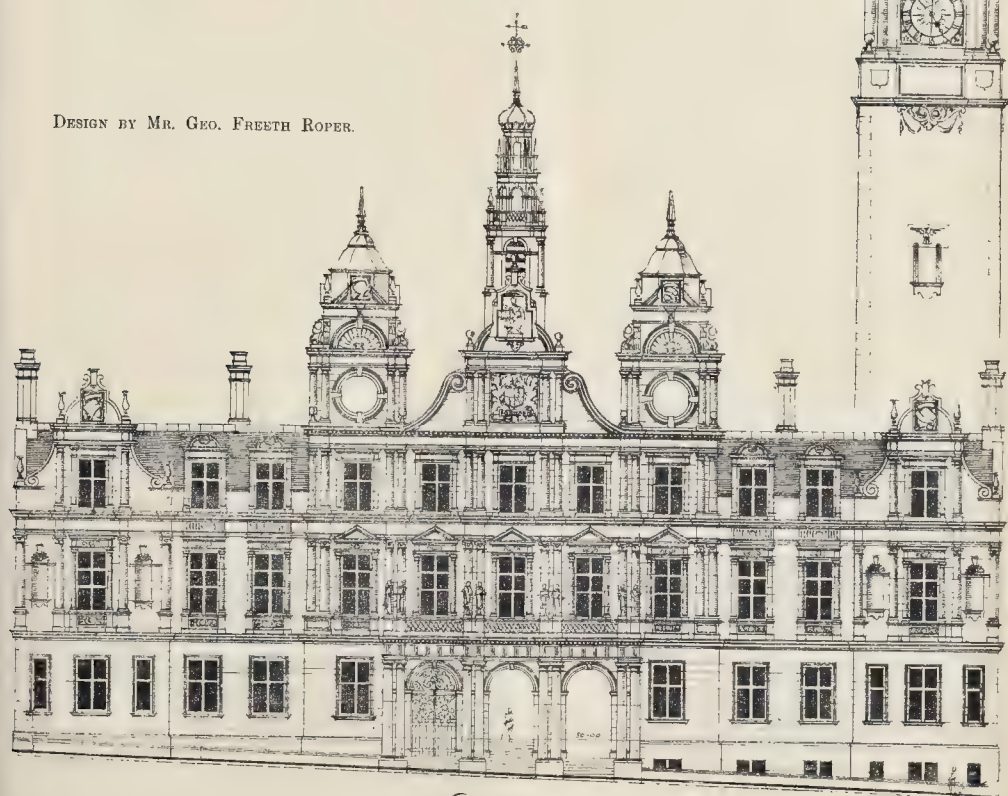


ELEVATION TO CORPORATION STREET

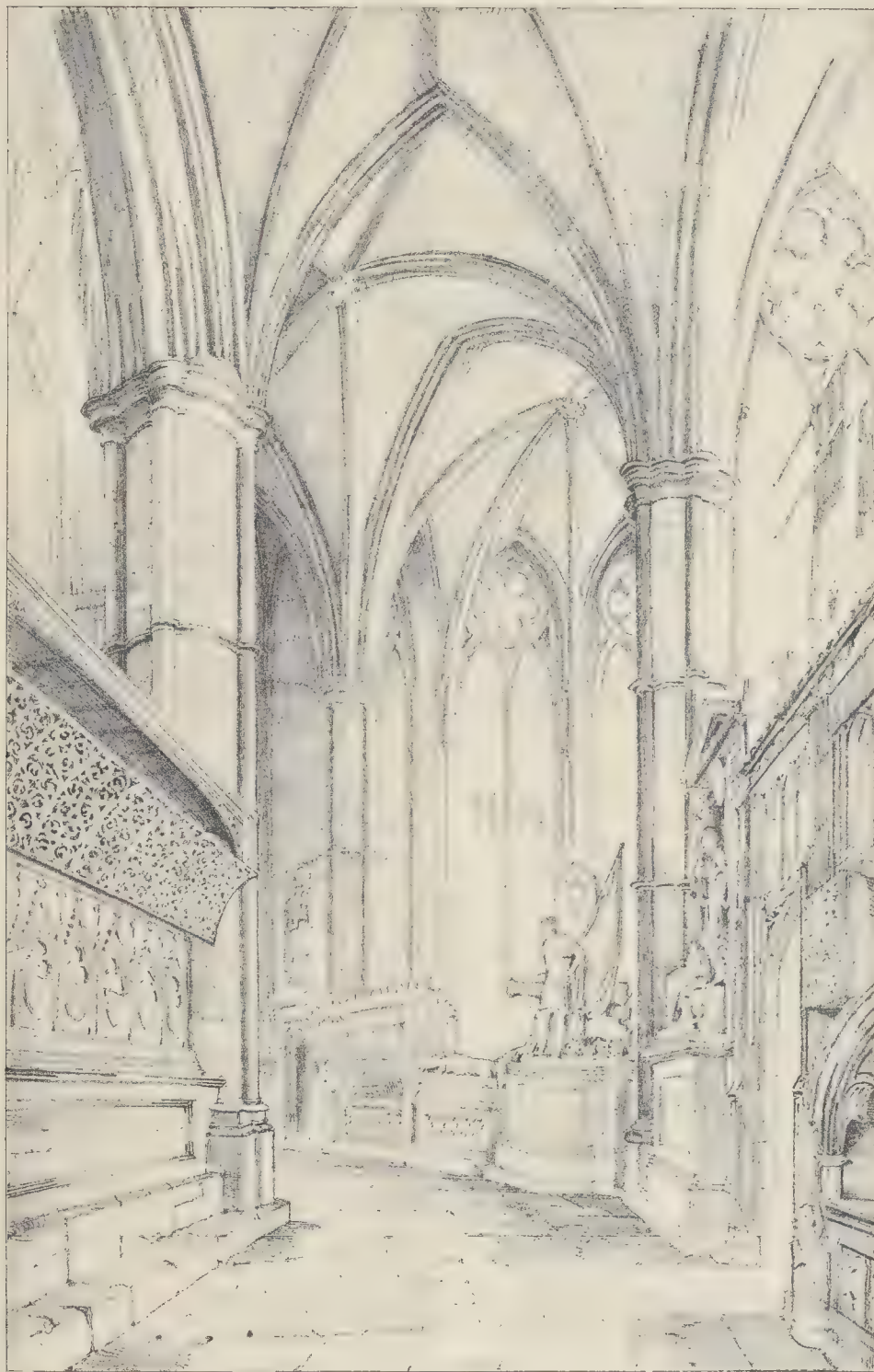
THE BIRMINGHAM
SOME OF THE I



DESIGN BY MR. GEO. FREETH ROPER.



First Entrance



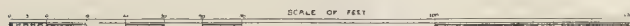
THE NORTH CHOIR AISLE, WESTMINSTER ABBEY.—SKETCHED BY MR. W. H. BIDLAKE M.A.



DESIGN BY MR. A. BROAD



ELEVATION TO CORPORATION STREET.



DESIGN BY MR. W. T. FOULKES.

THE BIRMINGHAM LAW COURTS COMPETITION.
SOME OF THE DESIGNS IN THE FIRST COMPETITION

PHOTO LITHO BY J. H. BURNETT & CO. LTD. LONDON

communication unbroken, and has placed a tower in the principal front.

The plans of the other three designs differ so slightly from Mr. Waterhouse's plan (given on another page) that it seemed unnecessary to reproduce them.

GLOUCESTER CATHEDRAL TOWER.

The central tower of Gloucester Cathedral was commenced in 1454 A.D., by Abbot Seabroke, who, with a boldness of construction characteristic of the times, as it is also of this particular cathedral, reared the tower on the old Norman piers without deeming it necessary to give them extra strength.

The work was finished in 1457 A.D., after the abbot's death, by Robert Tully, one of the monks.

SKETCH IN NORTH CHOIR AISLE, WESTMINSTER ABBEY.

The sketch here reproduced gives a suggestion of the view seen from the foot of the steps leading to Henry VII.'s Chapel, looking toward the Chapel of St. John the Baptist. It was made originally not so much on account of the picturesque quality of the subject as to show the arrangement of the vaulting; for at Westminster the apse differs from the usual Continental type, inasmuch as its five sides are not those of a regular polygon, as at Rheims and Cologne, but the three easternmost only are sides of an octagon, the other two being inclined towards them from the straight sides of the choir. The crowded appearance of the apse is thus avoided, and its bays are made nearly as wide as those of the remainder of the choir. The arches opening into the apsidal chapels, however, are necessarily much wider, for their piers are placed on the same radii as those of the chevet, and the vaulting compartments of the aisle are consequently of irregular form.

FURTHER NOTES ON THE EDINBURGH EXHIBITION.*

A STRIKING feature of the Exhibition is the illumination by electric light, which has been carried out according to five different systems.

The Exhibition buildings cover seven acres of ground, and the remaining portion of the West Meadow (fourteen acres in extent) is laid out as a promenade dotted over with pavilions, and with groups of shrubbery from different nurseries. The lighting is on a scale of great magnitude, installed at a cost of 5,000. There are upwards of 3,200 lamps, with illuminating power equal to 725,000 candles, and the motive power is supplied by nine engines of an aggregate of 235 horse power. The boiler-house, in the south-eastern section, contains five large Lancashire boilers working at a pressure of about 80 lb. Two of these are by Messrs. Pennam & Co., of Glasgow; one by Messrs. Sinclair of Leith; and two by Messrs. Adamson & Co., of Manchester. Messrs. Babcock, Wilcox, & Co., of Glasgow, have a Robey engine, supplied by a boiler of 136 horse power, which is fitted with a chain-grate mechanical stoker. Four of these are for the electric light and two for the machinery. The electric lighting plant of Messrs. King, Brown, & Co., Rosebank, Edinburgh, in an adjoining court, consists of fourteen dynamos driven by four vertical engines by Marshall, of Gainsborough. These dynamos provide 1,400 incandescent lights in the central avenue of the buildings, and 1,200 in the grounds. The lighting of the central avenue is very effective, and the light is of a mellow yellow colour, free from the somewhat ghastly effect produced by the white light. Two of Robey's engines, of 30 and 40 horse power respectively, are worked by Mr. Richard Miller, of Glasgow, according to the Thomson-Houston system, and are applied to seven dynamos, four of which supply sixteen lamps in the great hall, two of them supply eighty lamps to the north-west courts, and the other supplies outside illumination at the principal entrance. A peculiarity of this system is that the light is regulated at the brush instead of at the lamp. The Anglo-American Brush Corporation have four dynamos for fifty-five arc lights in the north-east courts, and two Victoria machines for lighting "Old Edinburgh"

with 250 incandescent lamps. The Gulcher Company have four dynamos, which supply thirty-two arc lamps in the south-west courts, and the incandescent lamps in the hall and reception-rooms. Messrs. Andrews & Co., of Glasgow, have the largest dynamo in the Exhibition. It weighs upwards of five tons, and provides thirty-three arc lamps. A second dynamo is kept in reserve in case of accidents. Over the promenade which runs parallel with the north side of the buildings, are festooned, from three rows of masts, glass shades of different colours, which are illuminated by incandescent lamps, and produce a brilliant effect. At the outer northern verge of the grounds there is an electric railway, which has been supplied with two handsome cars by the North Metropolitan Tramway Company, free of charge. Mr. W. A. Bryson is the electric light engineer.

Messrs. Norman & Sons, of Argyle-street, Glasgow, demonstrate the application of the incandescent light to private residences by means of storage batteries, and the light is applied to various artistic designs of fittings and ornaments. The absence of smoke is an element in its favour, but it engenders a considerable degree of heat. When we were examining the exhibit a pendent Cupid holding a light came in contact and set fire to certain hangings, but as they were of woollen fabric the fire was easily mastered, and the whole lights supplied by the battery were instantly extinguished. They can also be lowered just as gas is, and as very small globes can be used more artistic effects can be obtained than with gas.

"Old Edinburgh" as viewed by the light has an effect which it would not otherwise have had. In order to sustain the verisimilitude of an ancient city, lanterns are suspended over the roadway, which give but a feeble light, but these are supplemented by the moon (electric, of course) which produces the most fantastic and vivid effects of light and shade upon the nooks and corners of the ancient and quaint edifices. The Rembrandtesque scenes in the booths and the twinkling lights in the windows aloft lend aid to the making up of a scene more deceptive than could be attempted upon the stage.

In the picture-galleries, which are lighted by the white light, both good and bad results appear. Some pictures, especially those where the shadows are deep but luminous, stand the test of intense illumination in a satisfactory manner, but any roughness of handling is made conspicuous, and where toning down has been attempted, or where there is too great an intermixture of colours, the works appear flat or muddled-looking.

Still worse is the effect upon works of plastic art. Intended to be seen under a diffused light producing soft shadows, they suffer greatly when the shadows are intensified to the degree produced by the new method. In some instances this is carried to such an extent as to cause very unpleasant effects, occasionally suggesting distortion. The general effect upon the statues is ghastly, and in no instance do we find the statues exhibited appear to advantage when viewed by the electric light.

The sculpture is ranged along the centre of the picture galleries, but it appears to us that a much more effective arrangement would have been to place groups of sculpture around the great hall, instead of jewellers' cases and stands for the display of ceramic ware. It may be, however, that the demands for space necessitated the existing arrangement, and there is no doubt that there is little room to spare in any portion of the buildings. The display of statuary is the most important ever exhibited in Scotland, and, as was to be expected, it comprises many works which are well known to the artistic public, comprising examples from the ateliers of Calder Marshall, G. A. Lawson, E. O. Ford, E. R. Mullins, W. Story, G. Simonds, H. Thornycroft, the late W. Brodie, Clark Stanton, &c.

In the open ground facing the western entrance there is an admirable seated statue of her Majesty the Queen, by Mr. John Rhind, of Edinburgh. He has succeeded in imparting an air of dignity to the figure, and the arrangement of the drapery has been carefully studied. We have heard it whispered that this statue, reproduced in durable material, is likely to go to one of our Colonial possessions.

In niches at either side of the grand entrance are placed models of the bronze statue of Tannahill, by Mr. D. W. Stevenson, erected at Paisley

and of the marble statue of Burns, by Mr. W. Grant Stevenson, at Kilmarnock.

In the grand hall, under the dome, is placed the model for the colossal statue of Wallace, by Mr. W. Grant Stevenson, to be erected in Aberdeen. A small model of this figure was exhibited in the galleries of the Royal Scottish Academy last year, and it has been, as appears, successfully enlarged. It is about 20 ft. in height, and would have been seen to greater advantage had it been placed in the open air. Standing where it does, one is too apt to scrutinise the high bulk of the legs and to look upwards at the head and bust, whereas the whole figure is intended to be viewed from some distance.

In the centre of one of the small galleries there is a monumental effigy, which is a commission from the Earl of Wemyss to the sculptors, Messrs. J. & W. Rhind, and consists of a recumbent figure of the late Countess of Wemyss, to be placed in Seaton Chapel, the ancient burial-place of the family. The placid serenity of the noble features of the aged lady are rendered with great delicacy of feeling, and the air of repose which pervades the whole figure is worthy of high commendation.

Another monumental effigy is that of the Right Hon. W. E. Gladstone, by Mr. E. O. Ford. It is of heroic proportions, and the Premier is represented in the costume of the period, and "in act to speak." This work may be had in bronze for the sum of 1,050. There are altogether seventy-six works in sculpture, of the most varied description, but want of space compels us to forego entering upon further details.

THE RECENT MEETING OF THE LINCOLN DIOCESAN ARCHITECTURAL SOCIETY.

We noticed briefly at the time the meeting of this Society at Lincoln. A well-known member who was present has since forwarded to us the following more detailed notes of what was done, which, though coming rather late in the day, will probably be of interest to many of our readers.

After an interval of eighteen years, the Lincoln Diocesan Architectural Society for a third time held its annual meeting at Lincoln, under the presidency of the Bishop of Northampton, on June 30 and July 1. The attendance was large and influential, including many members of the associated societies, Sir Henry Dryden, Archdeacon Thicknesse, the Rev. G. F. Browne, Canon Raine, Mr. Neal, &c. The weather was perfect, bright but not overpoweringly hot, and no contretemps marred the pleasure of the gathering, which was pronounced by all to be one of the very pleasantest they had ever attended. Wednesday was devoted to Lincoln. In the morning, after the Cathedral service, the Bishop of Nottingham opened the proceedings in the Chapter-house, the use of which had been granted by the Dean and Chapter. An oral lecture was then delivered by Precentor Venables on the "Architectural History of the Minster," illustrated by plans and diagrams, chronologically coloured, prepared by the late Prof. Willis and Mr. Edmund Sharpe for their lectures in 1848 and 1868, presented to the Chapter by the representatives of those distinguished architectural authorities. On the conclusion of the lecture, the Precentor accompanied the members through the Minster, drawing attention to the chief features which illustrated its architectural development. Some of the party descended beneath the floor of the stalls, lantern in hand, to trace the footing of Remigius's apse, while others ascended by ladders to the Norman treasury in the northern wing of the west front, only thus to be reached. Much satisfaction was expressed at the complete deliverance of the choir from the high box-pews which till recently encumbered it, and at the development of the exquisite proportions of the fabric by the lowering and widening of the roof on the west and south sides, the demolition of mean sheds and out-buildings, &c., and the removal of the vast mass of soil heaped up against the walls of the north and south aisles. Afterward, a perambulation of the city was undertaken, also under the Precentor's guidance, commencing with the existing remains of the Roman settlement of "Lindum Colonia." The recently-discovered portico was first visited, the remains of the façade to the chief thoroughfare of some vast public building, probably the basilica, in the vicinity of the pretorium. A short distance northward the Roman gate-

* See last vol. of the Builder, pp. 808, 809.

way was inspected, known as the Newport Arch, and still forming the north entrance into the city; and the party moved eastwards along the Agger, where a great mass of the wall is still standing, to the site of the bastion at the north-east angle, in the garden of Mr. Septimus Lowe, which was obligingly thrown open. Here the eastern ditch and bank exhibit their original height and depth with but slight diminution, and there is a considerable length of the wall, though stripped of its ashlars. The whole lends itself delightfully to the formation of a most picturesque garden. Reluctantly leaving the Castle unseen from exigencies of time, the two Jews' houses of Transition Norman date were next visited, and the Steep Hill was descended to the "Stone Bow," i.e., the southern gateway of the Medieval city, picturesquely carrying the Guildhall in its upper story. Having heard and read much of the threatened attack upon this interesting relic of municipal architecture by the Philistine party in the corporation, it was no small satisfaction to find it actually undergoing a conservative repair under Mr. Pearson's directions. After visiting the picturesque little disused Church of St. Benedict, the members proceeded to St. Peter at Gows, identified by Mr. Freeman with one of Colswegen's churches erected after the Conquest in the Old English style, of which its tall tapering unbattered tower with its windows furnished with mid-wall shafts is a characteristic example. A similar tower was also seen at St. Mary le Wigford. The large range of Transition Norman building which formed the hall of St. Mary's Guild, but which is now known as "John of Gaunt's Stables," long used as a malt-house, was also, like the Stone Bow, found in the hands of the restorer. We were happy to notice that the works were strictly limited to necessary measures of conservation, without any attempt to reproduce missing features or restore the building up to a fancied ideal. A curious half-timbered house, absurdly called "The White Friars"—the Grey Friars' Conduit, and the High Bridge, where old half-timbered houses project above the Norman arch and hang over the turbid river, were visited, and the Steep Hill being once more mounted the party passed through the old episcopal palace, where a new residence for the bishop is rising from Mr. Christian's designs, by the side of the ruins of St. Hugh's and Bishop Alnwick's structure, to the lovely little Medieval nook, known as the "Vicars' Court." Here, on the smooth lawn, with the Minister towering overhead and the Medieval residences of the Priest Vicars rising around, by the considerate kindness of the Rev. G. T. and Mrs. Harvey a refreshing *à fresco* tea was spread, which was most gladly partaken of by the weary party. One of the more interesting houses, dating from the early years of the fourteenth century, with traceried windows and turret-stair, having been examined, the party adjourned to the Assembly Rooms for dinner. An evening meeting was held in the same place at which a paper was read prepared by that archaeological veteran, Mr. M. H. Bloxam, on the Monuments of the Minister, valuable but necessarily dry, and a discourse on pre-Norman sculptured stones was delivered by the Rev. G. F. Browne, illustrated with an extensive series of rubbings, which was listened to with unflagging interest.

On Thursday the party left Lincoln at 9.30, in a long string of carriages, for a visit to some of the churches of the Heath and the Cliff, and to Somerton Castle, the Bishop of Nottingham, according to annual custom, acting as the lucid expounder of each building. Passing through Lincoln, and climbing the opposite hill, the first church visited was that of Canwick, for many generations the home of the Sibthorpes. The church, a small one, with a western tower and a single north aisle, exhibited some interesting features. A singularly rich chancel arch of Norman date with elaborate mouldings, unhappily half-buried in repeated coats of lime and colour wash, a Norman north arcade, and a very curious little Early English reredos of lancet arches and medallions, cruelly bedaubed with paint, in the north chantry, now serving as a vestry, were noticed. This was almost the only church visited during the day, which called for restoration. Branston Church, a mile or two further on, was one of the last restored by Sir Gilbert Scott, who, greatly to the improvement of the picturesque effect, added an additional aisle on the north side. The interior is of considerable stateliness, with tall Decorated

arcades, and rich foliated capitals, a Perpendicular clearstory, and a good open roof. The chancel, which is Early English, had been restored before Scott's time. One wishes its restoration had been deferred. There are good sedilia, with the square abacus; but the altar-rails are ingeniously arranged so as to entirely preclude the use of them. In the pavement is a matrix of a fine floriated brass cross to Richard de Thistleton, circa 1314, and there are many monuments to the Berties and the Winches. One looked in vain for any monumental record of Jeremy Taylor's granddaughter, Mary Harrison, who took for her second husband Sir Cecil Wray, of Branston, and had a daughter, Albina, who in 1730 married Lord Vere Bertie, son of the Duke of Ancaster. All memory of her seems to have perished. From Branston the drive was continued to Nocton, where is a sumptuous but unsatisfactory church, from Scott's designs, rich with painted glass, frescoed walls, sculptured reredos, and all of ornament that a lavish expenditure could supply, but wanting in real church feeling. It was begun by the late Lady Ripon, in memory of her husband, the once well-known Lord Goderich, of whom there is a white marble recumbent effigy on an elaborate altar tomb, and completed by the present marquis. The lofty tower and spire failed after its erection, and had to be underpinned. The next church visited, Dunston, is also a modern building, by H. Carpenter, but though far less pretensions, the structure is much more pleasing. Its old ivy-mantled tower is retained, together with one of the east-end arcades, and a very elaborate founder's tomb with a rich pedimental canopy in the north wall of the north aisle. The chancel, which is entirely new, is perhaps the least satisfactory part of the church. The Decorated tracery of the east window is heavy, and quite devoid of local feeling. The inner door of the south porch is a lovely example of Early English. Blankney, which was next visited, is a very good example of restoration, save that the inner walls have been scarified, also by Mr. Carpenter. The tall Decorated arcades are singularly pleasing. The west tower is a reconstruction of the last century, not wanting in picturesqueness. In the chancel lies a very remarkable monumental slab to one John de Glory, the head and shoulders alone appearing through a square eight-cusped aperture. The inscription is curious in its spelling,—"Johan de Glori gyt ivy, priets pur as alme pur Dieux que Dieux ly facets verrou (vrai) m'cy." After an inspection of the yearlings of Mr. Chaplin's racing stud, with their noted sires, Hermit and Galopin, kindly led out for inspection on the hall lawn, the excursion continued through the pleasant park to Navenby, one of the line of Cliff churches perched on the very verge of the steep escarpment. Navenby is famous for its Decorated chancel, magnificent both in size and loftiness, and in its decorative furniture, if that word can properly be applied to the Easter sepulchre, sedilia, piscina, and founder's tomb. These are all examples of Decorated carving at its very best, and may be compared with the same features at Heckington and Hawton. The final of the canopied tomb, with its free foliage, is of surpassing beauty, only second to that of the Percy shrine. The east window of six lights is reckoned by Mr. Sharpe one of the finest of its style in the kingdom. It certainly contains parts of exquisite beauty; but the tracery is disjointed and wants unity. The large open quatrefoils and trefoils in the upper part of the window want vital connexion with the tracery below them, and the latter seem toppling over. The nave, which is dwarfed by the disproportionately grand chancel, contains one interesting but unpleasant Early English clustered pier at the north-west end, but its arcade is chiefly Geometrical Decorated. The ugly stunted western tower is of the last century. Here, too, unhappily the walls are scarified.

Descending the steep hill, and driving across the marshy plain at its foot, we reached Somerton Castle, erected in 1381 by Antony Beke, then Chancellor of Lincoln, afterwards Bishop Palatine of Durham, King of Man, and Patriarch of Jerusalem, in his day the "Most Masterful Prelate of the Realm." To appease Edward I.'s jealousy of his overweening power, Beke, like Wolsey in after times, made a present of his Castle of Somerton to the monarch, and of his manor-house of Eltham to his queen, Eleanor. Hither, in August, 1359,

was brought King John, of France, after his capture at Poitiers, and remained in honourable confinement till the following March 21st. The account of the captive monarch's household expenses, his tailors' and apothecaries' bills, and his vintners' charges, still exist, and have been published by the Duc d'Aumale. Of these the Bishop of Nottingham gave piquant extracts, affording very curious and amusing pictures of John's tastes and manner of life. The castle itself was a quadrangular pile, 330 ft. by 150 ft., with a tall drum tower at each angle. Of these, that to the south-east remains perfect and habitable, incorporated in a picturesque Elizabethan farmhouse. The basement story of the south-western tower, with beehive vault, also remains, half hidden among stables and cowsheds. That diagonally opposite to the north-east, though ruined and shapeless outside, within exhibits a very remarkable polygonal windowless chamber, vaulted from a central shaft, from which spring twelve ribs affording a rude resemblance to a miniature chapter-house. So curious an apartment deserves, as does the whole castle, more attention than it seems yet to have hitherto received. Reluctantly leaving Somerton, refreshed by copious draughts of fresh milk kindly tendered by the farmer's family, the *cortège* slowly remounted the hill, and, passing through Bottisham, where the church is modern, halted at Coleby. The church here is interesting. The basement story of the western tower exhibits very Early Norman, if not pre-Norman, work; the upper part is Perpendicular, supporting a very well-proportioned crocketed spire. The south door is of very Late Norman, with rich mouldings and foliated capitals. Within, the north arcade is Norman, and resembles that of Canwick, with low cylindrical columns and unadorned arches. The south arcade is Early English, the capitals of the piers showing the upright curling leaves of the opening of the style. The font, also Norman, is of the twelfth shape covered with an intersecting arcade standing on a square base, with an octagonal shaft at each corner. The two last churches visited, those of Harston and Waddington, afforded less of interest than those previously seen. The former has been entirely rebuilt, with the exception of the west tower, which is of the same pre-Norman type as those already mentioned in Lincoln. Waddington is completely spoiled by a low clumsy western tower (its predecessor presumably having tumbled down), having been built within the first bay of the nave, into which it has been ruthlessly squeezed, swallowing up the beautiful piers and arches. What remains of the arcade is Early English work of a singularly pure and beautiful type. The foliage of the capitals deserves notice for its elegance, the leaves alternate pointing upwards and downwards. The clustered capitals of the piers on the north side have a single ring-shaped abacus of a pleasing form, of which an example had been previously seen at Navenby. With this church the architectural interest of the expedition closes. Lincoln was soon reached. Dinner was awaiting the party, after which the second evening meeting was held, at which Precentor Venablen read a paper, showing too plainly that at the end of the fourteenth century, so far from the dean and his canons living in brotherly love, deadly feuds between their respective retainers were only too common, polluting the church itself with bloodshed. The Rev. A. R. Maddison also gave an interesting sketch of the internal history of the choir between the Reformation and the great Rebellion, and Mr. Thropp presented a careful description of the ancient book recently discovered at Brigg. So ended a most enjoyable and successful meeting. It is not improbable that a collective meeting of the Associated Societies will be held at Peterborough in 1887.

The Albo-Carbon Light Company.
Report for the year ending 30th of June, presented at their meeting on Monday last, showed that the balance at credit of profit and loss was 3,360l. 7s. 2d., out of which the shareholders have received 615l., being an interim dividend at the rate of 10l. per cent. per annum, paid on February last. After transferring as usual 1,000l. to the further reduction of patent account, a further dividend at the rate of 2 per cent. per annum for the half-year, making 15l. per cent. for the year was declared.

NATIONAL COMPETITION PRIZE

WORKS, 1886.

SCIENCE AND ART DEPARTMENT,
SOUTH KENSINGTON.

The annual exhibition at South Kensington of drawings, paintings, models, and designs which have carried off the prizes offered at the national competition between schools and classes of Science and Art promoted by Government, scarcely receives the measure of public notice it deserves, as the exponent of a system very largely of the nature of technical education, which is now of quite a respectable age. Unfortunately, it is subjected to those unfavourable conditions which exist at the South Kensington Museum, and arise from the want of proper exhibiting space. Last year the exhibition took place in galleries overlooking the Inventors' Exhibition. This year it is held in a fragment of the old "Brompton boilers," the first sheds for the South Kensington collections were euphemistically called by Mr. George Godwin more than a quarter of a century ago. Although, no doubt, the best that could be had been done with the space, there is a crowding together of students' work, some of which is quite up to the level of more than ordinary artistic production, and therefore deserving of better display. The official pamphlet containing the statistics as to the number of works and drawings submitted to the Examining Board, and the awards made, serves as usual all the purposes of a catalogue. We confine our remarks chiefly to the decorative designs, which are usually the best part of the work in these exhibitions. At the same time, any one taking an intelligent interest in the exhibition, and its aims, must not suppose that the studies of figures from the antique and living model, from ornament, &c., whether sketched or modelled, should be passed over. Indeed, they are specimens of the class of study and work which should be, if they are not taken up by the architect and decorator when student, and admirable life studies, painted in monochrome, are those (No. 10) by Edward Taylor, of the West London School of Art. This same student last year was very highly commended for his remarkable and complete scheme for the decoration of a corridor, into which ornamental treatment of the figure largely entered. No similar work is to be found in this year's exhibition. A word of praise, however, is due to Lehmann Oppenheimer, of Manchester, for his design (No. 53) for the decoration of a mineral well-spring on, executed in Pompeian style. It is, on the whole, but a slight sketch of his intention, and would be interesting to see some portion of it tried out on as large a scale as the rather commonplace band of ornament (No. 283) recently painted in blue and grey by Albert Wilkinson, of Manchester. This hangs above an array of modelled works hung upon the left-hand side of the Court. Amongst these are several panels of decorative work, of which the two best are No. 5, by William Parker, of Lambeth, and No. 47, by John Cassidy, of Manchester. The principal prize offered by the Asterisks' Company is won by Cassidy, who is evidently a skilful modeller in low relief, and, moreover, possessed of artistic ability in all his figures, representing Commerce truce on a raft, surrounded by the Arts, presided by a vigilant youth typifying "Capital," and sailing upon the Tides, who, as Naiads and Tritons, speed the craft along, are charmingly sketched and grouped. From Hanley, Joseph, comes a sketch-model in terra cotta of a half column (No. 36). There is novelty in the ornamentation of this piece. The drum is decorated and surrounded by caryatide figures, who carry the moulding of a band upon which in high relief are grotesque animal masks. Above this band rises the main portion of the column, which is daintily covered with delicate scroll-work springing in balanced intertwining on each side a terminal figure. The right of the column is a simple pannelled flut or support (No. 382) with a peculiarly modelled female head of classic type, carrying an abacus with volutes. This is by Tonelli, of the Training Class at South Kensington. A young lady, Miss Gertrude Keane, of Manchester, has produced an admirably-composed pilaster, rendered in low relief as suitable for plaster work (No. 49). The capital (No. 392), with grapes and vines, is massed with a certain decorative sense,

but altogether lacking decorative treatment in the rendering of the objects themselves, is by Edward Compton, of the Training Class.

The two best of the architectural designs have gained gold medals. These are by F. Whitwell of York, who has made drawings for a cathedral (No. 12); and Herbert Tooley, of Great Yarmouth, who has made drawings for a college (No. 11). Samuel Eachus, of Birmingham, has designed a bank and offices (No. 15), a tall, Flemish Gothic building of pleasant proportions. The design for a church in Late fifteenth-century Gothic style (No. 18), by James Tonge, of Barrow-in-Furness, is very commendable with its carved and pierced wooden pulpit and screen, which recalls the beautiful works of this kind which abound in Devonshire.

We are glad to see among the students' work some measured drawings from various buildings. Percy Adams, of Ipswich, has measured and drawn the Church of St. Margaret, at Ipswich, giving an exterior elevation, a transverse section interior elevation of one bay, details of the nave, canopy, niche, flint panelling, and gargoyles. William Hill, of Leeds, does the same for Skelton Church, near Leeds (No. 44). William Caple, of Cardiff, has sent pen-and-ink drawings (No. 28) to scale of various carved wood panels in St. John's Church, Cardiff. Amongst the ornamental designs are some for iron gates; the highest prize for these is won by John Macfarlane, of Manchester. He has adopted elegant proportions for the leading lines of his gate (No. 52), and without detracting from their structural importance, he has introduced between them light ornamentation which could be effectively made in wrought iron. The cresting group on the gateway is composed of a shield placed between two birds facing outwards.

Of machine drawings there are a number. Those from the Bradford Technical College Science Class are noticeable for thoroughness of work and careful recollection. J. Broughton, of Blackburn, has made two tinted drawings in projection, of stone-dressing machines (No. 18). Nos. 24 and 25, by Clarence Becher and Thomas Stephenson, of Bradford, are outline drawings of a Great Eastern Railway Company's express locomotive and twin triple-expansion engines of the steam-ship *Arabian*. George Simpson, of Grantham, contributes a tinted drawing in projection of a corn-mill. Outline measured drawings of a torpedo-boat compound engines, of lattice-girders with bending moment and shearing force diagrams (No. 81), and of vertical, strut, and Warren girders (No. 199), come from Bradford.

Glancing through the list of awards, it is seen that two gold medals and six silver medals are given for architectural designs; two gold and fifteen silver medals are awarded for various decorative designs, painted and modelled such as those briefly mentioned; four silver and five bronze medals are given for machine drawings, and four silver and three bronze go to measured drawings from historical buildings.

THE KENT ARCHEOLOGICAL
SOCIETY.*

Prior to the perambulation of Rochester Cathedral the dates of the erection of the various portions were stated as follows. They are now given, since they will be of service to any visitor desirous of elucidating the growth of the present building. A.D. 604, the consecration of Justus as first bishop by St. Augustine, and a church of stone built by Ethelbert, king of Kent. Between 1077 and 1080 Bishop Gundulph erected a bell tower on the north side of the present church. The lower part still remains. About 1080 Bishop Gundulph rebuilt the Saxon church. The church then erected consisted of a choir and aisles six bays long, narrow transepts, and a nave of nine bays, the west front being probably not completed. Of this building the western portion of the crypt still remains, also four of the south arches of the south aisle (recessed in front) and parts of the aisle walls. 1115-1124, re-arrangement of the choir and completion of the nave, west front, &c., still in existence, the work, perhaps, of Bishop Ernulf. The west front and diaper work in the triforium are of slightly later date than the arches. 1130, consecration of the church. 1138, destruction of the

church and monastery by fire. The gable of the south transept was probably reconstructed after this event, and executed by William the Englishman, or workmen of his school, the mouldings being identical with some of his work at Canterbury. 1179, second destruction by fire. Outer wall of north choir aisle probably of this date. About 1190, lower part of the outer wall of the south choir aisle built as part of a new cloister. Commencement of the central tower piers, carried up a few feet only. About 1195, removal of the eastern half of the Norman crypt and east end; erection of the present extended east end and its crypt. About 1220, rebuilding of the Norman choir by Wm. de Ho, Sacrist, from offerings at the shrine of St. William of Perth. New choir first used in 1227. About 1235, the great north transept and north-west tower pier built. Begun by Richard de Eastgate, Sacrist, and almost completed by Thos. de Meopham, Sacrist, in 1255. About 1240, demolition of a small south tower, erected by Gundulph, somewhat similar to that on the north side; erection of south choir aisle in its present form, but the roof is later. 1240, dedication of the church, i.e., the choir, by Rich. de Wendover, Bishop of Rochester, and Rich. Bishop of Bangor. Shortly afterwards, erection of the south transept, south-west tower pier, the south, west, and north arches of the tower. The two eastern bays of the nave erected in place of Norman arches removed, as if the intention had been to remodel the nave. The junction of the two works made good about 1322, when various small changes of work and alterations were effected; 1327, insertion of small door in west front, apparently for entrance of parishioners of St. Nicholas, the parish altar being in the nave; 1343, erection of central tower and leaded spire, for four bells, by Bishop Hamo de Hythe. About 1344, insertion of Decorated window tracery in windows of presbytery; door to the chapter-room apparently of this date. 1423, removal of the parish altar from the nave, where it had stood probably at least from Gundulph's time, owing to disputes with regard to the two services; erection of the present parish church of St. Nicholas on the north side of nave. About this time, or a little later, insertion of Perpendicular windows in nave aisles; building clearesty and vaulting of the north choir aisle. About 1470, great west window inserted, nave clearesty rebuilt, with its pinnacle of western gable. About 1490, westward extension of the Lady-chapel, which is in the south-east angle of the nave. 1544, erection of the pannelled book-desks in choir for use of secular canons instead of the monks of the suppressed priory. 1591, destruction of a great part of the chancel by fire. 1664, south aisle of nave recessed. 1670, north aisle partly rebuilt; rebuilding of north turret of west front and tower of the south turret, later. After 1779, partial demolition of Gundulph's north tower. 1826, repair of church and erection of present tower by Mr. Cottingham. 1850, new font. 1872 and later, repairs by Sir G. Scott.

The whole of the above, with references to the various authorities, were rendered by Mr. St. John Hope in a lecture of much interest, but unduly lengthy. During the perambulation he pointed out the remains of the choir fittings, probably the oldest cathedral oakwork still doing duty to be found in England.

The fine old Castle of Rochester was then inspected, and it was seen to great advantage, with the benefit of bright sunshine and a cloudless sky. Passing through the well-kept gardens the party assembled at the entrance to the keep, where Mr. Aveling described its history, illustrating his remarks by a carefully-prepared plan. The only portions of Bishop Gundulph's castle remaining are parts of the river wall, the present keep having been erected by Archbishop Corboul between the years 1126 and 1139, on the custody of the castle being transferred from the bishops of Rochester to the archbishops of Canterbury. The effects of the storming of the castle by King John in 1215 were explained by Mr. Aveling. The south-west turret appears to have been undamaged, and to have been entirely rebuilt, the work being much inferior to the Norman walling. The towers along the curtain wall were rebuilt about 1367-1380.

A dinner was afterwards held in the new Corn Exchange, presided over by Sir Walter Stirling. The party then returned to the cathedral to listen to an organ recital, with

* See p. 143, ante.

the singing of anthems, under the direction of the cathedral organist, the nave being filled by the visitors. It is fortunate that the doors of the cathedral were thus thrown open to the party, since thereby they escaped the effects of a sudden and violent storm of rain.

A *conversazione* was given later by the Mayor of Rochester, Mr. Lewis Levy, in the Corn Exchange, which was attended by many hundreds of visitors. Papers were read, including one by Mr. Roach Smith, F.S.A., on "Shakespeare at Rochester," and others, while Mr. Brenchley Rye had his paper on the "Episcopal Palace and Bishop Fisher" printed and distributed, whereby much time was saved. The visitors had an opportunity, at their leisure, of inspecting the really magnificent collection of old plate, &c., arranged with great taste, and evidently as the result of considerable pains, in the temporary museum. The space for the museum was the whole outer hall of the Corn Exchange, and this was filled with cases containing ancient coins, seals, pottery, and such like. Above all in appearance, but not in interest, the collection being so valuable, were the macos of Maidstone, 1548; Rye, 1576; Queenborough, 1608; Fordwich, 1665 (small mace); with large ones of Rochester, Canterbury, Deal, Gravesend, Fordwich, Rye (2), and, with others, the modern macos of Ramsgate and Folkestone. There was also a rich display of church plate from Chatham, Aylesford, Cowling, Cuxton, a very fine cup from Lenham, the cathedral plate, &c. The arrangements of the museum reflected great credit upon the local committee which had undertaken the arduous duty of its formation.

Thursday, the 22nd, was a day of brilliant sunshine; and, as the party, considerably augmented, proceeded through the green lanes of the country east of Chatham, the pretty landscape of well-fitted orchards, and cornfields betokening an abundant harvest, was seen to great advantage. The first halt was made at Gillingham Church, the history of which was told shortly and effectively by the Rev. Canon Scott-Robertson, the hon. secretary of the Society. The building is of fairly large size, having an embattled nave and side aisles, with a western tower, the staircase turret of which is circular. While the general features of the church are rather Late Perpendicular in style, there is a remarkable Early Norman font of circular form, having an arcade of blank panels around it. The nave arches are of late Early English character. The rivalry between the two famed statues, Our Lady of Chatham and Our Lady of Gillingham, was amusingly desecrated upon by the lecturer. Driving onwards, in a long procession of about twenty-one carriages, Rainham Church was reached, its fine tall tower having been seen by the party all the way from the last halting-place. A short inspection of Bloor's Place and its wonderfully preserved oak panelling, was permitted in passing. The church is a fine characteristic specimen of a Kentish church, with a somewhat plain exterior, and with its interior full of points of interest. There is no chancel arch; the roofs are mainly of fourteenth-century date; there is some very good thirteenth-century work in the chancel. In the vaults there are many interments of the Tufon family. Luncheon having been partaken of, progress was made to the quaint old church at Upchurch, which was also described by Canon Scott-Robertson. The church has a singular wooden spire formed by an octagonal portion placed upon a square base, the whole resting upon a plain Early English tower. There are here stone benches, arcades worked in chalk, wall paintings, early screen work, good Early English arches, encaustic tiles, a curious chamber at the west end of the north aisle (traces of), and five piscines. Passing onwards, Newington Church was reached, where again Canon Scott-Robertson pointed out the points of interest, especially that there were here before the Reformation three altars to the Virgin Mary. The church has a very good tower, which groups remarkably well with the landscape. Hartlip Church was next visited; it is a small building, the western tower having quoins of large size. Tea was partaken of on the lawn of Hartlip Place, to which the whole party were kindly invited by Mrs. Godfrey-Faussett-Osborne. Here terminated one of the most enjoyable of meetings, and the party separated with many expressions of gratification to the honorary secretary for the admirable pro-

gramme and for the way in which it had been carried out. The churches visited were of much interest, each one presenting features deserving of careful study, and at each many fragments of Roman material re-used in the walling were observable, particularly at the east end of Newington Church.

THE ST. JAMES'S DWELLINGS, WESTMINSTER.

In the last volume of the *Builder* (pp. 471, 486, March 27th last) we gave view, plans, sections, and detailed description of some industrial dwellings just then decided to be erected by the Vestry of St. James's, Westminster, with a trust fund at their disposal. This trust fund, it seems, is no other than part of the proceeds of the sale of part of the St. James's Burial-ground, Hampstead-road, to the London and North-Western Railway Company,—a proceeding which excited a great deal of opposition a few years ago. The new St. James's Buildings occupy a site at the bottom of Beak-street, Regent-street, with frontages to Silver-place and Ingestre-place. They are in the midst of what appears to be an exceedingly poor neighbourhood, though so near to Regent-street.

The following is a copy of the statement deposited in the foundation stone of the buildings, which was laid by the Hon Maude Stanley on Monday afternoon last:—

"The funds for the erection of this building were mainly derived from the sale of the burial-ground situate in Hampstead-road and formerly belonging to the parish of St. James, Westminster. The sale was effected under the provisions of a Special Act of Parliament obtained by the London and North-Western Railway Company in the year 1883. The Company sought power to acquire on payment of 15,000l. so much of the burial-ground as had not been disposed of under the St. James's Chapel Act, 1869. The Company were, however, restricted by Parliament from taking the whole of the ground for the purposes of their undertaking, and the trustees of the burial-ground were required by the Act of 1883 to convey a specified portion to the Company for the sum of 8,000l., and the remainder of the ground, without further consideration, to the Vestry of St. Pancras (within which parish the burial-ground was situate), to be by them preserved as an open space. The purchase-money was directed by the Act to be applied to such ecclesiastical, parochial, and other purposes for the benefit of the parish of St. James as the trustees, with the sanction of the Vestry, might direct. The money was paid into Court by the Railway Company, and the burial-ground conveyed, as to a portion thereof to the Company, and as to the remainder to the Vestry of St. Pancras. After mature deliberation the trustees decided to apply one equal moiety of the fund to ecclesiastical purposes, and the other moiety to secular purposes for the benefit of the parish, and the Vestry sanctioned this mode of applying the money. The moiety applicable to ecclesiastical purposes having been paid over to the rector and churchwardens upon certain definite trusts, it became necessary to decide upon the particular secular purpose to which the remainder of the money should be devoted, and, after having considered several proposals, the trustees, with the sanction of the Vestry, decided to apply the same, amounting to about 4,000l., to the erection of a building for the accommodation of the labouring poor. This fund was supplemented by the assignment of a leasehold house, known as No. 7, Ingestre-place, which had been erected by voluntary effort in or about the year 1850, as a model lodging-house, and a sum of about 2,000l., being accumulated surplus rents derived therefrom, also by the transfer of a further sum of nearly 80l., being the unapplied balance of a fund raised for the relief of sufferers by a fire which occurred in Little Windmill-street in the year 1876, and by the transfer of a sum of 200l., a portion of the funds remaining in the hands of the trustees at the closing of the trust in July, 1886, under the provisions of the London and North-Western Railway Act, 1884. The total sum thus available for the building is nearly 6,800l. The building is erected by the authority of an Order of the High Court of Justice (Chancery Division) made by Mr. Justice Pearson on the 3rd day of August,

1885, the scheme being set forth therein as follows:—

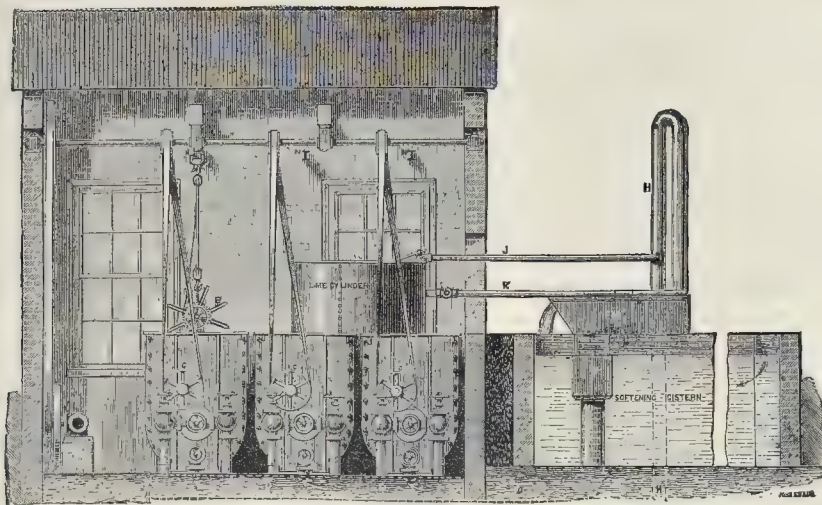
1. The funds are to be applied by the Vestry of the Parish of St. James, Westminster (hereinafter called the Vestry) in or towards the erection and fitting up of land comprised in the agreement dated the 18th of March, 1886, and made between Sir Richard Francis Sutton on the first part and the Vestry of St. James, Westminster, in the county of Middlesex, of the second part, of a lodging-house or lodging-houses to be used to and for the accommodation, at moderate rates, of female pieceworkers and others of the labouring class.
2. Such lodging-house or lodging-houses, and the premises, No. 7, Ingestre-place, are to be vested in the Vestry, and to be under the control and management of the Vestry or a Committee appointed by them. A declaration or declarations of trust of the premises comprised in the said agreement for lease of No. 7, Ingestre-place shall be executed by the Vestry and assent pursuant to the Acts of George II., chapter 39, and Victoria, chapter 9.
3. Any surplus income of the said properties, after providing for repairs and other outgoings and expenses, shall be invested in the name or names of the Vestry or of trustees to be appointed by the Vestry in such manner as the Vestry, with the approval of the Charity Commissioners for England and Wales, a court of competent jurisdiction, shall hereafter determine, either in perpetuating and extending the operation of the scheme, or for other purposes in or for the benefit of the said parish.

Plans were invited from the four universal mentioned architects, all of whom possessed special knowledge of the requirements of the artisans' dwellings.—Mr. H. H. Collins, 61, Broad-street, E.C.; Mr. H. M. Eytton, Ipswich; Mr. E. C. Robins, 14, John-street, Adelphi; and Mr. Ernest Turner, 24, Regent-street, London. No premium was offered, but a stipulation was made that if either design was adopted by the Vestry, the author thereof should be appointed architect at the usual rate of remuneration. Each of the architects named submitted a set of drawings, and the Vestry assisted in their choice by Mr. John Thomas Wimpey, of 25, Sackville-street, and Mr. D. Cubitt Nichols, of 3, Howard-street, Strand, who generously acted as honorary professional advisers. These gentlemen reported in favour of the design of Mr. H. H. Collins, and a report was approved by the Special Committee appointed to consider the matter, and unanimously adopted by the Vestry. Mr. H. H. Collins was accordingly appointed architect, and tenders for the erection of the building upon quantities taken out by Messrs. Gardner, Son, & Theobald, of 110, Great Russell-street, were invited from seventeen firms of builders, each of whom sent in a tender. Certain specifications were subsequently made in the quantities, and the tender of Mr. Mark Gentry, No. 2, Wormwood-street, in the City of London, to carry out the work on the revised quantities for the sum of 5,573l. was accepted. The building was to be erected in three years, on lease from Sir Richard Francis Sutton, Bt., for the term of sixty-three years from the 1st of June, 1886, at a ground-rent of 50l. per annum, the original ground-rent of 75l. had been reduced by Sir R. F. Sutton, in consideration of the object for which the building was to be erected. The building is designed to comprise twenty-three single-roomed tenements, twelve two-roomed tenements, six rooms for the caretaker, and a general workshop and workroom. The work is commenced in the hope that it will benefit the poorer labouring classes in the parish, to the increasing extent as the surplus rents are of an extension of the operation of the trust.

Mr. Allen is the clerk of the works, and Mr. Brown is the contractor's general foreman. It will be seen by the plans and sections referred to, the architect, Mr. H. H. Collins, has paid special attention to the details of sanitary arrangements.

From what was stated at the meeting, it appears that nothing is yet settled as to the amounts of the rents for the tenements, but it is hoped to provide widows and single women engaged in industrial pursuits (who will be preferred rather than the robust workman) a better able to fight the battle of life (they) with comfortable and homelike accommodation at a rent somewhat less than would have to pay for inferior lodgings elsewhere.

Altogether the work thus commenced by the Vestry constitutes an important social experiment, and the promoters were happy in the choice of the Hon. Maude Stanley as the first of the foundation stone, that lady having taken a very active interest in the well-being of the poor of the neighbourhood, and especially of the women and children.



Section showing Arrangements at the Henley Waterworks.

WATER-SOFTENING AT HENLEY-ON-THAMES.

On Saturday last a large number of gentlemen interested in municipal and local government, together with several engineers, chemists, and medical officers of health, visited Henley-on-Thames, on the invitation of the Atkins and Engineering Company, for the purpose of inspecting the water softening and filtering apparatus erected by that Company in connexion with the Henley Waterworks some years ago, and which has been in uninterrupted and successful operation ever since, affording the supply for the whole of the town. The waterworks were erected early in 1882, by Mr. Jabez Church, C.E., being the engineer. The water is obtained from a well sunk into the chalk, and is softened by the Atkins process, hereafter described. For domestic no less than for industrial purposes, the means of softening hard water have of late years necessarily attracted much attention, but it remains a fact that the only practical and economical method known of softening hard water was discovered by the late Mr. J. B. Clark, in the year 1841, and consists of adding a small quantity of lime water to the hard water. It might be supposed that this would render the water harder, but such is not the case. The lime combines with the carbonic acid which holds the chalk in solution, and a precipitate of extremely fine white powder (carbonate of lime) is formed, which can be allowed to subside, or is removed by filtration. The "Porter-Clark" process, which was fully described and illustrated in the *Builder* for No. 15, 1877, consists in the combination, with Mr. Clark's process, of a system of filtration. In the "Atkins" adaptation of the Clark system, the process of softening is carried on continuously, in the following manner:—The hard water is pumped from the well into an automatic "mixer" (lettered M in the above illustration), a small quantity being diverted and passed through a cylinder (shown in the illustration) containing cream of lime whence it issues as a saturated solution of lime water, and joins the bulk of the hard water. The lime water and hard water then flow through the "mixer" into a softening cistern. This cistern always fills, and the water travels slowly from the one end to the other in the course of an hour, by which time softening is effected; and the water has a milky appearance, owing to the presence of carbonate of lime in suspension. In this state the water is conducted to the filters, where the deposit is arrested, and the water, softened and filtered, is received by a duplicate pump, and forced to the storage reservoir. The whole process is automatic and continuous. At the end of the day's work the filters are cleaned in a few minutes by steam power.

The improvements introduced by Messrs.

Atkins, it will therefore be understood, relate chiefly to the application of labour-saving machinery to the Clark process. Their filtering apparatus consists of large filters, which can be used either singly or in sets of two, three, or more, according to circumstances, so connected that any one or any two can be used alone, or all can be used at the same time. The "Atkins" patent machine filters are constructed with a series of hollow metal discs, covered with cloth, so arranged as to give the largest possible amount of surface in the smallest space, and sets of revolving brushes are attached in such manner as to play over the whole surface of the discs when set in motion. When a filter requires cleaning the brushes are made to revolve by a pulley outside the filter tank, worked by steam, and so quickly is the cleaning effected by this means that the cleaning of all the filters scarcely occupies half an hour a day.

In addition to the machine filters and their connexions, the "Atkins" patent water-softening apparatus, of the size of the one at Henley, comprises the following parts:—1. A "softening cistern," about 25 ft. long by 12 ft. wide by 5 ft. deep, holding about 10,000 gallons; 2. A "lime cylinder," in which the lime water is formed; 3. special regulating valves; 4. a specially-designed "mixer," for facilitating the proper mixing of the lime water with the hard water; also some minor apparatus and material introduced specially by Messrs. Atkins to save time and labour. The following are the references to the lettering on the illustrations: C, Straps and wheels for setting filters in motion for cleaning purposes; D, Outlet from softening-tank and supply to filters; E, Outlets from filters; H, Hard water supply; J, Branch to lime cylinder; K, Outlet from lime cylinder to "mixer"; M, Mixer.

The whole space occupied by an apparatus capable of delivering over 100,000 gallons in ten hours, or 250,000 each day of twenty-four hours, is as follows:—

	Sq. Feet
"Softening Cistern," "Lime Cylinder," &c., about 600	
Set of three Machine Filters, including their connexions	300
Total	900

The filtering-apparatus is thus very compact as compared with sand filter-beds, and at the same time can be readily extended or diminished to meet varying demands. Of its efficiency, Mr. Jabez Church, the engineer of the Henley Water Works, writes,—"I have had ample time and opportunity of proving the capabilities of the water-softening apparatus. I find that we can uniformly reduce the hardness from 18° to 5°, and that one man one hour a day can do all that is necessary for softening and filtering 100,000 gallons. I may also add that I am generally very pleased with the apparatus, it being most useful, easily managed, and thoroughly reliable."

The Atkins Company's process has also lately been adopted for treating the water-supply of the town of Wellingborough, and has been adopted by the Corporation of Southampton (on the recommendation of their engineer, Mr. W. Matthews, M.Inst.C.E.) for use at the new waterworks at Otterbourne, now in progress of construction, for softening and filtering the whole town's supply, which amounts to between 2,000,000 and 3,000,000 gallons a day. In addition, it is in use at Lambeth Workhouse and other large public and private institutions, giving great satisfaction, as we have learned upon inquiry, on the score of its efficiency, economy, and simplicity.

THE MANCHESTER SHIP CANAL.

SIR,—In re the proposed Manchester Ship Canal, I am somewhat surprised that you should so persistently take the view that Liverpool is alarmed at the prospect of competition, and really bases its opposition on this apprehension, and that you should think it worth while to reprint such a suggestion as that there may accrue to the shareholders eventually a dividend of even 18 per cent.

With many opportunities of gathering the opinions of our leading and least prejudiced merchants and shipowners, I am convinced that the enlightened view is that Liverpool cannot help being actually benefited by any scheme which must result in some reduction of carriage rates to inland towns, and probably of our Dock Board rates too.

It is very shortsighted of any one to suppose that the railway companies will quietly sit down while the canal, supposing it to be made (which seems at least doubtful, as the money is not flowing in as was anticipated by the promoters), takes away their business, and that the sharp competition which would ensue would not naturally reduce the profits of the canal. Such competition would be encouraged by steamship owners, who do not like the risk and delay of navigating long canals. Many people think it very probable that such a canal would fail to pay by itself, and would fall into the hands of the railway companies eventually.

To adduce the case of the Suez Canal as a parallel, as I have seen and heard done, is simply illogical, and betrays ignorance of the situation.

If the canal ever be constructed and worked, probably every one will be benefited, more or less, with the somewhat important exception of the shareholders.

W. H. S.

Liverpool.

The Calvinistic Mission Hall, Cardiff.

On Wednesday last, the 28th inst., three memorial stones of the Calvinistic Mission Hall, Cardiff, were laid. The building is of Gothic character, and consists of a hall, 42 ft. by 49 ft., accommodating about 400 persons; and opening into the same are infants' classroom accommodating about 80, and minister's vestry. The contract amount is £24, and the building is being erected from the designs and under the superintendence of Mr. J. H. Phillips, architect, Cardiff. Adjoining the hall, a large plot of ground is being retained for the erection of a chapel.

DRAIN VENTILATORS.

Sir,—It seems to me that the houses described by Mr. Campbell in your last issue [p. 145] are in no worse position than those which are facing or near to the sewer ventilators in roadways. People seem to think it all right as long as they notice no unpleasant smell, and there are still some who do not seem to mind even that. Passing along Southampton-row the other day, I noticed a small coming from an untrapped gully. I remarked to a man standing at a shop door close by that this was very dangerous; he said, "We never notice it." I suppose he had got accustomed to it. I am afraid street gullies are as often untrapped as not.

When one sees men cleaning them out they never appear to pour water down afterwards; at least, I have never seen them do so; the trapping is left to chance rain or the watering-cart, but perhaps the men do not see much use in trapping them. It certainly does seem ridiculous to trap a gully when you have an open grating a few yards off.

CHARLES F. MOXON.

SUMSION v. PICTOR.

In reference to the notice of this case in your last issue [p. 145] I ask you to insert, on my part, the following brief statement.

In the year 1877 I took a lease granted by Sir G. Goldney, Bart., of 36 acres of stone lying under the park in which Monks' House in the parish of Corsham is situated, and found valuable stone. I sold the stone to a large extent under the name of Monks' Park Stone, and in the year 1882 registered a "Trade Mark" under the Act of 1875 with the name of "Monks' Park" as the description of stone from my particular quarry, thinking thereby to prevent the use of this name by any other quarrymaster who might after that date raise stone from the other parts of the Monks' Park Estate.

In April, 1883, I for the first time saw by an advertisement in the *Stonemason* that the defendants were offering "Monks' Park Stone" for sale. I remonstrated with them against the use by them of the term "Monks' Park" as a description of their stone, and they ceased to advertise it in "newspapers" under that or any similar name, but, as they allege, continued to advertise it by the circulation in the trade of "slips" and "pamphlets," under the name of "Pictor's Monks' Park."

This "slip" and "pamphlet" advertisement the learned Vice-Chancellor was certainly convinced, at the hearing of the motion, had come to my knowledge at the time or immediately after the ceasing of the defendant's advertisement in the *Stonemason*, but, as a matter of fact, I had no knowledge of the defendant's "slip" advertisement until shortly before I applied to the Vice-Chancellor, and as the defendants, in their defence, partly relied upon *lack* on my part for not having followed up my remonstrance in 1883 against their use of the name, probably had I been in possession of this information the result to the defendants might have been different.

ISAAC SUMSION.

Bath, July 23th, 1886.

THE "SIPHOSILLA" PIPE FASTENING.

EVERY ONE who has had to do with the repair of buildings has had more or less experience of that fruitful source of mischief, a stopped rain-water pipe. These pipes are always liable to be choked by rubbish of some kind. When this takes place, or when a pipe cracks, and great damage has been done both to the inside and outside of a building by the overflowing or escaping water, it is often very difficult and expensive to detach a length or two of pipe for clearing or renewal. Generally, several workmen with long ladders are required, and the expense incurred is out of all proportion to the actual amount of work done, to say nothing of the damage sometimes incidentally done to the walls in detaching an old or securing a new length of pipe.

We have had brought to our notice a new method of securing such pipes which appears likely to go far towards overcoming the evils just referred to. The invention in question, which has been patented by Messrs. G. Potter & Son, of High-street, Hampstead, is extremely simple, and consists of two parts, the first being a cast-iron seating or chair (A), which takes half the diameter of the pipe to be fixed, and which is secured to the wall of the building by pipe nails, in the ordinary way; the second part being a cast-iron semicircular clamp (B), which takes the remaining half of the pipe, and easily but securely fits the chair by two tapered dove-tail joints (CC). These joints are, in fact, similar to the joints of metallic bedsteads, and the clamp B is easily detachable by one or two slight blows on the under surface. The pipes ordinary cast-iron pipes, cast without ears.

The advantages claimed for the invention are thus enumerated by the patentees:—

1st.—That after the chairs are once fixed any unskilled labourer can readily detach and renew one or more lengths of pipe in a few minutes.

2nd.—That the pipes can be revolved while secured in position, thus enabling the whole of their outside surfaces to be painted, and so lessening the liability to rust through at the back.

3rd.—That the pipes being necessarily fixed $\frac{1}{2}$ in. clear of the walls, they are less liable to get cracked during frost, or to make the walls damp when leaky.

4th.—The avoidance of damage to ornamental stone or brickwork in good buildings, which the renewal of defective rain-water pipes fixed in the old way so often entails.



We are informed that Messrs. Pfeil, Stedall, & Son, of Broad-street, Bloomsbury, are the sole agents for the sale of the new fastening, which, it may be stated, can be applied to pipes of any design. The invention, in the form now illustrated, is the simplest and latest embodiment of the principle of Messrs. Potter's invention, which in one form or another has been applied with much success, we understand, to a number of houses at Hampstead.

Wimbledon.—On Friday, the 9th inst., there was laid the foundation-stone of a new Roman Catholic Church which is in course of erection in Darlaston-road, Edgehill, Wimbledon. When completed the church will consist of nave, aisles, large square tower at west end, chancel, and side chapels, together with sacristies and south porch. The total internal length will be 168 ft., the width 64 ft., and the height from floor to apex of nave-roof being 59 ft. Seatings will be provided for upwards of 800 persons. The style is to be Late Decorated. Internally the church will be almost entirely of Beer stone, whilst externally the walls will be faced with split flints, Ancaster stone being used for the tracery windows and other ashlar work. The architect is Mr. Frederick A. Walters, of Great Queen-street, Westminster, and the contractors are Messrs. Goddard & Sons, of Farnham.

CHURCH-BUILDING NEWS.

Bamber Bridge (near Preston).—Recent three foundation stones were laid at the chance end of St. Saviour's Church, Bamber Bridge near Preston. It is proposed to considerably enlarge this church by erecting new chancel, transepts, organ-chamber, and vestry, and further improve and adorn the existing building, from designs by Mr. T. Harrison Myres, A.R.I.B.A. (Messrs. Myres, Veivers, & Myres, architects, Preston). The works are being vigorously carried out by Mr. Charles Walker of Preston, the total cost being about 3,000*l.*

Goreinon (Glamorganshire).—St. David's Church, Goreinon, situated in the grounds of Penllergare, was built in the year 1837 by the late Mr. John Dillwyn Llewelyn. It has just been repaired, and enlarged by the addition of a chancel, 37 ft. long by 18 ft. wide, together with an organ-chamber and a vestry. The whole of the nave has been re-seated, the seats being of pitch-pine. Six steps lead up to the communion-table. The roof of the chancel is formed of pitch-pine, and is late Early English style; in fact, the whole of the timber in the roof is of pitch-pine, unvarnished, and in a natural state from the carpenter's bench. The east end of the chancel is a three-light moulded Early English lancet window, with four columns supporting the interior arch above. The floor of the chancel is laid in encaustic tiles. In front of the communion rail and in the tiled floor is laid a brass, memory of members of the Llewelyn family. An arch, deeply moulded, and executed in red bed Farleigh stone divides the chancel from the nave. The wood principals over the sanctuary are supported by columns running from the floor to the roof, with moulded English capitals. On the north and south sides of the sanctuary are two long lancet windows. The base of that on the south side is formed for a scullia. The old doors of the porch had been taken away, and in their place have been substituted others of oak. The whole of the work has been carried out from designs by Mr. James Buckley Wilson, architect, Swansea, and the work has been carried out by Messrs. Thomas Watkins & Jenkins. The hot-water apparatus for heating purposes has been supplied & fixed by Mr. Bonnett, Swansea.

DISSENTING CHURCH-BUILDING NEWS.

Birmingham.—The Wesleyan Chapel, Cherry-street is about to be pulled down. The society having obtained, after ten years' negotiations with the Improvement Committee, a freehold site at the corner of Corporation-street and the Lower Priory for the purpose of building a new chapel with schools and class rooms invited several local architects to submit designs in competition, showing how suitable premises for their accommodation could be arranged with shops for letting on the ground-floor. The plans of Messrs. Osborn & Reading, of Bennett's-hill, Birmingham, were selected. The buildings are now in course of erection and include on the ground-floor fronting Corporation-street two large shops, with basement under, and a smaller shop with basement under the Lower Priory. The inclination in the adjoining streets admits of a level entrance from Dalton-street to the basement of the shops. The principal entrance to the chapel premises is in the centre of the Corporation-street facade, by a wide corridor leading to a spacious staircase and hall on the first floor, of which is entered the chapel, meeting-house, and vestries. The chapel occupies in length the frontage to Corporation-street; over the shops adjoining the Lower Priory it has an apsidal end, in which will be placed the minister's platform, and at the other end an organ-gallery. It will accommodate 300 persons. The hall and chapel communicate by a corridor out of which the vestries and retiring-rooms from the platform are entered. The meeting hall is 56 ft. by 55 ft., and will occupy the bulk of the first floor. There is also an alcove for the orchestral platform and organ, and gallery on three sides. It is lighted from the Lower Priory and Dalton-street, and from internal area. The whole of the first floor staircases are to be constructed with fireproof materials. Separate staircases are provided for the hall, so that it may be used independently, one at the corner of Dalton-street and Lower Priory, and the other from Dal-

reet. Under the hall will be placed the school buildings and class rooms, libraries, secretarial and other rooms, entered from the lower Priory by a separate entrance, staircases, and corridor; and on the Dalton-street level the infants' school, tea meeting room, and a special school for children of the poor. Entering from Dalton-street, are the caretakers' apartments, and tea kitchen, heating apparatus, &c., conveniently placed, adjoining each other. The external elevations are to be carried out in the Mediaeval style of the thirteenth century, depending more upon proportion and grouping than upon elaborate details. In the centre of the Corporation-street facade is a six-light window and gable over, rising to a height of 80 ft. from the pavement. The Lower Priory elevation is well broken up above the shop level, and in the angle formed between the chapel and meeting-hall is placed an octagonal turret or spire, rising to the height of 120 ft. The materials used in the elevations will be Darley Dale stone on the ground or top story, with red brick facings, and Corsham town stone on the upper stories, the high-topped roofs being covered with red tiles. The works are being pushed on rapidly by the contractor, Mr. John Bowen, under the immediate direction of the architects.

St. Kilda (South Australia).—The Melbourne Argus of May 29 records the completion of the new Presbyterian Church at St. Kilda. The church, which is calculated to accommodate 100 persons, occupies a prominent site at the corner of Barkly-street and Alma-road. The main buildings, consisting of a nave and two aisles, are built in the Gothic style, of bluestone, with dressings, mouldings, enrichments, tracery, windows, pinnacles, and spire executed in patent hydraulic freestone. The length inside is 110 ft.; width, 62 ft.; the height from the floor to the springing of the ceiling is 30 ft., and to the ridge 52 ft. There is a spire rising to a height of 142 ft. The white freestone of which it is constructed forms a striking contrast to the sombre bluestone of the main buildings. The architects were Messrs. Wilson Beswick, of Melbourne, and Mr. Thos. Corley is the contractor.

The Student's Column.

STONE QUARRIES.—V.

GRANITE QUARRYING.

IT would be impossible to state, with any pretensions to accuracy, the date when granite first began to be quarried. We know that the ancient Egyptians quarried the red granite of Syene as far back, at least, as the reign of Zestus, king of Thebes, 3000 years before the Christian era. These quarries can even now be traced along the hills near that place, and one of them still retains a half-finished obelisk of ancient sign.*

When granite was first used as a building material in the British Islands the loose blocks were hewn about the surface of the ground were used for the purpose, and granite quarrying, now understood, was not begun till about the middle of last century, but it was a long time before the methods of working it were such as to promise a good supply of stone.

The granites of Aberdeenshire appear to have been the first to attract the attention of miners and surveyors, for we learn that in 1744 it was resolved to have the streets of Aberdeen paved with Aberdeen granite.† From that date the export trade of Aberdeen gradually increased, especially after a lapse of a few years, when the stone at first obtained, having undergone practical tests, was shown to be of good quality. Great quarries were then opened in the important branch of industry which characterises that city was begun in earnest.

It appears from a reference in "Kennedy's Memoirs" that the contractors for paving the streets of London, began quarrying operations in the rocks on the sea-coast of the lands of Aberdeenshire, and transported the stones roughly sawn to London. This mode of procedure at length found to be too expensive, and the owners of Aberdeenshire were employed to work the stone to proper shape, according to contract, a system which in the main has survived to the

present day, and will, no doubt, be likely to do so for a long time to come.

Machinery was first used in quarrying these granites about the year 1795, when stones of large dimensions were ordered by the Admiralty for the docks at Portsmouth, at that time in course of construction. This machinery, however, was very crude, and several years elapsed before much progress was made, either in keeping the quarries in good working order or in improving the instruments of labour. When a step was made in that direction steam-power was introduced, with the result that the output of stone was considerably augmented, and, worked-up material being produced at a cheaper rate, Aberdeen granite came to be more generally used.

One of the first things to attend to in opening a quarry is to observe the lie of the rock. To give an example of the importance of this we may state that in the old Cairngall quarry the stone lies from east to west. The east side of the hill is that on which this quarry was opened, with great success. Shortly afterwards another quarry was opened on the same hill, but on the west side, and the working had to be abandoned. The posts of granite, by which we mean the masses that stand separate from each other by dries or natural divisions, were the quarry to be worked on the side to which they incline, would fall upon the workmen engaged beneath them.*

After a quarry has been opened up, the "clean" rock is detached from its site by means of powder, unless the stone lies in a favourable situation for detaching, when this is not required. The quarries where blasting is not carried on are few in number, and with one or two exceptions are unimportant. In some quarries the powder is exploded in holes varying from 5 ft. or 6 ft. to 20 ft. in depth, and from 3 in. to 6 in. in diameter, according to the size and position of the rock. The process of splitting these masses, when detached, into suitable pieces for dressing, is effected by means of "plug and feather" wedges. Holes about 4 in. apart and 3 in. deep are bored by "jumpers." Into these the "plugs," which are made either of iron or cast steel are inserted between two "feathers," or small thin pieces of wrought iron. The plugs are driven tight, and, under ordinary circumstances, a cleave is readily made. Sometimes as many as 300 holes are required in clearing a single mass; in such a case the operation is watched with much interest, as upon the result of the cleave the quarryman's chances depend.

In porphyritic granites the felspar often lies regularly, that is to say, the long axes of the crystals are approximately in the same direction, and the quarryman takes advantage of this, as it practically denotes the grain, or the way the rock will most readily split.

It is desirable that as little powder as possible be used, as otherwise the rock is frequently shattered in a direction not intended. The holes are usually filled up with powder and closed at the top, being fired with a fuse, timed to allow the workmen to retire to a safe distance.

The first "shot" or blast generally does no more than shake the rock, and make a number of cracks round the holes. The holes are again charged, when the cracks become filled with powder, so that the second shot does a considerable amount of work. The third shot generally brings down the finer grained kind of granites. The depth of the holes and the amount of powder, is regulated by the peculiar circumstances connected with each blast, such, for instance, as the size of the block to be detached, the position of the grain, lie of the joints (if any), and so forth.

Some of the principal quarries work the granite in benches, which occasionally are from 50 ft. to 70 ft. in depth, according to the magnitude of the workings.

Masons work granite in much the same manner as they do stones of a softer nature; but, of course, the time occupied in shaping is much greater in comparison with other stones. If the surface is not to be polished, it is usually left "fine-axed," as it is called, which is for the most part produced by an instrument composed of a number of thin slips of steel tightly bound together, their edges being on the same plane. The surface of the stone is then smoothed by a series of taps, given at right angles to the

surface previously operated upon. The introduction of machinery, however, has much facilitated the shaping of the stone, especially for circular work.

The surface of some of the granites used by the ancients, and handed down to us, has been observed to peel off, but it is noteworthy that the granites in buildings erected in recent years do not exhibit this peculiarity. Professor Tennant believed that this scaling was produced in the process of dressing, by which the tool fractured or "starred" the surface, so that eventually the fractured part would weather loose or fall off the stone. Whether this is so or not, there cannot be much doubt that this fracturing of the surface has become very much minimised, if it has not altogether disappeared from the better kinds of granite, by reason of the introduction of less cumbersome tools.

A very important branch of the granite industry is the polishing of columns, posts, monuments, &c. Most of this is done by machinery; mouldings, and other ornamental work not presenting plane or rounded surfaces, in some instances only, being polished by hand, which, by the way, is a very tedious process. The large size in which some of the finer granites of Cornwall is obtainable, has led to its use in monolith, stones of very large dimensions being frequently polished. Slabs, 10 ft. square, and columns from 20 ft. to 30 ft. in length, can be turned and polished, but for such stones special provision has to be made.

By far the greatest quantity of granite is quarried for dock-work, embankments, kerbstones, and things of a like nature. Mouldings and ornamental work made of granite, are much more common in the better class of buildings than they were a few years ago, whilst for monuments, drinking-fountains, &c., it is very popular. We notice that the foundations of several large buildings in London have recently been constructed with granite, and this is decidedly a step in the right direction. When we look at the rotten stone with which many large edifices in our metropolis are built, we wonder more and more, why granite is not oftener used for foundations, and exposed parts of buildings. We will not go so far as to say that the buildings should be entirely made of granite; but if more care were exercised in selecting the freestones and sandstones used in the less exposed situations, and good granite were placed in places where those stones would suffer most injury, the greater cost of the first production would be amply repaid eventually. We should then find in London, what appears to be a great rarity at present, viz., buildings made of durable stone. Besides, we must not forget that the greater demand, the cheaper granite will become, and the more machines for further facilitating the cutting, dressing, and working are likely to be invented.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,113, Ventilators. J. Honeyman, F.R.I.B.A.

The improvements in the form of ventilators in use consist chiefly in designing a chamber divided by two partitions or diaphragms, and with tubes inserted horizontally. The air or wind current enters by the air-trunk into the compartment of the ventilating chamber on one side of the central division or wall, the pressure closing the valve and preventing down-draught. One of the main features of the invention is to prevent down-draught, and another scarcely less important is that of preserving the architectural appearance of the building to which they are fitted. The apparatus instead of being set outside the roof in the usual way may be set inside the roof, and the air-trunks carried up flush to the slating of the roof; or the apparatus may be set on the joists under flooring, the air-trunks in that case being carried flush with the outer walls.

10,488, Improved Screw-driver. H. C. Chocquet.

This is simply a magnetised screw-driver so treated as to retain the steel screws fastened by it. The handle of the screw-driver is used also as a tool-holder, the tools being held by a set screw fixed in the opposite end to the blade or bar.

10,033, Tile Hearths and Fenders. S. B. Sutcliffe.

The object of this invention is to construct a tile hearth and fender combined which shall be complete in itself and shall not require to be affixed to the permanent hearth, nor require cementing into its place, and is thus capable of being removed say when giving up the tenancy of

* Trevor, "Ancient Egypt" (1883), p. 10.

† Bremner, "Industries of Scotland," p. 405.

* See paper by G. W. Muir, "On Granite Working," Journal of the Society of Arts, vol. xiv, (1886), p. 471.

house. The tile hearth is constructed with the surrounding fender all in one removable piece, and the fender of which is built up of tiles all secured by cement to a combined metal and wooden frame-work or base; the fender in some cases being further surrounded by an edging of wood, metal, or other suitable material.

8,931, Connecting Pipes, &c. W. Bruce.

The connexion of pipes and earthenware apparatus commonly used in closets is improved by using a faucet connexion, with packing between the earthenware bend and ring, which is secured and compressed together by means of screwed bolts passing through the ears of two rings. Improvements in flushing out water-closets, by using louver plates to direct the flow of water, are also incorporated in this patent.

NEW APPLICATIONS FOR PATENTS.

July 16.—9,244, S. Yeates, Surveyors' Levels.—9,252, F. Dove, Cramp.—9,255, H. Coombes, Sash Stop and Lock.—9,279, R. Robinson, Brick cutting Tables.

July 17.—9,296, J. Maxwell and C. Toke, Pillars or Columns for Building.—9,298, B. Pitt, Chimney Pot.—9,332, J. Carvell and W. Holland, Varnishes.

July 19.—9,362, W. Simpson, Opening, Closing, and Locking Windows.

July 20.—9,377, A. Moore, Attaching Knobs or Handles to Spindles.—9,396, T. Wood, Opening and Shutting Doors.—9,409, P. Martini, Dovetailing Apparatus.

July 21.—9,444, T. Taylor, Door Knobs, &c.—9,476, H. Lake, Ventilating.

July 22.—9,496, C. Bellamy, Plumbers' Blow-pipes.—9,500, C. Oliver and Others, Sealing Wood Flooring without Nails or Screws.—9,507, J. Evans, Wood Moulding Machine.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,894, C. Whale, Metal Batten Pin.—6,943, E. Wright, Ventilating Rooms.—7,290, W. Clarke, Devices for Window Sashes.—7,670, G. Mason, Fastenings for Window Sashes.—8,310, J. Janka, Spray Ventilators.—8,418, W. Wodson and R. Skeoch, Bricks, Ridge Tiles, &c.—8,518, G. Atkins, Metal Bars or Frames.—8,624, J. Bennison, Chimney Pots.—8,676, W. Temple, Mouthpieces for Horizontal Brick-making Machines.—8,713, M. Blanchard, Ornamental Tiles, &c.—6,082, T. Potter, Building Concrete Walls.—6,153, W. Whieldon, Casing Bricks, Tiles, &c.—8,067, P. Milligan, Bricks. 8,330, J. Rothwell, Hoisting Engines.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,928, A. Common, Water-closet.—11,098, R. Stone, Cement.—11,206, F. Dutoit and A. Burkart, Fireplaces or Grates of Stoves.—11,270, E. Killick, Cement.—142, J. Brown, Transverse Ventilation of Sewers.—2,601, S. Pardee and F. Biggs, Sash Fastener.—4,856, S. Worsnop, Fixing Iron Laths and Slates to Iron Roofs.—7,675, H. Mathey, Cement.—7,676, H. Mathey, Colouring Cement.—7,684, L. Wall, Connecting Knobs to Spindles.—8,314, S. Watson, Copings and Gutters.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 19.

By F. MILLARD.
Caledonian-road—Nos. 306 and 308, term 58 years, ground-rent 10l. 21,460
Kingland—106, Mortimer-road, 32 years, ground-rent 3l. 1,450
No. 131 to 131 (odd), Culford-road, 37 years, ground-rent 14l. 6s. 1,630
Buckingham-road—Range of stabling, 37 years, ground-rent 3l. 15s. 110

By G. A. WILKINSON.
Roxborough—Freehold farmhouse and 5a. Or. 1p.—Two enclosures of land, 4a. 8r. 30p., freehold. 2,290 1,670

By WOOD & SPIKE.
Kilburn—39 and 41, Albert-road, 78 years, ground-rent 10l. 1s. 600

By GODWIN & BALEY.
Norbiton, Manor Gate-road—Holly Lodge, freehold Belgravia, Chester-street—Improved ground-rent of 16l., term 23 years. 870 210

By E. E. CROUCHER & CO.
Enfield, Buryell-road—Two freehold houses. 1,253
Thornton-leath, Beulah-road—Four freehold residences. 1,450
Victoria Docks—39 to 53 (odd), and 54, Alice-street, 7 to 13 (odd), Junction-street; 46, Fishers-street; and 48, Edwards-street, ground-rent, 52l. 5s. 1,190

By W. J. NEWELL.
Old Charlton—The lease of business premises, term 18 years. 310

By W. A. BLAKEMORE.
Fulham—9, Edith-row, 63 years, ground-rent 3l. 380
St. John's Wood—17, Belisle-road, 58 years, ground-rent 10l. 650

By S. WALKER & RUNY.
Camden-town—92 to 100 (even), Albert-street, 54 years, ground-rent 31l. 12s. 1d. 2,680

Walworth—Ground-rent of 3l., reversion in 15 years. 2103
Notting-hill—22, Dextons-terrace, freehold. 1,000
Belhurst—1, Grosvenor Villas, 80 years, ground-rent 4l. 8s. 310
Peckham—75, Avondale-road, 89 years, ground-rent 5l. 6s. 283
East Dulwich—34, Ondine-road, 89 years, ground-rent 6l. 283

JULY 20.

By W. T. GRAY.
Old Ford—139, 141, and 143, Armagh-road, 79 years, ground-rent 9l. 12s. 858

By DRIVER & CO.
Hammermith-road—Nos. 65 to 81 (odd), and 1 to 7 (odd), Elizabeth-place, freehold. 6,100
Nos. 83, 85, and 87, Hammermith-road, freehold. 2,175
Hampstead—Grave House and Eland House, freehold. 1,876

By BEAN, BURNETT, & CO.
Finsbury—153 and 155, Clifton-street North, freehold. 1,405

By BARRETT.
Forest-hill—3 to 9, Perry Rise, and the Prince of Wales beerhouse, 25 years, ground-rent 52l. 730
The lease of Forest Lodge, term 6 years. 145

JULY 21.

By C. C. R. SPELMAN.
Norwich—No. 17, Cattle Market, freehold. 1,330

By C. D. FIELD & SON.
Peckham—72, Lugard-street, 89 years, ground-rent 4l. 10s. 250

By NEWSON & HARDING.
Talington—2 and 3, Allen-street, 63 years, ground-rent 24l. 1,300
No. 35, Dean-street, 40 years, ground-rent 10l. 290
No. 3, Cloudeley-street, 11 years, ground-rent 6l. 125
Nos. 4, 6, and 6, Cloudeley-street, 13 years, ground-rent 18l. 480
Kentish Town—4, 10, and 11, Circus-road, and 29 and 31, Gospel Oak-grove, freehold. 1,640
Holloway—25, St. John's Villas, 64 years, ground-rent 10l. 945
Caledonian-road—10, Sutterton-street, 60 years, ground-rent 6l. 265
Canonbury—14, Alwyne-square, 50 years, ground-rent 10l. 400
Hoxton—Improved ground-rents, 36l. 15s. 60 years 640
Fulham-road Improved rent of 47l. 10s. term 14 years. 275

By FAREBROTHER, ELLIS, & CO.
Norfolk—Part of the Houghton Hall Estate.—Great Missingham—The Fox and Phoenix public-house, and 15a. Or. 3p., freehold. 1,200
A freehold house, and 8a. Or. 3p. 600
Five freehold cottages and gardens. 700
Four houses and a blacksmith's shop, freehold. 855
A freehold cottage and 2a. 8r. 1p. 300
Snettisham—A plot of copyhold land, 1a. 1r. 20p. 110

JULY 23.

By C. P. WAINWRIGHT.
Commercial-road, E.—No. 112, 15 years, ground-rent 9l. 8s. 290

Miscellaneous.

Sewerage and Water Supply, Petersfield.

The opening of the works of sewerage and water supply for the town of Petersfield, Hants, on the 26th inst. was inaugurated in the presence of a large number of those interested in this district. These works have been carried out by the Engineer to the Board, Mr. Henry Robinson, C.E., of Westminster.

Durham.—The North of England Café Company's new premises in Saddler-street, Durham, were formally opened on the 23rd inst. by the Bishop of Durham. The premises have been entirely remodelled by Messrs. Geo. Gradon & Son, builders, of Durham, and furnished, upholstered, and decorated by Messrs. Harland & Sons, of Bradford. Mr. H. T. Gradon is the architect who has had charge of the works.

The London Trading Bank (Limited) has this week opened new premises at No. 12, Coleman-street. The whole of the mahogany fittings and furniture were supplied and fixed by Messrs. Sage & Co., of Gray's Inn-road, from the designs and under the superintendence of Mr. T. H. Smith, architect, Basinghall-street.

Cottages at Chiddingstone.—The sketch, on p. 141 of our last number, of some cottages visited by the Architectural Association on the 17th inst., was erroneously entitled "A Sketch at Penshurst." For "Penshurst" read "Chiddingstone."

A New Hospital at Teheran, Persia, is about to be erected, from the designs of Mr. Ernest Turner, F.R.I.B.A., London.

The Army and Navy Hotel in the

Auction Market.—The Army and Navy Hotel, in Victoria-street, Westminster, which was erected only a few years since, at the large outlay of 80,000l., exclusive of the cost of the land, was offered for sale at the Auction Mart on Friday, the 23rd instant, by Messrs. Greaves & Son, by direction of the mortgagees, stated to be the National Provident Company, an auctioneer, in submitting the property, that the land alone, which occupied an area of about 14,800 ft., ought to be worth 42,000l., estimating its value at 3l. per foot, which was understood to be the price of freehold land at that locality, and with the building he considered the property was worth at least 120,000l., for the valuable machinery and steam power in the basement for working the various lifts and electric lighting plant cost a considerable sum in addition to the large outlay incurred in the erection of the building itself. It was suggested that the hotel might readily be converted for general business purposes, or let as residential flats, and that very slight structural alterations would be required to adapt it to either purpose. The biddings commenced at 40,000l., and 70,300l. being the highest offer the property was withdrawn.

Gunduck Bridge. The Gunduck Bridge, is, next to the Hooghly Bridge, the most important work of its class now in progress in the Bengal Presidency. The foundation stone was laid by the Lieutenant-Governor of Bengal in January of last year, and the bridge was expected to be ready for traffic before the middle of 1887. The crossing selected is about a mile from the junction of the Gunduck with the Ganges, and is in the immediate vicinity of Sonepur, so well known for its great annual cattle fair. When completed, the bridge will consist of eight spans of 250 ft., the piers being built each on two wells 22 ft. diameter and in the depth of the river-bed. The foundations vary in depth from 40 ft. to 110 ft. The water approach is an arched viaduct, rather more than half a mile long, which passes through ground occupied by the Sonepur fair. The girders will be of steel of the modified Whipple's type, 26 ft. deep, carrying the railway on the bottom boom, and weighing about 10 tons per span. They will be built in position on timber stagings, partly carried on piles, and partly set up on the dry river-bed.—*Indian Engineer.*

Colonial and Indian Exhibition: Testimonial to H.R.H. the Prince of Wales. The Committee of the Royal and Executive Commissions named on the 14th inst., at meeting which was held at the residence of Earl Granville, had their first sitting on Tuesday, the 20th inst., in the Durbar Hall of the Exhibition. It was resolved:—That Earl Cadogan be requested to act as Chairman, and Col. Sir Owen Tudor Burne, K.C.S.I., O.L.S., and Sir Arthur N. Birch, K.C.M.G., as Honorary Secretaries. Earl Cadogan having taken the chair, it was resolved,—That communications be addressed by the Hon. Secretaries to the Viceroy of India, the Governor-General of Canada, and the Governors of the various Colonies and Indian Presidencies informing them of the movement. And it was further resolved,—That subscriptions not exceeding a limited amount of 2l. 2s. each might be sent to the Honorary Secretaries, Prince of Wales Testimonial Committee, Bank of England, Western Branch, Burlington-gardens, London, W.; to the Bank of England, E.C.; or to the Provincial Branch of the Bank of England.

The Registration of Plumbers.—The Worshipful Company of Plumbers held on the 21st, 24th, and 26th inst., and issued Certificates of Registration to the plumbers whose names appear in the advertisement which appears on another page. We further informed that there are a large number of applicants for registration in both London and the provinces whose applications have been passed by the Committee of Registration, who were unable to attend at the Guildhall the days fixed, and so their names must be deferred for further publication. The communications which are being received by the Company show that the scheme of registration is approved not only by the plumbers (mas and journeymen), but by sanitarians and builders. In recent volumes of the *Builder* the aims, objects, and mode of procedure of the Company in this important work have been fully reported and explained.

Sale of Building Land near Epping
On the immediate borders of Epping
Forest, at Loughton, a large tract of land,
ten acres in extent, known as the Queen's
ark Estate, has just been laid out for build-
ing purposes. One of its principal frontages
is the high road, and new roads, 40 ft. in
width, have been formed on the estate, which
contains 130 plots for the erection of houses
and shops. On Monday evening Messrs.
Pouchard & Co. offered for sale the first
portion of the estate, at the Crown Hotel,
Loughton. The plots submitted were thirty-
three in number, and comprised that portion
of the property facing the high road. There
was a very numerous attendance of capitalists
and others interested in the building trade.
Before the commencement of the sale the
company were conveyed in carriages from
the Loughton Station to view the estate and the
surrounding neighbourhood. On their return
the Crown Hotel the sale proceeded. Mr.
Pouchard pointed out the advantages of
the estate, its being situated on the borders of
a Forest, and within easy distance of the
metropolis. He stated that a new main sewer
is immediately about to be constructed in the
high road, closely adjoining the estate, producing
letter from the Local Board of Loughton,
which stated that the contract for making the
road had already been signed. The several
plots submitted have frontages to the high
road of 25 ft. each, and a depth of 190 ft.
There was an active competition for the prop-
erty, and every plot was sold at prices ranging
from 40l. to 56l. each, one plot, having a
frontage of 32 ft., realising 75l. The entire
proceeds of the sale amounted to 1,560l., being
the rate of about 500l. an acre. The
auctioneer announced that the second portion
of the estate would be offered for sale in the
course of a few months, as soon as the roads
are completed.

Washing London Buildings.—An un-
usual scene was witnessed in Piccadilly in the
early hours of Saturday morning last, when
the exterior of the premises of the National
Provincial Bank of England were washed from
top to bottom by means of a steam fire
engine taking water from the street mains. The
mode of the work was performed in three
days, whereas if the work had been done by
hand several days would have been required
for the purpose. The cost of the former
method is stated to be not more than one-
tenth of that of the latter. The steam fire
engine used was one constructed specially by
Messrs. Merryweather & Sons for similar
work.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Heart, B.G.	6 5 0	7 0 0
do, R.L.	11 0 0	15 0 0
do, S.L.	0 2 4	0 2 8
Canada, 1st do, 2nd do, 3rd do, 4th do, 5th do, 6th do, 7th do, 8th do, 9th do, 10th	8 0 0 8 0 0 8 0 0 8 0 0 8 0 0 8 0 0 8 0 0 8 0 0 8 0 0 8 0 0	4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0 4 0 0

TIMBER (continued).			
Pine, Canada red	2 10 0	4 0 0	
do, yellow	3 0 0	5 0 0	
Larch, Daintie	3 10 0	5 0 0	
St. Petersburg	4 0 0	6 0 0	
Waincoat, Riga	2 15 0	4 10 0	
do, Odessa, crown	3 7 6	0 0 0	
Deal, Finland, 2nd and 1st, std. 100	7 0 0	8 0 0	
do, 4th and 3rd	6 0 0	7 0 0	
Riga	6 0 0	7 0 0	
Deal, St. Petersburg, 1st yellow ..	9 0 0	14 0 0	
do, 2nd	7 0 0	10 0 0	
do, white	7 0 0	10 0 0	
Swedish	6 0 0	15 0 0	
White Pine, 1st	7 0 0	17 10 0	
Canada Pine, 1st	17 0 0	30 0 0	
do, 2nd	13 0 0	17 0 0	
do, 3rd, &c.	6 0 0	10 0 0	
do, Spruce 1st	8 0 0	11 0 0	
do, 3rd and 2nd	5 0 0	7 0 0	
New Brunswick, &c.	4 0 0	12 0 0	
Battens, all kinds	0 9 0	0 13 0	
White Pine, 1st, 1 in, Pre-	0 7 6	0 8 6	
pared, first	0 5 0	0 7 0	
Other qualities	0 5 0	0 7 0	
Cedar, Cuba, 1st	0 0 31	0 0 4	
Honduras, &c.	0 0 21	0 0 4	
Australian	0 0 2	0 0 3	
McGowan, Cuba	0 0 5	0 0 7 1/2	
St. Domingo, cargo average ..	0 0 31	0 0 7 1/2	
Mexican	0 0 31	0 0 7 1/2	
Tobacco	0 0 4	0 0 6 1/2	
Honduras	0 0 44	0 0 6 1/2	
Maple, Bird's-eye	0 0 6	0 0 11	
Rose, Rio	7 0 0	10 0 0	
Bahia	6 0 0	10 0 0	
Box, Turkey	6 0 0	17 0 0	
Satin, St. Domingo, 1st	0 0 7	0 0 11	
Porto Rico	0 0 8	0 0 1 1/2	
Walnut, Italian	0 0 4	0 0 5	

METALS.			
Iron—Pig, in Scotland	0 0 0	0 0 0	
Bar, Welsh, in London	4 10 0	4 17 6	
do, in Wales	4 6 0	4 10 0	
do, Staffordshire, London	5 5 0	10 0 0	
Sheets, single, in London	6 15 0	8 10 0	
Hoops	6 0 0	7 0 0	
Nail-roads	5 10 0	6 10 0	

COPPER.

British, cake and ingot	42 0 0	43 0 0
Best selected	43 0 0	44 0 0
Sheets, strong	47 0 0	48 0 0
do, India	46 0 0	47 0 0
Australian	0 0 0	0 0 0
Chili, bars	39 15 0	39 2 6

YELLOW METAL.

Lead—Pig, Spanish	12 15 0	12 17 6
English, common brands	13 5 0	0 0 0
Sheet, English	13 17 6	14 2 6

SPRINT.

Silesian, special	14 2 6	0 0 0
Ordinary brands	14 0 0	0 0 0

TIN.

Banco	0 0 0	0 0 0
Billiton	0 0 0	0 0 0
Strait	88 0 0	88 10 0
Australian	88 10 0	89 0 0
English ingots	102 0 0	103 0 0

ZINC.

English sheet	18 0 0	18 5 0
---------------------	--------	--------

OILS.

Linseed	21 15 0	22 0 0
Cocanut, Ceylon	32 17 0	33 0 0
Ceylon	25 10 0	26 0 0
Copra	0 0 0	0 0 0
Palm, Lagos	24 0 0	0 0 0
Palm-oil, Kerkira	0 0 0	0 0 0
Bappedseed, English pale	0 0 0	0 0 0
do, brown	21 0 0	0 0 0
Cottonseed, refined	18 5 0	18 15 0
Tallow and Oleine	26 0 0	45 0 0
Lubricating, U.S.	6 0 0	10 0 0
do, Refined	8 0 0	13 0 0

TURPENTINE.

American, in casks	1 5 6	0 0 0
Tag—Stockholm	0 15 0	0 15 6
Archange	0 10 6	0 11 0

CONTRACTS AND PUBLIC APPOINTMENTS.				
Epitome of Advertisements in this Number.				
CONTRACTS.				
Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
and Cement	Chelsea Vestry	G. R. Strachan	August 3rd ..	ii.
Sewer-making and Paving Works ..	Wandsworth Bd. of Wks ..	Official	do.	ii.
and other Lifts	St. Saviour's Union	Jarvis & Son	August 4th ..	ii.
Derby Barracks	War Department	Official	August 6th ..	ii.
Justice, Reading, Berks	Justice, Reading, Berks ..	J. Morris	August 7th ..	ii.
Borough of Croydon	Borough of Croydon	Official	August 9th ..	ii.
Tottenham Local Board	Tottenham Local Board ..	De Pape	August 10th ..	ii.
St. James's Westminster	St. James's Westminster ..	Official	August 12th ..	xii.
Epping R.S.A.	Epping R.S.A.	R. Egan	do.	xii.
Admiralty	Admiralty	Official	August 13th ..	ii.
Limerick Harbour Com.	Limerick Harbour Com.	W. J. Hall	August 16th ..	ii.
Central London Sch. Dis.	Central London Sch. Dis.	A. G. Langdon	do.	ii.
Northwich Public Hall	Northwich Public Hall	J. Johnson	August 17th ..	xii.
Northwich Local Board	Northwich Local Board	H. Benett	August 21st ..	ii.
Portsmouth Cor.	Portsmouth Cor.	W. Hill	August 25th ..	ii.
Cardiff Cor. Water Wks	Cardiff Cor. Water Wks ..	J. A. B. Williams	August 26th ..	ii.
Not stated	Not stated	Not stated	Not stated ..	xii.

PUBLIC APPOINTMENTS.				
Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor's and Surveyor's Assistant	Barrow-in-Furness Cor.	Not stated	August 7th ..	xvii.

TENDERS.	
BERMONDSEY.—For alterations, additions, and repairs to No. 105, Bermondsey-street, for Mr. William Wilkins. Mr. Edward Crose, architect, 52, Bermondsey-square, S.E. Quantities not supplied.—	
T. Laphorne & Co.	£396 0 0
S. Kippes	373 0 0
J. Chalkley	365 0 0
J. Bullers	365 0 0
R. Russell	346 0 0
J. Almond	341 0 0
A. White & Co.	333 0 0
Spencer & Co. (accepted) ..	323 0 0
[Architect's estimate, 377l.]	
BLACKHEATH.—For alterations to residences, Vanburgh Park, Blackheath. Mr. A. Bradley Roode, architect.—	
Kennard Bros., Lewisham* ..	£245 0 0
* Accepted.	
CHELSEA.—For repairs and alterations to premises at Walton-street, Chelsea, Board Schools, for the School Board for London. Mr. T. J. Bailey, architect.—	
Thompson	£231 10 0
Hewitt	280 10 0
Seabrook	280 0 0
McCarthy	267 0 0
Green	244 0 0
Newton & Idle	232 0 0
Brown	228 0 0
Greentree	228 0 0
Kearley	223 10 0
Simmonds Bros.	213 10 0
Wilkins & Kent (accepted) ..	213 0 0
CROWTHORNE (Berks).—For extensions to schools at Crowthorne, Berks. Mr. N. Komphorne, architect, Acton.—	
Spears & King (accepted) ..	£810 0 0
[No other Tender.]	
FULHAM.—For the erection of St. Andrew's Vicarage. Messrs. J. E. K. & J. P. Cutts, architects, Southampton-street, Strand, W.C.—	
Martin, Wells, & Co.	£3,225 0 0
W. H. Ashfold	3,210 0 0
Dove Bros.	3,065 0 0
Lathley Bros.	2,950 0 0
Goddard & Sons	2,886 0 0
L. H. & E. Roberts	2,884 0 0
J. Tierman	2,882 0 0
J. Holloway	2,780 0 0
GREENWICH.—For building a house and shop, at the corner of Anandale and Woolwich roads. Mr. Herbert B. Walters, architect, Laurence Pountney-lane. Quantities not supplied.—	
Waddington, Greenwich	£293 0 0
Robson, Lewisham	549 0 0
Sly, Greenwich	513 0 0
Pettit, Greenwich	508 0 0
Huishson, Greenwich	395 0 0
GREENWICH.—For the erection of small model dwellings, at Bridge-street, Greenwich, for Mr. A. J. Dear. Mr. H. Stapley, architect, Strand.—	
A. Taylor & Co., Cambridge-road, E.*	£240 0 0
* Accepted.	
HAMPTON.—For the erection of a new house and shop, in New-street, Mr. Goodman, architect, Reading.—	
Wright	£765 10 0
Singleton	645 0 0
Bailey	629 0 0
HASTINGS.—For alterations and additions at 54, High-street, Hastings, for Mr. E. W. Rubie. Mr. B. W. J. Hennah, architect, Hastings.—	
Eldridge & Son	£1,497 0 0
J. L. F. Phillips	1,495 0 0
C. & F. Harman	1,473 0 0
W. E. Werman	1,400 0 0
G. Star	1,380 0 0
W. Elliott	1,350 0 0
E. Duffie	1,283 0 0
H. Chapman	1,165 0 0
HOUSLOW.—For new bakehouses and store-rooms, at 195, High-street, for Mr. Tissell. Mr. James R. Morgan, architect, Chancery-lane.—	
Hogben	£530 0 0
Addis	497 10 0
Danells*	486 15 0
* Accepted, subject to alterations.	
ISLINGTON.—For alterations and additions at rear of premises, No. 217, Upper-street, Islington, for Mr. T. R. Roberts. Mr. J. Kingwell Cole, architect. Messrs. Battam & Co., surveyors, Mount-street, Grosvenor-square.—	
G. Foxley, King-street	£1,350 0 0
G. S. Williams & Son, Thornhill-square	1,350 0 0
Petman & Fotheringham, Theobald's-road	1,243 0 0
Dove Bros., Islington	1,236 0 0
Bishop & Webb, Stratford	1,170 0 0
B. E. Nightingale, Law both ..	1,073 0 0
Drew & Cadman, Holborn	1,060 0 0
Wall Bros., Kentish Town	1,048 0 0
LEE.—For the erection of residence for Mr. Melton Prior, Lee.—	
Kennard Bros., Lewisham* ..	£1,100 0 0
* Accepted.	
LEICESTER.—For the erection of an Auction Mart, in Silver-street and Oak-street, for Mr. H. T. Kincks. Messrs. Pettifer & Simpson, architects, Bridge-street Chambers, Leicester. Quantities by the architects.—	
T. & H. Herbert	£1,730 0 0
T. Bland & Sons	1,721 0 0
Laurence & Walker	1,679 0 0
O. Wright	1,621 0 0
C. Wright	1,499 0 0
C. Bass (accepted)	1,455 0 0
LEWISHAM.—For alterations to premises, High-street, Lewisham, for Mr. J. Skinner.—	
Kennard Bros., Lewisham* ..	£203 0 0
* Accepted.	

LONDON.—For the erection of the "Queen's Hall," being the first portion of the People's Palace, at the East End. Mr. R. R. Robson, F.S.A., architect:—
 Higgs & Hill, Lambeth £29,340 0 0
 Wood Bros, Mile End-road 26,893 0 0
 Boyce, Hart-street, Bloomsbury 27,159 0 0
 Morter, Forest-lane, Stratford 25,300 0 0
 Shepherd, Bernoulli New-road 25,228 0 0
 Wall Bros, Kenilworth Town 25,173 0 0
 Gentry, Wormwood-street 24,980 0 0
 Jerrard, Lewisham 24,440 0 0
 Perry & Co., Bow 24,277 0 0

LONDON.—For alterations to the Duke of York public-house, King's-cross, for Mr. F. J. Deacon, Mr. John Hudson, architect, Leman-street, E. Quantities not supplied:—

J. Bentley, Waltham Abbey £1,070 0 0
 T. Boyden, Gray's Inn-road 980 0 0
 Hearle & Son, Cable-street 887 0 0
 Spencer & Co., Knight-bridge-street 850 0 0
 T. Little, White-chapel 779 0 0
 Consett Bros, Rednal-green 765 0 0
 J. Higgs, Dorset-square 697 0 0

Peckers' Work.

H. Warner, St. George's-road 105 0 0
 Buckley & Beach, Chelsea 103 0 0
 J. Edwards, Camden-town 99 14 0
 J. Heath, Goswell-road 99 0 0

LONDON.—For alterations, new story, &c., at 113, Piccadilly, for Mr. Joseph Underhill, Q.C.:—
 Wetherill, Lee, & Martin (accepted) £493 4 6

LONDON.—For painting works at the Clerk's Office, Dispensary, &c., for the Guardians of the Poor of the Parish of St. George-in-the-East. Messrs. Wilson, Son, & Alderman, architects, East India-avenue, Leadenhall-street:—
 McCullen £738 0 0
 Derby 287 0 0
 Bishop & Holloway 278 0 0
 Wythe 274 0 0
 Furniss (accepted) 214 0 0

PURTON.—For making alterations and additions to the Angel Inn, Purton, Wilts. Mr. William Drew, architect, Swindon:—
 J. Williams, Swindon (accepted) £235 0 0

RICHMOND (Surrey).—For the supply of road materials. Mr. Walter Brooke, Town Surveyor:—

	A	B	C	D
Beavis, Union-street, Borough	s. d. s. d.	s. d. s. d.		
E. Downe, Richmond	12 11	-	-	-
R. L. & J. Fennings, Cannon-street	11 7	4 6	4 1	12 11
J. Horsford, Faversham	12 8	-	-	-
Kenaley, Sittingbourne	-	-	4 4	-
A. & F. Manuelle, Leadenhall-street	11 10	-	4 4	-
Mowlem & Co., Milbank	13 4	-	-	-
J. Neal, Wandsworth	-	5 10	6 0	-
Nowell & Bolson, Kensington	13 0	-	-	-
Peirce, Brentford	-	5 1	4 7	-
Ross & Sons, East India Dock-road	12 8	-	-	-
J. Russell, Penzance	-	-	-	12 3
F. Sims, Richmond	-	-	3 6	-
Trickett & Sons, Millwall	13 3	-	-	-
Wills & Packham, Sittingbourne	-	-	4 8	-
Covington, Claverton-street	-	4 2	4 1	-

A.—Broken Guernsey Granite.
 B.—Chalk Flints (broken).
 C.—Brown or Pitt (broken).
 D.—Broken Penzance Stone from the Elvan Quarries, Penzance. * Accepted Tenders.

ROTHERHITHE.—For certain works required in repairing churchyard wall, iron railings, and two new entrance gates, at the Parish Church, St. Mary, Rotherhithe, for the Churchwardens and Overseers. Mr. Edwd. Thomas, architect:—

Masons' and Bricklayers' Work.
 L. Chaffer £138 0 0
 Almond 127 0 0
 White 121 0 0
 Etheridge (accepted) 118 0 0

Smith's Work.

F. Thomas 97 10 0
 Kimber & Son 86 10 0
 Kimber 82 0 0
 Chelman (accepted) 78 3 9

Painting.

Stuart 33 0 0
 Stuart 26 0 0
 Cracknell 28 0 0
 Bartlett (accepted) 24 10 0

ST. LEONARD'S-ON-SEA.—For additions to the Herts Convalescent Home, St. Leonard's-on-Sea, Messrs. Fowler & Hill, architects. Quantities by Messrs. Fowler & Huggan:—

Lawrence & Sons, London £1,585 0 0
 Saller, St. Leonard's 1,304 0 0
 Eldridge & Crutenden, St. Leonard's 1,225 0 0

SOUTH KENSINGTON.—For alteration of premises, by converting private house into shop, at 87, Gloucester-road, South Kensington, for Mr. W. Follet. Mr. C. J. Robinson, architect:—

Crake £198 0 0
 Wilkins & Kent 185 0 0
 Smith & Sons 169 0 0

SWINDON.—For erecting four houses in Dixon-street, New Swindon, Wilts, for Mr. A. G. Lay. Mr. William Drew, architect, Swindon (accepted) £280 0 0

SWINDON.—For erecting new club-room, &c., to Beer House, Crickhill-road, Gorse-hill, Swindon, Mr. William Drew, architect, Swindon:—
 E. Looker, Stratton (accepted) £145 0 0

TREDEGAR (Mon.).—For alterations and additions to police-station, Mr. W. Tanner, County Surveyor for Monmouthshire, architect:—
 Edwd. Morgan, Tredegar £565 0 0
 G. Wilkins, Newport 550 0 0
 G. J. Brind, Newport 532 0 0
 J. Linton, Newport (accepted) 520 0 0

TUNBRIDGE WELLS.—For repairs and painting, &c., at 6, Nevill Park, Tunbridge Wells. Mr. E. Leuchars, architect:—
 Oakley, Tunbridge Wells £440 0 0
 Strickland Bros., Belvedere 389 10 0
 Mansfield & Son, Tunbridge Wells 391 0 0
 Tarrant & Son, London 350 0 0
 Strange & Son, Tunbridge Wells 310 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

THE INDEX and TITLE-PAGE for Volume L (Jan to June, 1886), were given as a Supplement with the Number for July 17. A COLOURED TITLE-PAGE may be had, gratis, on personal application at the Office.
 CLOTH CASES for Binding the Numbers are now ready, price 2s. 6d. each, also.
 READING CASES (Cloth), with Straps, to hold a Month's Numbers, price 2s. each, also.
 THE FIFTIETH VOLUME OF "The Builder" (bound), price Twelve Shillings. Expenses, now ready.
 SUBSCRIBERS' VOLUMES, on being sent to the Office, will be bound at a cost of 2s. 6d. each.

CHARGES FOR ADVERTISEMENTS.
 SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.
 Six lines (about fifty words) or under 4s. 6d.
 Each additional line (about ten words) 6s. 6d.
 Terms for Series of Trade Advertisements, also for special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c., may be obtained on application to the Publisher.

SITUATIONS WANTED.
 FOUR Lines (about thirty words) or under 2s. 6d.
 Each additional line (about ten words) 6s. 6d.
 PREPARATION IS ABSOLUTELY NECESSARY.
 * * * * *
 ** * * * *
 Remittances payable to DOUGLAS FOUNDRINER, Publisher, Addressed to No. 48, Catherine-street, W.C.

Advertisements for the current week must reach the Office before THREE o'clock p.m. on THURSDAY.
 The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 48, Catherine-street, Covent Garden, W.C. Free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
 "THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 12s. per annum PREPAID. To all parts of Europe, America, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOUNDRINER, Publisher, No. 48, Catherine-street, W.C.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

A. T. W.—C. M. W.—J. D. W.—E. T. W.—A. G. L.—W. J. J. H. We are certainly not going to waste our time over insignificant correspondence.
 All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.
 We are compelled to decline pointing out books and addresses.

York. The responsibility of signed articles, and papers for public meetings, rests, of course, with the authors.
 We cannot undertake to return rejected communications.
 Letters or communications in beyond mere newsworthy which have been duplicated for other journals, are NOT DESIRED.
 All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND,
 Box Ground, Combe Down

Corsham Down, And Farleigh Down,
 RANDELL, SAUNDERS, & CO., Limited,
 Corsham, Wilts. [An

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, WILTS. [An

Doubling Freestone.

THE CHELYNCH STONE.
 The stone from these quarries is known as the "Wool Beds," and is of a crystalline nature, and is doubtless one of the most durable stones in England.

THE BRAMBLEDITCH STONE.
 Is of the same crystalline nature as the Chelnych Stone, but finer in texture, and suitable for the most useful work.

HAM HILL STONE.

Greater facilities have been provided working these quarries, and the stone can be supplied in large quantities at short notice.
 Prices, and every information given, application to CHARLES TRASK & SON, Norton-sub-Hamdon, near Ilminster, Somerset.
 London Agent—Mr. E. WILLIAMS,
 16, Craven-street, Strand, W.C. [An

Doubling Free Stone For prices, &c., address S. & J. STAPLE

HAM HILL STONE, Quarry Owners, Stoke and Lime Merchants.
 BLUE LIAS LIMESTONE, under - H

(Ground or Lump), Ilminster. [An

Ham Hill Stone! Ham Hill Stone! For Ham Hill Stone of best quality and workmanship, apply to JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Established 1837. Agents, MATTHEWS & GEARD, Albion Wharf, Regent's Park Basin, N.W. [An

Asphalte.—The Seyssel and Metallic L Asphalte Company (Mr. H. Glenn), Office, Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and mill rooms, granaries, tun-rooms, and terraces. [An

Asphalte.

Seyssel, Patent Metallic Lava, and White Asphalte.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [An

BANNER EXHAUST VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCE

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

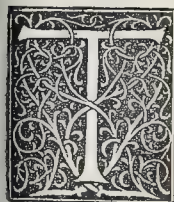
ILLUSTRATIONS.

Design for Proposed Church, Teddington.—Mr. Ernest C. Lee, Architect.....	193-199
Warehouses, Rochester-street, Westminster.—Messrs. Isaacs & Florence, Architects.....	292-303
Norwich Regimental Depot Barracks.—Drawn by Mr. J. Meehan Rogers, Architect.....	208-307
A Village Coffee-Tavern, Temperance Hotel, Hall, &c.—Mr. George J. Skipper, Architect.....	210
Two Houses, Twickenham.—Mr. Thos. R. Richards, Architect.....	211

CONTENTS.

Architectural Notes in Kent.....	187	Sussex Archaeological Society.....	185	Somerset Archaeological Society.....	215
The Indian and Colonial Exhibition: Models of Irrigation and other Public Works.....	188	The Proposed Hospital for Small-pox Patients.....	190	Superintending Architect, Metropolitan Board of Works.....	215
Notes.....	189	The Lost of the Old Treasury House at the Tower (Illustrated).....	190	Pressure in Water Pipes.....	215
Letter from Paris.....	191	Design for Proposed New Church, Teddington.....	196	Provincial News.....	215
Proposed Extension of the Metropolitan Railway.....	192	Warehouses, Rochester-street, Westminster.....	196	Church Building News.....	217
Sussex Domestic Architecture.....	192	Norwich Regimental Depot Barracks.....	196	Dissenting Church Building News.....	217
National Association of Master Builders.....	193	A Village Coffee Tavern, &c.....	196	Stained Glass.....	217
Lych Gate, Great Bourton, Oxon. (Illustrated).....	193	Two Houses, Twickenham.....	196	The Student's Column: Stone Quarries—V.L.....	218
The British Archaeological Association.....	193	The Bickenbath Memorial Hall, Hampstead (Illustrated).....	213	Recent Patents.....	219
Railway Extension in the Colonies.....	193	Berkshire Archaeological and Architectural Society.....	213	Recent Sales of Property.....	219
Competitions.....	193	Yorkshire Archaeological Association.....	214	Miscellaneous.....	220
		Devon and Gloucestershire Archaeological Society.....	214	Prices Current of Building Materials.....	221

Architectural Notes in Kent.



THE forthcoming excursion of the Architectural Association, which takes place next week, promises to be of great interest. The places to be visited include the ancient city of Rochester, with its cathedral, its castle, unrivalled in spacious massiveness, and several interesting houses of Elizabeth's time; Maidstone, with a fine church and an ancient archiepiscopal palace; Cobham Hall, a stately Elizabethan mansion, with a splendid collection of pictures; Leeds Castle, a stronghold dating from Edward I.'s time, but bearing on its face the marks of many subsequent periods; Penshurst, the home of the Sidneys, and for a few months in the possession of Sir Philip, one of the most brilliant ornaments of a brilliant age; and Igham Mote, perhaps the most charming house in Kent. These are the chief items in the bill of fare; but they will be interspersed with the smaller courses of village churches, manor houses, and picturesque cottages, to be seen under the additionally exhilarating influence of beautiful scenery.

At Rochester, the centre of attraction some years ago would have been the cathedral; but now, who will venture to predict the smothered expressions of impatience if the *cicerone* be diffuse in his exposition of the notable features of Gundulf's work?—for Gundulf flourished in 1077, and was necessarily ignorant both of the beauties and enormities of five centuries later. Fashion will change, and the purities alone permitted to the excursionists some ten years ago are not quite so eagerly studied now. The strange food then rigidly forbidden is now welcomed, and speedily assimilated, and presently transmuted,—perhaps to a fine Principal's Residence in Oxford, or to new Law Courts at Birmingham. Of such food Rochester can offer a few dishes. There is Restoration House, so called because that excellent monarch, Charles II., stayed there on his progress towards London when returning to his inheritance in 1660; and Eastgate House, a picturesque old place, hard on the High-street, with roomy bay-windows, and panelled rooms, elaborate ceilings, and a handsome chimney-piece. The date 1591 occurs on one of the panelled beams. Then nearly opposite Eastgate House is a good street-front of Elizabeth's time, renovated in 1846, apparently, though the natives prefer to regard the figures (which are fancifully

arranged) as representing 1684. The High-street contains several other interesting buildings, one of which, the old Corn Exchange, proffers a large gilt clock to the gaze of the passer by. As this dates from 1706 no doubt it will find its way into one or two sketch-books.

The High-street finally reaches the bridge leading to Strood, and near it stands the modern version of the "Crown," the inn where Elizabeth stayed, and where we may well suppose the company to have lodged who were afterwards set upon by Falstaff and his companions at Gadshill. The "new chimney" which then served the flea-bitten carrier as his clock (when he could see the position of Charles's wain in reference to it), together with the rest of the house, said to have been picturesque, has entirely disappeared and made way for the modern building. The excursionists will cross the bridge and pass through Strood on their way to the next place on the programme, Cobham Hall.

At Cobham we have the home of a valiant and enterprising race, who helped to make history in their day, and who were the dominating lords of that part of the country. The Cobhams took a leading part in most affairs of the neighbourhood from the time of John to the end of the fourteenth century, when the only representative left was a girl, heiress of vast estates, and by turns the wife of five husbands. The only daughter of the heiress became herself an heiress, and endowed with her estates her husband, Sir Thomas Brooke, of Somerset. For nearly two centuries the estates remained in the family of Brooke, lords of Cobham, until Henry, Lord Cobham, was attainted in the first year of James I., when they passed to the Crown, and were granted a few years later to a kinsman of the king's, Ludovic Stuart, Duke of Lennox. The last Duke of Richmond and Lennox left a sister, through whose grand-daughter the estates finally passed to the Earl of Darnley, and in this family they still remain.

Of the first and most famous Cobhams no architectural traces are left. The mansion is chiefly the work of Sir William Brooke, Lord Cobham, who succeeded to the estates in 1558 and died in 1597. The initials of himself and his second wife, Frances, daughter of Sir John Newton, Knight, are still to be seen on the spout-heads on the south side of the court:—W. F. C. 1587. On the north side the heads bear the initials W. C., a lion, and the date 1595. The porch on the south side is dated 1584, and that on the north 1594. All these dates fall within the time of William, Lord Cobham, who, as above stated, died in 1597. To him succeeded his son Henry, to whose time the chimney-piece in the gallery, dated 1599,

and the ceiling in Queen Elizabeth's room, also dated 1599, both belong. But Henry's continuance in the estates was of short duration, for in 1603 he was attainted, and, though his life was spared, he fell into great poverty and died miserably in 1619. His father had been a high favourite with Queen Elizabeth. He entertained her nobly on one of her progresses. He was Lord Warden of the Cinque Ports, Constable of Dover Castle, Lord Lieutenant of the County, a Privy Councillor, Lord Chamberlain, and Knight of the Order of the Garter. The unfortunate Henry himself began life under happy auspices, but those times craved wary walking, and before he had enjoyed his patrimony seven years he found himself cast out and a stranger presently installed.

The building itself is not the only record remaining of its erection, as the following interesting particulars, kindly furnished by Lady Darnley, show:—

"State Papers (Domestic), temp. Elizabeth, vol. 283, No. 64.
Endorsed '1601'; written by R. Williams, from Cobham Hall, to Henry Brooke, the last Lord Cobham.

Particular of buildings thought necessarie to be done this yeare at yr Lo. house at Cobham, together wth an estimate of the charges thereof, as well as for materials to be bought as for the workmanship of the same:—

1. First, the building of the fourth turret, according to the modell agreed upon by yo^r Lo. already.
 2. The making of the staire and half paces of stoane.
 3. A newe doore case to be made and set up in the newe parlor.
 4. The flooring of the same parlour wth deal boordes.
 5. The plastering of the same parlour over hed with suche kinde of work as it shall please yo^r Lo. to sett doune.
 6. The plastering of the great staire overhed.
 7. A dore to be made at the hed of the staire, into the olde buildings of brick or timber.
 8. Joyners work to be doen in the great chamber and the Lodging adjoining to the Queenes chamber.
 9. The covering of 3 turrets wth led.
- Provisions to be made for the same works.
Ledd to be bought v^o foder dimi (?) xliij
Lyme xxy loades xliij
Irons & glasse 6s
For Lathe 6s
For Tiles 6s
The charges of the half paces, step, and dore case over and above the money already dispensed xxx^s.

Sum^{ms}, liij^sxxiiij^d [that is, fourscore and thirtene pounds].

Workmen's wages.
The wages of 2 Carpenters for 6 months, at 1s⁶ per moneth xviiij^s
The wages of 4 Joyners for the same time xxxviij^s
The wages of 2 Bricklayers for the same time, at 1s⁶ per moneth xviiij^s
The labourers' wages for the same time xliij^s

Masons' wages, by estimate	v ¹¹
The plumbers' wages	v ¹²
The plasterers' work by estimate	xv or x ¹¹
For priggers nailes flooring and other extraordinary charges	x ¹¹
Sum ^a cxxviii ¹¹ .	
Sum ^{as} totalis ccxv ¹¹ .	

Yo^r Lo. must resolve what and how much you are pleased to have done by Giles de Whitt, either upon some new chimney-piece, or upon my Lo. yo^r father's tombe, that the poore man have some worke to get wherewithall to maintaine and susteyne himself."

Extract from a previous letter written by R. Williams to Lord Cobham in State Papers (Domestic), Elizabeth, vol. 279, No. 94:—

"March 30, 1601.—We have bargained with Giles de Whitt for making two chimney-pieces for the two chambers next to your new Chapel. He demands 65*l*. for both. I will not give above 50*l*., and he will accept it in the end rather than fail."

Poor Giles de Whitt! his price beaten down from 65*l*. to 50*l*., yet "he will accept it in the end rather than fail." No record is left of the sum his lordship finally gave, but if, rather than fail, Giles would do the work for 50*l*., it is to be feared his lordship made the best bargain he could. He did not then expect to feel the pinch of poverty himself so soon.

There are two wings of the original structure of the Cobhams left; the part which connects them was built by the last Duke of Richmond and Lennox in 1662, as the date on the building testifies, and is the work of Inigo Jones. In it, in addition to the Gilt Hall, are two fine ceilings by Adams. But the interior has been much modernised, and little of the original work is left, except a ceiling or two and a few chimney-pieces, which, however, do not include the two for which Giles de Whitt was beaten down. The chief interest of the interior lies in the magnificent collection of pictures, which rivals that seen last year by the excursionists at Wroxton Abbey. The general effect of the house outside is fine and stately. The north side of the north wing is perhaps as picturesque as any, including one of the four turrets mentioned by R. Williams. But a close inspection tends to damp one's enthusiasm, since most of the windows, both in the bays and the plain wall, are but counterfeit presentments. Some of them, no doubt, have been built up since their erection, for the greater comfort of the rooms and the avoidance of the window tax; but many of them must have been shams from the outset.

Considerable repairs and restorations were undertaken at the end of last century and extended over a period of thirty years, but they seem to have been done with much judgment, and the whole effect of the exterior is very little impaired.

Across the park lies the pretty village of Cobham, where the church contains a magnificent series of brasses extending from 1320 to 1529, as well as a coloured altar-tomb of Sir George Brooke, Lord Cobham, the father of the Sir William who built the house. In the village are also the remains of the old college or chantry founded by one of the last of the first race of Cobhams, and the picturesque new college or almshouses founded by the same Lord Cobham who built the house.

THE INDIAN AND COLONIAL EXHIBITION.

MODELS OF IRRIGATION AND OTHER PUBLIC WORKS.

IT is much to be regretted that the same pains and skill which have rendered the Indian Courts such a brilliant success have not been bestowed on that portion of the Exhibition devoted to an exposition of the public works of India. The same people whose handiwork testifies to their having advanced so far in arts and manufactures, whether regard be had to beauty in design or perfectness in execution, have also proved themselves equally capable projectors and constructors of works of public utility. In boldness and grandeur of conception, as well as in skill of workmanship, the engineering works of the ancient rulers of India will certainly bear favourable com-

parison with, if they do not actually surpass, those of any other nation during the age in which they were constructed. The scale on which their operations were carried out dwarfs the works of former generations even amongst European nations, for it is not until the present century that the rapid progress of civilisation has created a demand for gigantic enterprises amongst Western nations and the stupendous structures connected with them. It is, therefore, much to be deplored that there should be almost a total absence of information regarding the native public works of India. Beyond a model of the Grand Anicut (weir) across the river Cauvery, in the Tanjore district, and one showing the system of tank or reservoir irrigation, there is little or nothing from which can be gathered what the ancient rulers of India accomplished. We searched in vain for a model of one of the many great reservoirs in the Madras Presidency, whose areas are represented by square miles, and whose capacities are measured not by gallons, but by hundreds of millions of cubic yards, whose embankments vary from 50 ft. to 100 ft. in height, and whose masonry outlets are of the most solid description, constructed with the finest ashlar, and which, after the lapse of centuries, are still in the highest state of preservation. Models of such works as have stood the test of ages so well, though they may not have been the outcome of scientific calculation, are, nevertheless, and are certainly invested with the greatest interest. It would have been much to the purpose had the Indian Government sent home sections of some of the most important reservoir embankments, with working models of the waste-weirs and masonry outlets, together with particulars of the dimensions and capacity of the reservoirs and the areas irrigated by them.

The models which have been selected, and which are exhibited in the Administrative Court, consist, for the most part, of individual structures connected with the irrigation projects more recently constructed by the British Government; but even these have been chosen only in a haphazard sort of way, and arranged in an equally random manner, without any attempt at classification, and unaccompanied by any intelligible explanation. Seeing the importance justly attached to irrigation works in India, and the absolute dependence of a great portion of that country upon them for its very existence, it might have been expected that special attention would have been devoted to elucidating this branch of the exhibits, so as to

high level, and preventing its escape into the low-level river, the Coleroon, and, at the same time, to act as a waste-weir for the superabundant water brought down in high floods, which had formerly made a clean breach through the narrow neck of land that separates the two rivers a few miles below their bifurcation, and which used to inundate large tracts at the lower end of the Delta. Since the British Government took the Cauvery irrigation in hand, all the works comprised in the system have been gradually improved, and the floods brought under complete control; but the main design is still the same as originally projected by the native rulers, and remains a monument of their intelligence and skill. The great importance of the Cauvery system may be gathered from the fact that the crops of over 800,000 acres are dependent entirely upon its canals.

The next series of river works represented is that of the Sirhind Canal, supplied by the River Sutlej, and is the largest as regards dimensions of any canal yet constructed in India. The model shows the arrangement of the river dam and head works as a whole, with enlarged details of the sluices. The weir itself is a vertical wall, 8 ft. in height, surmounted with movable shutters, 2½ ft. high, and is protected by a long talus of rubble stone. The Sirhind system is of a different type to the Deltaic series of South India. The whole of the water required for the irrigable area, amounting to 800,000 acres, instead of being taken off from the head by two or more main canals, is all passed through a single regulating bridge, which is a grand structure, comprising thirteen large arches, divided into thirty-nine smaller ones, in which the gates are fitted and worked by a travelling winch. The canal, with its branches, measures 550 miles, and irrigates a hitherto very neglected tract of country. In connexion with this model is another, illustrating one of the locks, and an ingenious arrangement for the adjacent fall or canal weir. The water is passed from the upper to the lower reach through notches so designed as to maintain the water above the fall at its normal depth in all stages of supply. In passing over semicircular lips in front of the notches the falling water assumes a V-shape, and attains a wide even distribution before it reaches the basin below, which is made wide and deep, and of a form which keeps the floor intact and prevents any harm to the adjacent slopes of the canal.



illustrate clearly the different systems adopted to meet the differing conditions encountered in the various provinces of the Empire. As, however, this has not been done, it is difficult to convey to those not conversant with India an idea of the great series of works, detached portions of which only are represented either in the models or photographs.

The best model showing the arrangement of a river weir and its attendant head works for supplying a system of irrigating channels, is that of the Lower Coleroon Anicut, in the district of Tanjore, situated some fifty miles below the bifurcation of the rivers Cauvery and Coleroon. The dam is built in two bays, each 1,500 ft. long. In its centre are sets of scouring sluices, for the purpose of preventing an accumulation of sand on the upper side of the weir. The design is a clear vertical fall on to an ashlar apron, which is protected by a long talus of large rubble stone. The main canals are led off from either flank. To have made this work intelligible generally there should have been a model of the whole Delta, showing the manner in which the main canals and distributaries are led over the country. Close by this model there is another on an enlarged scale of the "Grand Anicut," which is a very ancient structure. It was constructed for the purpose of maintaining the water in the river Cauvery, which runs on a

The next model deserving notice is that of the dam and head works for supplying the Baree Doab Canal. The conditions in this case differ from those on the Sutlej, inasmuch as the weir is built high up in the boulder region where the River Ravee has a fall of 30 ft. per mile, and where consequently when in flood it is a raging torrent rolling huge boulders along its bed as though they were marbles. Accordingly, a different alignment of the dam and a different arrangement of details were rendered necessary. Instead of being built perpendicularly to the axis of the stream, it is carried obliquely to it. Great precautions had to be taken for preserving the piers of the sluices and regulating bridge from the action of the boulders, and special arrangements had to be made for working the gates according as the floods rose or subsided. These details have not, however, been shown in the model. The river dam is 2,445 ft. long, from 3 ft. to 6 ft. high above the original bed, and the regulating bridge across the head of the canal consists of twenty-three arches, each 10 ft. wide. The irrigable area is 654,000 acres, about half of which has up to this time been actually irrigated.

This canal was designed upon the model of the great Ganges Canal, which is the type of what is known in Upper India as a "doab" irrigation, doab signifying a tract of country lying

between two rivers whose beds run in a deep rough considerably below the level of the adjacent country.

The model showing a section of the longest weir in the world, in one unbroken wall of masonry, $2\frac{1}{2}$ miles in length,—that across the river Sone, a tributary of the Ganges,—had been perfectly rendered would be one of the most interesting of those exhibited; but as it stands, it conveys no idea of what the great work really is. A small model of a portion of the dam sluices is given in detail, but on too small a scale. It would have been much more useful had a working model,—say one-half, or even one-fourth, of the full size,—been so arranged with a head of water against it, as to show the actual mode of lowering the gates on a rising flood. The gates, which are 14 ft. high and 10 ft. wide, are stayed up by rods working in a cylinder against a water-tight piston. A small hole bored in the cylinder allows of the gradual escape of the water when the gates are forced back after being released by a lever actuated from the shore end; and thus, instead of being suddenly and violently thrown down by the pressure of water on the upper side, the gates fall gradually and gently on the floor of the sluices. Placed as the model is, merely upon a table and without any means of testing its operation, the value of the design is completely lost. It is in reality most ingenious though simple mechanical contrivance.

There are also models of detached structures connected with the Godavery and Kistna delta works, but they convey no idea of the magnitude of those splendid irrigation schemes, nor are there any plans, maps, or descriptions from which any information regarding them can be gathered. The Orissa series and the Ganges canal are also unrepresented, beyond some photographs of various isolated portions. There is, however, a good model of a large irrigation well, showing the arrangements for raising and distributing the water. The well is surmounted by an octagonal structure fitted with four bullock runs, and corresponding basins and outlets from which the raised water is discharged into the field channels. It is, however, incomplete without the cattle and the apparatus by which the water is raised. There are also some good models of timber slides showing how felled timber is conveyed on the forest to the river, down which it is afterwards floated. The old method adopted in Madras for sinking brick cylinders for foundations in sandy and treacherous soils is also illustrated by a good model. That method is now superseded by the use of the various excavators which were introduced by the late Mr. C. Fourcares and other engineers. As a specimen of native handicraft, the model of a carriage used on the Oude and Rohilkund railway is likewise interesting, as well as that of the track boat used on the Godavery and Kistna Canal, and a canal dredger designed by Mr. Fourcares.

On the whole, this portion of the Exhibition, which might and should have been made one of the most useful and instructive, as well as interesting, comes decidedly short in every way. It is the more to be regretted, as since the opening in India, with their attendant horrors, of late years have been brought so prominently before the English public, it was all the more incumbent that they should have been better and more fully instructed as to the kind of works by which those famines can alone be mitigated, if not altogether prevented.

Surrey Archaeological Society.—The annual excursion of this society took place on Wednesday in last week, when Guildford was selected as the place of meeting. About a hundred ladies and gentlemen took part in the outing, and the whole arrangements were carried out with much care and ability by the indefatigable honorary secretary of the society, Mr. Thomas Milbourne, and Mr. Ivatt. After visiting the Grammar School, the members listened to a paper by Mr. D. M. Stevens, on "The Royal Grammar School; its Founders and History." Subsequently they proceeded to the Castle (where Mr. Ralph Nevill, F.S.A., acted as cicerone), Shalford Mill House, Tangley Manor House, Chilworth, and Tooting.

NOTES.

THERE still seems, according to Mr. Jeans's interesting paper read at the Exhibition Conference last week, a good field for the expansion of the railway system in our colonies, the figures showing an average of one mile to every 7,379 of the population and every 269 miles of area, while in the United Kingdom there is one mile of railway to every $6\frac{1}{2}$ miles of area, and in the United States one mile to every 25 miles of area. Still, when we take into consideration the scanty settled nature of the various colonies, and the sparseness of the population, the comparison is by no means so much to their disadvantage as appears at first sight. The results of the colonial railways are not so encouraging as they might be, for, with the exception of India, Queensland, and New South Wales, which all pay at least 4 per cent., they are not particularly remunerative regarded as investments. Canadian railways only pay on an average 1·4 per cent.; Victoria (Australia), 2·91; New Zealand, 2·51; and the Cape 2·65,—and this, too, although freight rates are higher than in England, with the exception of India and Canada, where they are lower. On the other hand, the development of traffic on a colonial railway is somewhat of an unknown quantity, and sometimes sets in with great rapidity when least expected; and it occasionally happens that a net traffic of less than 3000 a mile will yield a dividend of over 4 per cent., whereas in England it requires 1,7000 per mile to produce the same. In any case, the extension of railways is a necessity to the colonies, whose varied produce must be brought to market; and it becomes, therefore, less a question for the capitalist than for the prosperity of the country.

WE understand that the Board of Works are much disappointed with the response to their advertisement for a Superintending Architect, and may probably advertise again,—a report which seems to be confirmed by the fact that the *agenda* paper for this week's meeting contains (as mentioned in another column) a recommendation that Mr. Vulliamy should be formally retained in office for another quarter. Meantime, Mr. Hebb, who has for ten years acted very ably as Mr. Vulliamy's second in command, has sent in his own statement of his claims to consideration for the vacant post, which are certainly greater than those of any of the present list of applicants. Mr. Hebb has the advantage of having been for a long time personally conversant with the work of the Architect's Department of the Board; he has had a great deal of practical experience; and he is also a man of architectural and artistic taste and of general culture. The Board may, if they advertise again with somewhat different conditions, obtain the ideal "strong man" whom they want; but, as matters at present stand, it would really be unsuitable to place any one of the candidates who have applied over Mr. Hebb's head, as his superior officer. Mr. Hebb is, according to his own statement, one year older than the limit of age prescribed in the Board's advertisement, and therefore was formally precluded from responding to it; but hard-and-fast lines as to age are rather misleading in such cases. Some men are fit for more work at fifty-five than others at forty-five.

THE world has lately been running to buy the latest editions of evening papers with as much eagerness as if every man in the street were a possible Home Secretary. The only appointment, however, in the new Government with which we are concerned is that of Mr. Plunket, as First Commissioner of Works. This gentleman is almost an unknown quantity in this office, for though he filled it during the last Conservative Government, his tenure of office was too short to enable a judgment to be formed on his capabilities as First Commissioner. Of more importance was one of the last acts of the late Government, viz., the appointment of Mr. Gladstone's first Private Secretary, Mr. Primrose, to succeed Mr. Mitford

as Secretary to the Board of Works. A really larger amount of power is in the hands of this permanent official than in those of the Parliamentary representative of the office. Capacity as a private secretary is no test of capacity as head of such an office as this. But both Mr. Plunket and Mr. Primrose are far from being bureaucrats, and they are more likely to listen carefully and to heed attentively really authoritative opinions on London buildings and improvements than were the previous holders of these two offices.

WE are indebted to Lord Rosebery, the Foreign Secretary of the late Government, for a movement calculated to be of considerable value to the commercial community. It consists in a re-arrangement of the publications known as Consular Commercial Reports, which hitherto have been brought out and put together in such a manner as to neutralise their undoubted utility. By the time that the routine of the department has allowed public access to the reports, the information is so old that its value is greatly decreased and it is only retrospectively useful. Lord Rosebery has, however, arranged for the immediate issue of what may be called the current commercial intelligence, leaving the residuum of statistical and geographical matter to be completed later on. It is to be hoped that these cheap and handy little blue books will become a real *vade-mecum* for merchants, instead of finding their usual destination in the buttermen's basket.

UP to the 30th of June, 1885, according to the report just made by M. de Lesseps, the sum of 19,834,480*l.* had been expended on the Panama Canal, about 1,000,000*l.* of which, however, had not been paid on that day. The "constituted capital" of the company, it should be remembered, is 12,000,000*l.*; and the "rectified estimate" of the cost of the works, made by M. de Lesseps, in September, 1880, was 21,200,000*l.* On the 30th of June, 1885, according to the figures now furnished, the excavation performed amounted to about 14,000,000 cubic metres; the total excavation of the Canal, originally estimated at 46,000,000, being now estimated at 110,000,000 of cubic metres. On these figures, 93 per cent. of the estimated capital had been expended, and rather less than 8 per cent. of the work had been performed, at the end of June, 1885. The resources created, the report states, including the share capital, and the three series of obligations already issued, amount to 28,524,176*l.* This, however, speaks of cash actually received. The sum for which the Company is responsible already is 36,647,740*l.*, the difference consisting mainly in the rebate or discount at which the obligations were issued. This sum will be raised by the new loan, if effected, to 60,524,176*l.*, or nearly three times M. de Lesseps's "rectified estimate" of 1880. However, the annual meeting of the Canal Company, on the 29th of July, accepted the report of M. de Lesseps without hesitation.

ALTHOUGH few counties are more profusely supplied with railways than Yorkshire, room is being found for another in the shape of the Scarborough, Bridlington, and West Riding Junction. By its first section, from Scarborough to Driffield, a direct communication will be afforded to Hull, instead of the present rather circuitous route by Flamborough Head; and by the second, from Driffield to Market Weighton, the Selby and South of England traffic will go *via* Bridlington and Filey, instead of being taken round by Hull in one direction, or by York in the other. The three East coast watering-places will all benefit by the more direct access, while a great impetus will be given to the Filey fisheries; and the making of the new railway may perhaps revive the oft-mooted scheme of constructing a harbour of refuge at the latter port. Anyhow, the southern section will open up to the tourist a bit of country not so well known as it deserves,—a wold district rich in early remains and modern restorations. Goodmanham, a village near Market Weighton,

through which the line will pass, is associated with the first appearance of Christianity in these islands, the church having been built on the site of the Pagan temple, which was under the official care of Coifi, high priest of Odin. Convinced, however, by the arguments of the missionary Paulinus, he broke in pieces the idol, and was baptised in company with King Edwin, while the Saxon temple was succeeded by a Christian fane. The "Sir Tatton Sykes" country between this and Driffield is wild, but full of interest to the ecclesiologist and the architectural sketcher.

IT may, perhaps, be an open question whether urban communities should not be the proprietors of the gas lighting of the streets and houses. Artificial light being necessary, the community ought to supply themselves. To do this is to work on the broadest and truest principles of co-operation. Most persons will be of this opinion when they observe that the Gas Light and Coke Company, which supplies a great space of London with gas, have just declared a dividend of twelve per cent., and carried an enormous balance over to the next half-year. The cheapness and excellence of mineral oils has somewhat diminished the consumption of gas in many houses, but it seems in no way to have affected the profits of the gas companies. But any one who takes the trouble to read the report of the Company to which we have referred, as published in the daily papers, will certainly inquire of himself why the metropolis does not, like some provincial towns, supply itself with gas, and not put such huge profits into the pockets of comparatively a few shareholders.

A DECISION of some importance as to the meaning of the term "tenantable repair" was given by the Court of Appeal last week. The landlord contended that by that term was meant decorative repair, in other words that the tenant was to paper and paint the house. On the other hand, the tenant urged that it was only necessary that he should keep the house in a state of structural repair, and the Court decided that the contention of the latter was correct. At the same time they declined to say what the exact meaning of these words was. An ordinary tenant from year to year not under lease must keep the premises wind and water tight, but need not do more than this. "Good repair" has been held to mean "habitable repair," but one naturally asks what does "habitable repair" mean? In fact, it would not be easy to say what is meant by these vague expressions, and the advice which may fairly be given both to landlords and tenants is to say explicitly and in detail what the tenant's obligations are. The use of such expressions as these generally arises because neither landlord nor tenant is quite at one as to their intentions, and by employing some vague phrase, each side hopes ultimately to get the better of the other.

WE print in another column an extract from the *Lancet*, entitled "Drink in the Building Trade." While quite agreeing with our contemporary as to the need of habits of sobriety and steadiness being observed by all engaged in building operations,—especially in these days of girder-work and mechanical appliances,—and while commending and endorsing the suggestion that master builders might, perhaps, do more than they do at present in encouraging the provision of water and other non-intoxicating thirst-slakers, we feel it incumbent upon us to protest against the implication that workmen in the building trades are more prone to "slip out for a drink at the nearest public-house" than workmen in other trades. Indeed, on all well-regulated "jobs," the workmen are sufficiently under the surveillance of foreman and timekeeper to render this "slipping-out for a drink" not very easy; but at stated intervals (whether too often or not we will not undertake to say) the potboy from a neighbouring tavern comes on to the works with a can of beer, which we trust (for the sake of those who consume it) is always unsophisticated.

A PART altogether from the political aspects of the question, the union between Great Britain and Ireland would probably be cemented more firmly than ever by the formation of the projected submarine tunnel between Donaghadee, in Co. Down, and Portpatrick, on the opposite Scottish coast. We learn that Mr. Douglas, the engineer to the Irish Board of Lights, has been engaged for some time past in taking soundings, with a view of ascertaining whether any geological difficulty stands in the way of the work, while shafts of a thousand feet in depth are to be sunk at each place, to ascertain the measures. Should it prove feasible, Government may well be asked to advance the undertaking with substantial help; for it would be one that, physically speaking, would not be so formidable as the Channel Tunnel, while the political side of the question would be greatly benefited by a union of so palpable a nature.

THE transformation of Rome is the subject of an article in a recent number of the *Saturday Review*, and is a point with which we are very much inclined to agree. There must be few visitors to Rome nowadays who can help seeing that a vast change is coming over that most wonderful of cities, and that the modern builder is showing a great deal too much activity there. Although it is our province as well as our pleasure to advance in every possible way the art of building, there are places which it is the truest appreciation to leave alone as much as possible. The Eternal City is one of these, and we cannot but regret the sad havoc that Haussmannism is making of the time-honoured remains and associations. To the speculative builders of the present day, we might apply the words of the once popular French song, "Rien n'est sacré pour un sapeur," so ruthlessly does he regard the remains of the past, when he is once fairly embarked on the war-path of a building "boom." There is something singularly jarring with all the canons of good taste when we read of the Quirinal being covered with the buildings of a brand-new quarter, and with boulevards that may vie in height and breadth with those of Paris and Vienna. The semi-circuit that the Civita Vecchia Railway makes round the outer walls presents a sad panorama of reckless demolition and scandalous reconstructions. Here is a venerable ruin cut clean in two, the gaping windows and severed arches yawning pitifully in the sunshine, while the walls, strong and solid as ever they were, are tottering to the strokes of the pickaxe. Another side of the question is, that for residential purposes Rome is becoming less and less desirable on the score of expense, the price of land reaching an artificial value, and rents being increased to match. There is, however, an archaeological set-off to this rather gloomy picture, and that is the discovery of many antiques of the highest interest, which, but for the excavator's pickaxe, would have remained unknown.

THE sale by auction of Staple Inn, Holborn (lately purchased by Messrs. Geo. Trollope & Sons, and, it is said, for 80,000*l.*), is announced to be held in next October. The transfer will not, apparently, include the block of buildings No. 11 and its adjoining messuage, or the terrace; No. 12, and the Land Registry, southwards of the garden court. This range has been taken over by her Majesty's Government as an addition to the Patent Office in Southampton-buildings, with which it will be thrown into communication. Though Staple Inn, with its hall of circa 1630 (teste Sir George Eue), escaped from the Great Fire, all the existing chambers, excepting the northern sets, Nos. 4-6, with their quite unique front towards Holborn, are of later date. They have been rebuilt at various periods between 1699 (No. 11), and 1759 (Nos. 2 and 3). The Holborn elevation seems to have been in danger from fire in the middle of last century, for the neighbouring chambers, No. 1, were erected after a conflagration in 1737. In that same year, too, was set up the unworthy and ridiculous portal over the hall garden door, one Thomas Leach being

then Principal of the Ancients. The terrace was built in 1843, from the designs of Messrs. Wigg & Pownall, and is a very successful example of its style. Lovers of Charles Dickens's novels will be sorry to learn that the homes of Mr. Grewgious (at No. 10, first floor), of Pip, and Mr. Tartar, together with the rooms that Crisparkle engaged for Landless will probably share the fate of the pretty little garden whither Mr. Snagby would so solace in retreat from his turbulent quarters. Cook's (rightly Took's) court hard by. Hitherto Dr. Johnson removed on March 23, 1759, from Gray's Inn, and here he wrote "Rasselas," wherewith to defray his mother's debts and the several charges that arose upon her death at Lichfield. But the imminent demolition of the Holborn frontage is to be regretted on other grounds, since it constitutes the best preserved relic of late sixteenth century Domestic architecture that the City can now show. It was until recent years almost entirely obscured by Middle-row, and now offers a fine prospect as approached from the newly-widened Gray's Inn-road.

SIGNOR GIACOMO BONI has recently reported, from the *Archivio Veneto*, the result of a survey made by him of the column and bronze lion on the Piazzetta at Venice, on the 1st of June last. It appears that the iron framework supporting the lion has suffered from rust and exposure to the air, and Signor Boni suggests that this framework, which is extremely heavy, should be replaced by framing of bronze of simpler construction. The lead covering of the abacus of the capital of the column is in a bad state, the joints of the sheets having given way in places. The abacus itself, which is in three beds subdivided into various pieces, is broken in places, the injury having been occasioned by the defective setting of the stones. The capital is broken into three pieces, and the cracks, which were pointed some twenty years ago, are beginning to re-open. The shaft of the column is of grey Egyptian granite. In 1863, when the inclination of the column was noted, it was feared that the dilapidation, which was observed, would continue to progress, but it is now understood that the condition of the column is due to a fire which occurred in the year 1756.

IT is stated that the Receiver for the Metropolitan Police District has purchased the site on the Embankment known as the Open House site for the erection of new Central Police Offices. It is an admirable site for the purpose, and we trust that the building to be erected upon it will be worthy of its position. To be so it must be something very far superior, in architectural character, to the ordinary run of Metropolitan Police Office buildings.

ALL who know the City Architect will be gratified to hear of the official honours which have been conferred on Sir Horace Jones as we are now to have the pleasure of styling him; and the members of the architectural profession generally may be glad to know that it was "for his distinguished services to the City of London as Architect to the Corporation" that the honour of knighthood was conferred upon him, and not for merely ceremonial reasons.

WE have repeatedly urged the completion of St. George's Hall at Liverpool, the sculpturing the panels which were intended to be sculptured, without which the building is only half completed. One of these panels has at last, been executed by Mr. Sir John Lee, who was to have made a series of panels illustrating the progress of Justice, at the very modest price of 150*l.* per panel. It appears, however, from a report of the proceedings in the Liverpool Town Council on Wednesday last, that the project is likely to be knocked on the head after all. The Council on that occasion, by a majority of twenty-nine against three, refused to vote the money for the second panel. As far as we can gather, the reason for this is that the majority of the Town Council are utterly unable to understand the meaning of

ideal sculpture, to begin with; that they have not the least idea of the abilities of the sculptor they have been employing; and that some of them regard the employment of sculpture in the decoration of one of the finest modern buildings in England as "a downright waste of public money." Mr. Rathbone, who had apparently most to do with the selection of the sculptor and the subject, has some whims about art with which we do not sympathise, but he knows what good work is, and he is not wrong in his estimate of Mr. Stirling Lee, who, however, we should imagine would hardly care to have anything more to do with the Liverpool Corporation as art patrons. Municipal council-chambers are not generally the arenas, it must be admitted, of very intellectual art-criticism; but anything more hopelessly stupid and vulgar than the remarks which formed the staple of the debate on the St. George's Hall sculpture, and the jokes (!) about the nude figures, as reported in the Liverpool papers, we never had the misfortune to read.

FROM some recent correspondence that has been published it appears that the Vicar of Stratford-on-Avon is indignant at the backwardness of his parishioners and of the public generally to subscribe to his proposed alterations in the way of taking down galleries and removing existing seats, and twits the public at large with an indifference to the memory of Shakespeare on this account. It appears to us that the memory of Shakespeare has about as little as possible to do with the matter. If the Vicar were applying for help to preserve the tomb of Shakespeare, or any other relic of the past, from decay or desecration, we could understand his tone; but that we are to subscribe to make alterations in the seating of the church to suit the Vicar's fancies, because Shakespeare is buried there, seems a piece of truly clerical logic.

THE *Calcutta Englishman* gives an edifying extract from the report of Mr. A. C. L. Carlisle, "First Assistant, Archaeological Survey," giving the writer's account of his own artistic prowess in exhuming an ancient statue of Buddha, putting it together again (all very well so far), and supplying the missing portions by additions in Portland cement, which he was "so fortunate" as to obtain from a district engineer, who, says the Indian paper, "it is to be hoped did not know the use which it was to be put to." Engineers in general are not over-sensitive on such matters, and would probably think Portland cement a very good material to repair Buddha with; but something better might have been expected from a member of an "archaeological survey," and the spectacle of a "first assistant" adding value to an ancient statue by modelling up the missing portions in Portland cement with his own hands is, indeed, one of those things the contemplation of which renders life so sad and bewildering a problem.

THE irrepressible *Times* art correspondent is at it again. He writes from Venice now, where again he seems to have picked up an architect to "coach" him. The description of the state of the foundations of St. Mark's, the cathedral "slowly sinking into the mud of the lagoons," is but too true; but the statement that the new mosaic work has been done so admirably in accordance with the spirit of the old, that the "correspondent" could not tell which was old and which was new, is likely to provoke a cynical smile in some quarters. That he could not tell ancient mosaic from modern is highly enough; but what does that prove?

The Street Memorial, Royal Courts of Justice.—An admirable piece of wrought-iron railing from the design of Mr. A. W. Blomfield has just been placed in front of the statue in the central hall at the Royal Courts of Justice. It has been manufactured by Messrs. Thomas Potter & Sons, of Oxford-street, who made the whole of the metal work for this building.

LETTER FROM PARIS.

An end has at length been put to many delays and evasions on the part of the Government by the appointment of three General Directors for the Exhibition of 1889. The first and most important post falls of right to M. Alphand, who is at the head of everything connected with the architecture and building of the Exhibition,—its planting, lighting, and sanitary arrangements, besides directing all fêtes and public ceremonies, and examining and deciding upon all estimates, contracts, special charges, &c. M. Georges Berger, General Managing Director, will superintend the transport department, both in the French and foreign sections, the classifying of groups and sections, the allotment of space, the arrangement of exhibits, the appointment of juries, the prizes, &c. M. Grisons will fill the less brilliant, but not less important and difficult post of General Director of the Financial Department of the Exhibition. Above these three hovers the Minister of Commerce. M. Lockroy, in appropriating to himself the lion's share of control, appears to forget how frequent political reverses are in France, and that the fortunes of a Minister are precarious, and dependent upon sudden and unforeseen crises in the political world.

The strongest impression made by the whole affair is that of the inflexible determination of M. Alphand in the midst of every sort of opposition and uncertainty. Even the other day at the Municipal Council a fraction of "irreconcilables" exerted themselves to find flaws in the architectural and engineering works of the Director, but with no other result than the calling forth of a speech sparkling with wit and humour, in which M. Alphand referred to his irreproachable past public life and services extending over fifty years. Come what may, the success of the Exhibition depends entirely upon him, and even should it fail, his fame is sufficiently established by what he has already done for the improvement of Paris.

There seems to be no doubt as to the cordial relations at present existing between the Minister of Commerce and the three directors, who are to have a large latitude accorded to them in their respective departments.

M. Alphand has been commissioned to prepare preliminary plans of the Exhibition buildings, utilising the most salient points in the designs of M.M. Dattier, Eiffel, and Formigé, and the following general arrangements are already adopted in principle:—The machinery department will occupy the end of the building on the side of the Ecole Militaire. In front, opposite the Trocadéro, will be erected the much-talked-of tower, 300 metres in height, surrounded by galleries devoted to an exhibition of works of art. Between this tower, which we maintain to be inappropriate, and the machinery gallery, there will extend two enormous halls, to contain the national and foreign sections of the Exhibition. The open space between these halls will be converted into an ornamental garden by M. Alphand, who is commissioned to prepare a report on the whole scheme with the least possible delay. The grouping of the various classes of industries will differ very little from that of the Exhibition of 1878. It behoves all concerned to bestir themselves in order that the opening of the Exhibition on the 1st May, 1889, may not take place in the midst of a confusion of unpacked cases and unfinished arrangements.

It is impossible to conceive all the interests and ambitions that are stirred by this project. The very title, "Exhibition of the Centenary of the Revolution," gives rise to all sorts of intrigues. One of these is an attempt to get up a Museum of the Revolution which will provide excellent sinecures for a favoured few, and extort absurd prices for autographs and curiosities dating from the revolutionary epoch, and of no actual value whatever. This attempt is all the more absurd since a Museum of the Revolution exists already at the Hôtel Carnavalet, and contains collections of real interest and value, both historical and artistic. The same may be said of the uncalculated monument to the French Revolution which the Municipal Council propose to erect in front of the Tuileries. The Minister of Fine Arts has refused the site, which he destines to another purpose. Hence great indignation at the Hôtel de Ville, and probable interference on the part of the Deputies for the Seine. It is unnecessary to add that M. Charles Garnier, architect of the Tuileries, can hold his own against all encroach-

ments, political or otherwise. But we must not trench on delicate ground.

Quitting the dangerous subject of politics, let us turn to the School of Art, where the annual examination and award of the "Prix de Rome" have just taken place. With regard to architecture, the students who had to deal with the restoration of the Court of Exchequer have produced a number of very interesting schemes, some of which give evidence of considerable artistic feeling. We would draw particular attention to the imposing façade which gained for M. Depasse (a pupil of M. André) the first prize, and the clever designs which brought M. Louvet and M. Sortais the second and third prizes respectively. The first prize for painting has been awarded to M. Lebayle, pupil of M.M. Cabanel and Aimé Millet. The subject given was "Clandius proclaimed Emperor by his Soldiers." The second prize fell to M. Alexandre Lavalée, pupil of M.M. Cabanel and Théodore Maillot. M. Sinibaldi obtained the third prize. He also studied under M. Cabanel, who, as will be seen, is everywhere victorious. To tell the truth, neither of these three compositions is animated by that spirit of power that points, even in the scholar, to exceptional genius. These "variations," played by clever pupils, are not worth very much. Nevertheless, in this kind of competition, if originality had any chance of finding favour in the eyes of the jurymen, the composition of M. Sinibaldi would certainly deserve it rather than either of the others. The sculpture competition strikes us as being far superior. The subject set was "Tobit drawing the Fish from the Water," and the successful competitor, M. Paul Capellaro, has shown himself a worthy follower of his father, the well-known sculptor. His composition (which leads us to hope much for his future) is, notwithstanding a little affectation, a decidedly decorative idea. In this competition the second prize was awarded to M. Larebe, and the third to M. Chavillaud. Finally, the first prize for engraving was unanimously decreed to M. Patriot; and we would end our record of the recent work of the Académie des Beaux Arts by noting that the "Duo" prize was carried off by M. Chancel for his design for a public hall.

The past month has been rich in inaugurations of all kinds. July 14th was the occasion for these, and it would seem that the best way of pleasing the living is by celebrating the dead with much speechifying and singing of the "Marseillaise." Diderot has now his statue (of which we do not think very much) in the Place St. Germain des Prés. Kabeleis has a bust (a poor work of Truphème) at Meudon; while that of Jean Jacques Rousseau ornaments,—one hardly sees why,—the town of Ambrès. A statue of Lamartine has been unveiled at Passy in the shady Place, which now, in long-delayed homage, bears the name of the great poet. And, before long, the statue of Louis Blanc, cast in bronze after M. Delhomme's model, will be erected in the Place Monge.

On the other hand, however, the new post-office, which should have been opened on the 14th of July, will not be ready for use until the end of August. The Municipality has contented itself with the inauguration of a monument in the Cemetery of Mont Parnasse to the memory of those Gardiens de la Paix who died victims of duty. This memorial, executed after the design of M. Formigé, consists of a stone stele, severely simple in treatment, and with no decoration but the arms of Paris and a commemorative inscription.

With reference to M. Formigé, we should add that the crematory designed by this young architect is proceeding rapidly. In this it is intended to dispose of the human remains furnished by the dissecting-rooms of the hospitals, the only possible use for cremation while the law prohibits any but the usual method of burial.

The recent death of Mgr. Guibert, Archbishop of Paris, has brought forward the question of the Church of the Sacré Cœur, of which the venerable prelate was the founder and promoter. Here, according to his express wish, his remains are to be deposited as soon as M. Abadie's work is finished. It was even said that the interment would take place at once in the crypt, but allowance has to be made for political and popular feeling, and rather than create complications for the Governments, and to avoid even the risk of a refusal, the ecclesiastical authorities have temporarily deposited

he body of the Archbishop in the vaults of Notre Dame.

Not long ago certain organs of the extreme Left declared that a recent landslide at Montmartre was occasioned by the works going on at the Church of the Sacré Cœur. The city engineers, with M. Alphand at their head, easily proved that it was nothing of the sort, and that the subterranean works executed by Abadie, so far from endangering the hill, actually consolidated its loose and crumbling soil. On the other hand, no one is heard to complain of the real injury done to the steps of the Pantheon by the accumulation of flower-wreaths placed there at the funeral of Victor Hugo last year. The damp has worn away the stones, and filtered through the joints to the subterranean arches. It will be absolutely necessary to repair and in part to replace the steps, and the five or six thousand francs which this will cost must be added to the amount already spent on the "secularisation" of the Church of Ste. Genevieve.

Artistic news is so rare at this time of year that we are glad to have to record the excellent measure that M. Turquet, Under-Secretary of State for the Fine Arts, has just carried. It consists in the founding of a gallery for the accommodation of sketches of all works ordered or acquired by the State. It may be added that for a long time past the City of Paris has been forming a similar collection, which constitutes a complete history of Parisian art during the last five-and-twenty years.

We may also note the opening of a new hall devoted to the architectural remains of the South of France, and the erection at the Ministry of War of a grand "Salon d'Honneur," decorated with portraits of former Ministers of War, from Louis de Revol, Secretary of State for War under Henri III. in 1588, to our own day.

Two years ago, at the request of the General Council of the Seine, the Government removed two paintings, by M. Robert Fleury, from the Audience Chamber at the Board of Trade and placed them, together with Flandrin's portrait of Napoleon III., in the Gallery at Versailles. It was no doubt considered that the subjects, "Napoleon I. promulgating le Code de Commerce," and "Napoleon III. inaugurating le Tribunal," were too political in their nature. In order to fill the void thus created, M. Bailly, President of the Society of Artists, intends to propose to the Government to issue a Commission for two great historical pictures, the subject of the first being the "Nantes," or Parisian boatmen of the time of Lutetia; and that of the second, a Railway Station and arrival of merchandise in the nineteenth century. The contrast would be striking, and as there can be no possible objection on political grounds to the paintings, the proposition will probably be entertained, and the works entrusted to M. Tony R. Fleury.

In conclusion, we must express our regret at having received last week intelligence of the death of the engraver Maxime Lalanne, whose reputation was made many years ago, and who leaves a considerable store of works behind him. He was born at Bordeaux in 1827, and studied at Paris under M. Jean Goussier. He made his *début* at the Salon in 1852, with some charcoal drawings, which attracted considerable attention. From this time till his death he continued to furnish illustrations to many important works, and to exhibit at the Salon. Among his greatest works may be mentioned twelve plates, representing Victor Hugo's residence in Guernsey, large views of Paris and Bordeaux, scenes of the war of 1870, and a great number of etchings after old masters, in particular a reproduction of the Bay of Weymouth after Constable. Maxime Lalanne was the author of two important treatises, — one on copper-plate engraving, an art of which he was a most accomplished master, and the other on charcoal drawing. He received medals as an engraver at the Salons of 1856, 1873, and 1874, and the Cross of the Legion of Honour in 1878.

Redbourn, Herts.—The east window of Redbourn Church has just been filled with Munich stained glass. The subject represented is the Ascension, and the window has been erected in memory of Mr. and Mrs. Wade by their children. The work was entrusted to Messrs. Mayer & Co.

PROPOSED EXTENSION OF THE METROPOLITAN RAILWAY.

It is somewhat of a truism to say that engineering considerations are of primary importance with reference to railway extensions; but, the fact is, that this principle does not appear always to have been grasped by railway directors and managers. A signal instance of its neglect is just brought before the public. The Metropolitan Railway is, as is well known, characterised by remarkable peculiarities. It has been constructed at the vast cost of some two-thirds of a million per mile, in order to carry an unequalled, — not to say an illimitable, — passenger traffic. In the last half-year it has transported 39½ millions of passengers, a number that shows the remarkable increase of four per cent. over the corresponding part of 1885. In order to accomplish this great task, everything is peculiar. The engines are constructed to attain the speed of forty-five miles an hour, starting and stopping as suddenly as is consistent with the safety of the passengers. Carriages and permanent way are specially constructed to meet this unusual condition of traffic. How admirably this has been done is illustrated by the fact that the Metropolitan Railway is, at the same time, the cheapest and the most costly line to work of any in the United Kingdom. The apparent contradiction may be thus explained:—If measured by the mechanical duty performed, that is to say, by weight transported over distance (without instituting any comparison with the Metropolitan District or the North London railways), the working expenses of the Metropolitan are between three and four times as much as on the average English railway. Measured, on the other hand, by percentage of receipts, they are the lowest in the country. It is clear that a machine of so delicate a nature as the railway requires to be managed in exact accordance with the principles on which it was constructed. And if any proof of so obvious a canon were required, it would be furnished by the extraordinary confusion into which the traffic was thrown by the opening of an additional link of the same system on the completion of the Inner Circle Railway.

That the case is eminently one in which well should be let alone is proved by the rate of increase above cited, which is nearly double that of the population accommodated by the line. At the same time, there is a material defect in the system, owing to the squabble with what is physically, and ought to be altogether, an integral part of the same system, viz., the Metropolitan District Railway. To weld into one these essential parts of the same scheme, and to foster and provide for the steady increase of so vast and lucrative a traffic, would be an ample occupation for an able and competent Board of Directors.

Instead of this, and in spite of the marked opposition of the shareholders present at the meeting of the 27th ult. (an opposition overborne by proxies in the hands of the directors), it is proposed by Sir E. Watkin to graft on to this self-contained system a branch of a totally different nature. From London to Rickmansworth and Chesham the country is of a character requiring but light works, light rails, light engines, and few trains, to carry a very light rural traffic. To run one of the 42-ton locomotives of the Metropolitan over this district would be, on engineering considerations, a reckless waste of money. To have a duplicate establishment of engines and of carriages, for the two different systems, would also be an idle cost. Sir E. Watkin said, "If they did not make the railway the London and North-Western Company would." Is that any good reason for launching out into an enterprise so essentially dissimilar from the true function of the Metropolitan Railway? The whole system of suburban traffic is a subject of delicacy. The interconnection of short and long trains has led to an enormous expense in the way of duplicating lines. The cost of interspersing traffic of different natures may be conceived from the fact that while the Great Western Railway employs 17½ men per mile, the Metropolitan Railway employs 766 men per mile. The French lines employ 14½; the Scottish, 12½; and the Irish 6½ men per mile. And while the servants of the Metropolitan Railway earn each 39s. per annum, for the employers, those of the French railways earn 207l.; of the Great Western, 202l.; of the Scottish lines, 201l.; of the London and North-Western

197l.; and of the Irish Railways, 164l. each in the year. These considerations, which might be extended to a much greater length, ought to be enough to warn the shareholders of the Metropolitan Railway of the probably mischievous results of the proposed incongruous extension of their line.

SUSSEX DOMESTIC ARCHITECTURE.

No county archaeological society exhibits greater vitality than that of Sussex. It has been in existence no less than forty years, and during that period has done and said so much for the antiquities of Sussex that one might believe that nothing had been left undone or unsaid. Mr. André, however, has struck out a new line of research, and in pursuing it* has come across a good deal that is interesting, and, to a certain extent, novel. Castles, churches, mansions, and abbeys have been again and again described and surveyed, but the old farm-houses and the town dwellings of the richer tradesfolk have met with little attention at the hands of the county historian, while the humbler homes of the peasantry have served only as studies to the artist in search of the picturesque. But it is among these unpretentious buildings that Mr. André has found many examples of good old English work well worthy of attention.

Of course, in a county like Sussex, where, until modern times, wood was abundant, very little else than timber was used in the construction of secondary domestic buildings for many centuries. These "half-timber houses," as they are called, generally present the same features. There is a foundation of rough masonry, rising a few feet above the ground, and on this a sill of wood connecting the end standards or uprights which carry the tie-beams and wall-plates of the roof. The chamber-floor often projects, and, when this is the case throughout the building, the angle-posts usually exhibit some moulding or decoration. The spaces between the story-posts are sometimes formed of wattle and daub, and sometimes of brick, set flat or herring-bone fashion. In the Eastern Counties the panels thus formed are often marked with patterns on the surface, but instances of this "target-work" are rare in Sussex. The chimney-stack is usually of brick or of masonry, solidly built in bold fashion, and carried up to a well-formed chimney-shaft, or cluster of shafts, in which the base, the shaft, and the cap are distinctly and carefully treated. Sussex chimneys, like Sussex fire-bricks, have a high reputation for beauty, and Mr. André especially commends a specimen at Moor Farm, Petworth, "with two lofty shafts, having angle pilasters of an elegant design." He has also introduced drawings of chimneys at Horsham of bold character, and one from Thakeham, in which the series of brick stepped gables which cover the sloping of the stack is a pretty feature.

"Doors, both external and internal, were generally what are known as ledged ones; that is, composed of three or four horizontal pieces, covered with boards (instead of being framed in panels as in modern work). These 'cladding' as they are termed, were often of two thicknesses, thus giving scope for mouldings on the stouter ones; at other times, the covering was of one thickness, the joints of the boards being concealed by fillets fixed on with large ornamental-headed screws or nails."

The difficulty of making a modern sash-window picturesque is great, but not insurmountable. Still, for pleasing effect, there is nothing equal to the old lead casements, divided by mullions of wood or stone, but extending pretty well across one side of the parlour or kitchen. Lead work admits of considerable artistic treatment, and examples are to be seen at Horsham and elsewhere of the metal pierced in patterns for the sake of ventilation. Mr. André draws attention to a plumber's shop-front in Olchester, which exhibits a leaden panel about 8 ft. long, bearing the date 1728, and enriched with figures of double-tailed mermaids and soldering-irons, &c., in salience.

The general plan upon which the smaller houses were built was a parallelogram, having a middle portion devoted to the chimney corner in the centre of it, flanked on one side by the entrance-lobby, on the other by the stairs

* *Sussex Domestic Architecture in its Humbler Aspects*, By J. Lewis André, Esq. (Paper contributed to vol. xxv. of the "Sussex Archaeological Collections.")

winding round the chimney, and closed in at the bottom by a door. The earliest staircase proper had massive carriages, to which solid triangular steps were affixed, and now and then, as at Tower Hill Farm, Horsbam, the staircase rises in one flight from the centre of the hall and then branches off right and left to the chamber floor. As a rule, the flights were composed of a fewer number of steps, and more numerous landings than at present, and occasionally a low gate, or even a trap-door, closed the headway and forbade access to the chamber floor.

Sussex was so rich in oak that wood-carving was naturally a common pursuit, and specimens of considerable beauty are still to be found in farm-houses and even in cottages. The oldest panels are oblong in shape; and, though the linen-fold is a favourite pattern, yet the carver often made his own design and displayed a good deal of taste therein.

"Old panels in both wall panelling and furniture were fixed to the framing round them in a different manner to that employed at present, as they had the back surface sloped or feathered off at the edges and sunk in grooves in the frames; modern ones have a square sinking all round the edges, instead of the feathering." When a room was panelled, special ornamentation was bestowed upon the cornice, and at a farm in Warnham (where the building must always have been of the humblest class) there are good roll and battlement mouldings still existing in this position.

Metal-work was an industry native to Sussex two centuries ago, and it will be remembered that the iron railings around St. Paul's Cathedral were made in the county. Collectors of curiosities have made fire-backs and andirons comparatively scarce, but examples of both may still be seen in remote farm-houses, while hinges and locks of quaint design are by no means infrequent. Mr. André notices beautiful specimens of wrought-iron work in the pretty village of Lindfield,—one, the entrance-gate to a small house, which has a crest cleverly worked in amongst scroll-work and foliage; the other, the bracket supporting the sign of the "Tiger Inn." Indeed, in the immediate neighbourhood of the hammer-ponds there is little difficulty in discovering abundant evidence of what was in the seventeenth century the most flourishing Sussex manufacture.

We cannot do better than conclude our remarks upon Mr. André's interesting paper in his own words:—

"Nearly every article of furniture used by our ancestors was made more or less ornamental; even tradesmen's business desks and common boxes were covered with carving, the design being often only slightly sunk, as in the Scandinavian "chip carving." Our forefathers were also fond of placing pious mottoes on articles of domestic use, such as drinking-cups and the like. A skillet in Lewes Museum, for example, has on it, 'Ere God'; and it may be mentioned that 'God's Providence House' at Chester has its fellow in Sussex, as one at Ninfeld bears the inscription, 'God's providence is mine inheritance. Except the Lord build the house, they labour in vain that build it. Here we have (1659) no abidance.'"

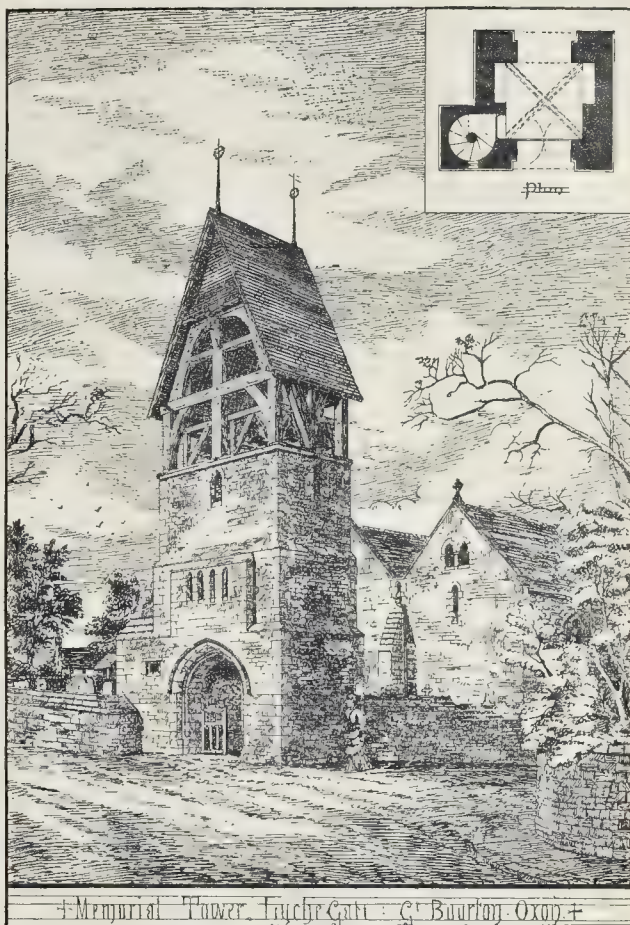
NATIONAL ASSOCIATION OF MASTER BUILDERS.

The half-yearly meeting of the National Association of Master Builders of Great Britain was held on the 27th ult., at the Red Lion Hotel, Cambridge, and was attended by representatives from London, Liverpool, Birmingham, Bristol, Hull, Bradford, Bolton, Lancaster, Northampton, Wigan, St. Helens, Cambridge, and Lincoln.

The meeting was presided over by Mr. W. H. Cowlin, of Bristol, the President of the Association, who reported to the meeting the evidence given before the Select Committee of the House of Commons upon the working of the Employers' Liability Act, 1880, and the proposed amendments, and also upon other matters of legislation affecting the building trade.

The report and accounts for the past half-year were read and adopted.

It was decided to hold the next half-yearly meeting at Nottingham.



TOWER LYCH GATE, GREAT BOURTON.

THE Memorial Tower Lych Gate was designed for the Parish Church of All Saints, Great Bourton. It is built of local yellow sandstone, with Hornton stone dressings, and the work was carried out by Messrs. J. & T. Lambert, from the drawings of Mr. W. White, F.S.A., Wimpole-street, London.

THE BRITISH ARCHÆOLOGICAL ASSOCIATION.*

THURSDAY, July 29th.—The party proceeded by train to Bishop Auckland Station, whence carriages were in readiness to convey them to South Church, dedicated to St. Andrew, one of the two old churches of the town. The day being wet, the church proved to be a welcome shelter, all the more agreeable from the great number of interesting features contained within its walls. The building was described by Sir J. Picton, the Rev. Dr. Hooppell, and Mr. Loftus Brock. It is of large size, having a long chancel, in which are still the stalls of the secular college founded here by Bishop Beck. The windows of the chancel are alternately lancets and insertions, of the end of the thirteenth century, having plain curved bars of stone instead of tracery, a feature which is not unfrequent in the Durham churches. There are transepts opening from the aisles, and not from the nave. The nave-arches are particularly good Early English work, very effectively moulded, as is also the south vaulted porch. The western tower is early thirteenth-century work, and, as at Staindrop, the original

* See p. 187, ante.

spire has disappeared, and a later belfry-story has been built in its place, having a square staircase turret. There are two very fine monuments, one of a knight in chain mail, carved in oak, and of a lady, with an elaborate head-dress, in stone. These monuments are now preserved in the tower. Much interest was taken in the very remarkable series of Saxon incised stones found during the restoration of the church, and now deposited in the north aisle. Some of these are of very great beauty, carved with figures and with foliage and birds so elaborately that the foliage would compare with some thirteenth-century work. The fragments consist, for the most part, of portions of the shafts of sepulchral crosses. A visit was then paid to the second church, St. Helen's, Auckland, which was described by the Rev. Dr. Hooppell. It is a small structure of Early English work for the most part, with some curiously-carved capitals.

The celebrated Saxon church at Escomb was next inspected, the unfavourable weather preventing more than a cursory view of the exterior. It consists of a nave, 43 ft. 6 in. by 14 ft. 4 in., and a chancel 10 ft. square. There is a porch on the south side of the same dimensions. The building is entirely built of squared stones, evidently taken from some Roman site, doubtless that of the station of Vinovia (Binchester) close at hand. These stones have not been reworked, but present the tool marks and broached patterns of the Roman masons. A stone inscribed with the title of the Sixth Legion exists on the north side, built up in the walling, and on the south side there is a piece of sculpture which has been made to do duty as a sundial, a feature which recent research shows was a usual one in Saxon churches. The

walls and the openings "batter" to a perceptible degree. The chancel arch is high and narrow, being 13 ft. 10 in. from the floor to the crown, and only 5 ft. 3 in. wide. It has well-defined "long and short" work to the jambs, and the semicircular arch appears to be a Roman arch re-erected. The flooring has been originally formed of a pitching of small stones, part of which is still visible. The font is a large trough, the step on which it stands being of masonry arranged in the form of a cross. Dr. Hooppell related the discovery of the building, which, although of such well-defined Saxon work, had escaped observation until only a few years ago. It was then in a very dilapidated condition, and had been superseded by a modern church erected on another site. In fact, the demolition of the building had been contemplated at an earlier period than the erection of the new church. The Rev. Prebendary Scarth and Mr. Roach Smith pointed out some of the features of the Roman walling stones, in which many curious evidences remain of their use in former buildings, and Mr. Loftus Brock called attention to the side windows, which agree with two recently discovered at Staindrop Church. The latter, therefore, may be considered as being of the same early date. The building stands in the midst of the cottages of a mining village close to the banks of the Tees, and it has now been sufficiently repaired to be used for divine service.

The party, which had completely filled the little sanctuary, left with regret, and arrived somewhat late at Bishop Auckland Castle, which was visited on the invitation of the President of the Association, the Lord Bishop of Durham. Luncheon having been partaken of, the Bishop led the party through the various ancient portions of the large irregular building, describing the history of every part. Taking the guests into the Stable Court, he pointed out that the buildings were the last remains of the houses of the secular canons removed from St. Andrew's Church to serve the Collegiate Church here instead. These are on the south side of the present castle. The chapel at the opposite extremity was then inspected, and here the Bishop delivered an interesting address, pointing out from documentary evidences the reasons for believing that the original chapel was on the south side, and that it consisted of two stories. The present chapel, which was consecrated by Bishop Cousins in 1663, has a series of fine pointed arches of early thirteenth-century work, evidently a portion of an ancient building. The Bishop inquired if it could be the hall of the ancient castle? Mr. Brock replied that the analogy of other buildings would appear to show that it was, but that it required the existence of a range of kitchens and offices to the north-east of the chapel, where there are no buildings at present. The original chapel would certainly be close to the canons' houses instead of on the other side of the castle. The chapel is now a detached building, and it has a capital oak screen very similar to other work of Bishop Cousins's in Durham Cathedral.

Notwithstanding the rain, a large party proceeded to the site of the Roman station Vinovia, now Binchester, under the guidance of Dr. Hooppell, to inspect a part of the excavations made by Mr. Proud under Dr. Hooppell's direction. Some very important discoveries were then made, and the remains were afterwards filled in again. A fine hypocaust, in almost perfect condition, was reopened and lighted up for the inspection of the visitors.

A meeting was held in the Reference Hall of the Darlington Free Library in the evening, when papers were read as follows:—"The Life of St. Wilfrid," by Mr. J. Anson; "On the Conyers Family of Sockburn," by Mr. Fred. R. Sutes; and "On the Works of the Nevill Family," by Mr. J. P. Pritchett, the latter paper being illustrated by plans of Raby and Middleton castles.

Friday, July 30th.—The rain again interfered with the arrangements of the day, but the programme was adhered to. It included a visit to Richmond, Easby Abbey, and Catterick. On arriving at Richmond Station, a visit was paid to St. Mary's or the Low Church, a name derived in regard to its relative position to Trinity Chapel in the higher part of the town. Mr. Loftus Brock, F.S.A., described the architectural features of the building, the oldest part being of Early Norman work. There are two twelfth-century arches at the west end, four-

teenth-century windows, and a good Perpendicular tower at the west end. The Early English features have suffered so materially in the restoration that whether or not the present are copies or otherwise of old work cannot now be determined by observation. The church stands on sloping ground, and it is a conspicuous feature in the view of the town. Proceeding up the hill, the chapel of the Holy Trinity was inspected. This is a free chapel, built originally by the Lords of Richmond Castle to meet the wants of the inhabitants who founded the town beneath the shelter of the castle walls. It consists of a nave, small chancel, and north aisle, with a western tower, all except the latter being over-restored. The building has suffered unusual degradation at the hands of a former generation, and the tower is now occupied as a dwelling. A house is built in the western part of the nave, and a range of shops has been formed beneath the north aisle. The south aisle is entirely ruined, and the party inspected a piscina on one side of a dust-bin. Mr. Brock quoted Leland with respect to the existence of ancient sculptures, and proceeded to point out fragments of what was probably an enriched Norman doorway, doubtless part of the sculptures referred to, built up on the north side of the nave.

The party next paid a visit to the grand old Castle of Richmond, which, by order of Major Dickenson, was thrown open for inspection, it being used as a military depot. Mr. Brock briefly related the history, calling attention to the recorded erection of a castle here by Alan Rufus, 1071, the later erection of the lofty keep by Conan in 1146, and many items of the history. Notwithstanding its commanding situation and the usual nature of the means for its maintenance, it was proved to be dilapidated so early as the fifteenth year of Edward III., and in ruins in Leland's time. The walls enclosing the little area occupied by the town, first of earth and afterwards of stone, were more than once damaged during incursions of the Scots, and repaired; but the castle itself appears to have been left to the elements from the time named. Proceeding to a survey of the various parts, the towers were identified from an ancient survey made to determine the parties responsible for upholding the various parts under the knightly service of castle guard. The building was erected originally as a curtain wall, enclosing a large area, built along the edge of the precipice beneath which the river Swale flows, there being towers at intervals, and a banquetting-hall, called Scollard's Hall, with an external staircase, upheld by the Lords of Beclale. The core of the walls was shown to be of very early Norman work, while the keep, of later work, is of well-squared light sandstone. The keep is planned fairly in accordance with usual arrangements, and its analogy to other keeps of nearly the same date was pointed out. It differs in one material particular. There is a large arch opening from the open area on its inner face, the whole of the ground-floor being thus open to observation. This unusual arrangement was accounted for by the fact that the arch was older than the keep, and that it was, in fact, the original entrance. It is built in the earliest style of Norman work, with roughly-carved capitals of red stone.

The magnificent site of the castle was inspected, the party proceeding along the newly-constructed path around the base of the walls on the outside, overlooking the rocky bed of the Swale and its water-fall. The market-place being crossed, the party passed beneath the little postern still remaining in a portion of the old wall of the town, to the ruins of the Grey Friars' Church, a building founded in 1257 by Ralph FitzRandal, Lord of Middleton, whose heart was buried here in 1270. But feeble remains exist of the church, but there is evidence sufficient to show that it was a building of the fourteenth century, consisting of a chancel, nave, and wide southern aisle or transept, of which the eastern wall with two Decorated windows remains. A fine light lofty steeple of very late Perpendicular work is built between nave and chancel, within the side walls of both, thus curtailing the width. Mr. Brock adduced other instances of this both in England and Ireland, and showed that it was a usual arrangement. The new work being bonded into the old is sufficient to indicate that the rebuilding of the church, as has been stated, was not intended.

After luncheon a portion of the party proceeded to inspect some newly-discovered pre-

historic remains in Whitecliffe woods. They found two or three circular chambers which have been recently excavated, formed of stone walling, with openings covered by large lintels.

Carriages then conveyed the party to Easby Church, which was described by Mr. J. P. Pritchett, the remarkable early thirteenth-century wall paintings being carefully inspected. They have deteriorated seriously during the recent years following their discovery, being now far less bright than when opened to view. There is an early Norman font, and a piece of still earlier Saxon shaft-work built into the arcade wall. Two fine thirteenth-century floriated crosses have been also built in as old material, without regard for their previous use, in the fifteenth-century wall of the south aisle.

The beautiful ruins of Easby Abbey, adjoining the church, on the banks of one of the most charming curves of the Swale, were then inspected, and Mr. Pritchett read a paper descriptive of the remains and their history, illustrating his remarks by a plan of the building. He afterwards led the party around the ruins. The carriages being resumed, a visit was made to the large but plain Perpendicular Church at Catterick. By the courtesy of Sir John Lawson, of Brough Hall, the original contract for the erection of the church, 1413, and the Bridge, 1423, were exhibited in the vestry. Mr. Brock referred to the executed work as illustrated by the contract, and pointed out that it was well executed, but singularly coarse in detail. Some monuments and the sedilla were evidently portions of the former church. A glance was given at the Roman Station, Caracato, and the Roman road passing it, and the party then returned to Darlington. At the evening meeting papers were read by Dr. J. W. Eastwood, on "Sockburn, Dinsdale, and the Roman Roads"; and by Mr. E. Hutchinson on the "Palatinus of Durham."

Saturday, July 31st, was devoted to the inspection of the antiquities of Sockburn and Dinsdale, various other objects of interest en route being visited. The first stoppage was made at Croft, where the quaint old church was described by Mr. Pritchett. It is a long, broad church, having roofs very little removed from flat. There is a low square tower at the south-west angle, built on a more ancient wall, and at the west end are remains of a very early Norman doorway, which was blocked in Medieval times. The aisles north and south are devoted to large heavy tombs of local families, and there are some large flights of oak steps ascending into pew-like boxes, on a line with the capitals of the nave arches. There are some good Geometrical windows, and several later insertions of about 1350, notably the sedilla and an ambury, covered with quaint carving and foliage. A fragment of very good Saxon interlaced work, part of the shaft of a cross, does duty as one side of an ambury, at the east end of the north aisle.

The fine old Medieval bridge at Croft was inspected, Mr. Pritchett guiding the party to the ancient side, the bridge having not long since been widened in the old style.

Hurworth Church was then visited, and Mr. Pritchett pointed out that six pillars are alone visible in the nave of the ancient building. The tower is, however, the original one, but cased with modern stonework in a poor Gothic style. Mr. Pritchett's recent additions to the church consist of a well-proportioned chancel and side aisles. There are two ancient effigies of knightly figures in the tower, said to have been removed from the neighbouring Neasham Abbey.

The drive was continued along the banks of the Tees, past the site of the Abbey, of which no traces remain, to Neasham Ford, which was once the only practicable one on the main road northwards in old times, until the erection of Croft Bridge. It is most probably on the line of a Roman road. The storm of the early part of the morning ceased shortly after passing this point, and the beautiful scenery of the Tees banks was seen in all the beauty of sunlight, as the carriages passed along the ancient road which gives access to the Sockburn peninsula, formed by a singular bend of the Tees. The party then inspected the ruined church at Sockburn, which was described by Dr. Eastwood. It is a beautiful ruin in a charming spot, close to the modern Hall. Much regret was expressed that so interesting a building as this church should ever have been allowed to become a ruin. It was perfect until about forty-five years since, when the then Bishop of the diocese permitted the removal of the

church to the opposite bank of the Tees, where, to gratify some passing caprice of the then owner of Sockburn, a new poor-looking building was erected, and the ancient fabric allowed to go to ruin. Within its roofless walls is a perfect museum of Saxon incised stones, portions of shafts of crosses, crosses and sepulchral slabs, one being a "hog-back" tomb, brought from the Hall for better inspection of the party, by direction of Sir Ed. Blackett, the present owner. Mr. Loftus Brock pointed out some fragments of Saxon masonry still forming a portion of the church walls. In the Hall in effigy of a knight in chain armour was suspended, and also, by Sir Ed. Blackett's courtesy, the celebrated falchion, said to be the weapon with which the Sockburn Worm was slain. This was presented to the bishops of Durham on their first entry into the diocese, mostly on Croft Bridge, as the tenure on which the Sockburn estates were held. This singular custom is known to have been in existence from a very early period, and it has been practised down to modern times. The party proceeded to the ancient Manor House of Dinsdale, after having been entertained at luncheon at the Salmon Leap at Pountney's Mill, by the owner, the Rev. Scott Surtees. The house is a plain building, with massive walls, a secret chamber, and some quaint old oakwork. The site is, however, remarkable for being enclosed with a network of low earthen banks, which appear to be ancient British. Within these, enclosing the area of the Manor House, is a well-formed deep moat, probably of Roman origin. Within this he massive foundations of a castellated keep have recently been excavated by Mr. Surtees. These were examined by the party, and appear to be thirteenth-century work. There are some curious masons' marks on the stones. A basement with a central pier has been completely cleared of earth, and is, with the stone steps leading to it, in very perfect condition. A curious brick-built furnace, of doubtful age, and in ancient pitched road across the moat, have also been excavated. The church, close to the Manor House, was then inspected, and Mr. Pritchett, who restored it, and Dr. Eastwood rendered appropriate descriptions. In the porch have been built up for security a great number of Saxon incised stones, having elegant knotwork patterns, while in the church is a large portion of a well-preserved "hog-back" tomb of the same early date. The party, some riding and some walking along the charming banks of the Tees, then made their way to Dinsdale Spa for tea, after which Darlington was reached in time for the closing meeting, over which Sir J. A. Pictou presided. Papers were read by Mr. E. P. Loftus Brock, F.S.A., on the "Peculiarities of the Churches of Durham," and by Mr. Geo. R. Wright, F.S.A., on "The Sockburn Worm, and other such legendary Creatures." After which, various complimentary votes of thanks were proposed to the Mayor and Corporation of Darlington, the Bishop of the Diocese, and others. The meeting broke up at a late hour.

Cable Tramways.—Mr. E. Pritchard, M. Inst. C.E., one of the engineers of the Birmingham Central Tramways Company, has just returned from America, where he has, on behalf of the company, been making exhaustive inquiries into the working of the various systems of cable tramways which have been adopted in the States with a view to the adoption of cable locomotion on the Handsworth and Bristol road routes in that town. Mr. Pritchard is stated to have gone out somewhat prejudiced against the cable system, and decidedly sceptical as to its adaptability to meet local requirements, but, according to the *Daily Mail*, he has come back thoroughly convinced, not only that cable trams are perfectly feasible, but that they are, all things considered, the most economical and desirable form of street locomotion yet put into practice. In consequence of the severity of some of the gradients on the Handsworth and Bristol Road routes,—especially in Hockley-hill and Snow-hill,—and the fact that certain objections were raised to the use of steam-power by the residents, the attention of the company was turned to cable trams, and as a result of Mr. Pritchard's favourable report upon the cable system of haulage it is stated that that system will, in the course of a few months, be tried on the route in question.

RAILWAY EXTENSION IN THE COLONIES.

A PAPER on "Railway Extension in the Colonies" was read at a conference held at the Colonial and Indian Exhibition last week by Mr. J. S. Jeans. The author began his paper by pointing out that this was a subject of almost equal interest to the Colonies and the mother country: to the former because no other single influence could so materially aid their development, and to the mother country because she would for a long time be called upon to supply the greater part of the materials of construction, and because the colonies would take more of our home produce, the more they were able to export themselves. The experience of the United States had shown that there was a close relation between railway facilities and the development of foreign trade, and that the more the exports were increased the greater was the volume of imports, although the two did not exactly nor necessarily run on all fours. Britain now imports over 125 million pounds worth of food supplies, of which America furnishes fully 30 millions worth. It is of great importance to England to endeavour to assist the colonies to take the place of the United States in this regard, because the United States was a hostile nation in commercial affairs, imposing as they did an average duty of 45 per cent. on the whole of their imports, with a view to the exclusion of foreign commodities. The immense development of the trade of the United States within recent years was clearly traceable, in great part, to railway extension. There were now 130,000 miles of railway opened in the United States, whereas our Australian colonies had only 7,000 miles for an almost equal area, and Canada, for a larger area, excluding Alaska, had only 10,000 miles. Assuming that a railway contributed to the opening up of a country for twenty square miles on either side, the railways of the United States would be equal to opening up about 5½ millions of square miles, or nearly double the absolute area of the country, excluding Alaska, whereas the railways so far built in Canada were only equal, on the same basis of estimation, to opening up about 400,000 square miles, or very little more than one-ninth of the whole. The railways of India provided for opening up about half a million square miles, or rather over one-third of the whole, and the railways of Australia provided facilities for 280,000 square miles, or one-eleventh of the whole continent. The total mileage of railways now constructed in the British colonies was about 30,000 miles, being an average of one mile to every 7,375 of the population and every 269 miles of area. In the United Kingdom, there is one mile of railway to every 6½ miles of area, and in the United States one mile of railway to every 25 miles of area. If our colonies had the same relation of railway mileage to area as the United States, their total railway mileage would be upwards of 330,000 miles. The freight rates of our colonies were generally higher than those of Europe, but in India and in Canada they were lower. The latter country had to arrange railway rates so as to compete for trans-continental traffic with the United States, where, within the last ten or twelve years, the rates had been reduced on an average by one-half, and where freighters were now paying the railways 100 million pounds per annum less than they would have had to pay for the same volume of traffic in 1872. It was of great importance to our colonial progress that the rates should be kept low, as this would develop traffic more rapidly, and better enable the colonies to compete with the United States. That they were able so to compete had been sufficiently proved by the enormous increase in their exports of broad-stuffs to Europe within recent years. With the exception of India, Queensland, and New South Wales, in each of which the railways were now paying over 4 per cent., the colonial railways were not generally so remunerative as to tempt capital on their merits. Canadian railways only paid an average of 1·4 per cent.; Victorian railways, 2·91 per cent.; New Zealand railways, 2·51; and Cape Colony railways 2·65 per cent. Railway promoters should endeavour not only to ascertain the traffic actually existing or available, but also the traffic likely to be created. Experience had shown that in the colonies traffic developed very rapidly, and in some cases a net traffic of less than 300l. per mile per annum was equal to yielding a dividend of over 4 per cent., whereas

it required over 1,700l. per annum to pay the same rate in England. It was of the greatest importance to the colonies that they should be furnished in the shortest possible time, and on the greatest attainable scale, with railway facilities, in order to transport the produce of their wheat-fields and vineyards, their sheep-runs, and their cattle-ranches, to the markets of Europe, and for this purpose colonies were justified in undertaking an expenditure and incurring a debt that would not be otherwise justifiable.

COMPETITIONS.

The Fleming Memorial Hospital, Newcastle.—Mr. Henry Currey, F.R.I.B.A., London, the referee appointed by the President of the Royal Institute of British Architects, at Mr. Fleming's request, to advise him in the matter of the competition for the Fleming Memorial Hospital for Sick Children, Newcastle, has awarded the premiums as follows:—1st, 50l., design marked "Simplex," by Messrs. Quilter & Wheelhouse, of London; 2nd, 30l., to Mr. Rounthwaite, Benfieldside, for design marked "Sweetness and Light"; 3rd, 20l. to design "Civis," by Messrs. Clark & Moscrop, of Darlington. The buildings are expected to cost at least 15,000l. There were thirty-one designs submitted.

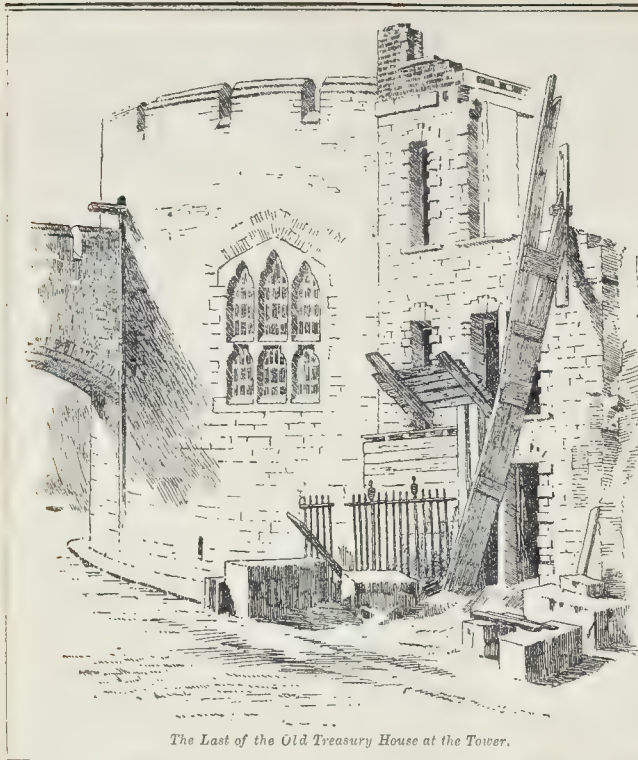
Stirling High School.—The School Board of Stirling having called in Mr. John Kinnross, architect, Edinburgh, to adjudicate upon the plans submitted in this competition, he has given his award as follows:—1st, "Stare super vias Antiquas"; 2nd, "Heir I forbear my name or arms to fix"; 3rd, "Simplicity." The Board acting on the advice of the referee have instructed the author of the design placed first, Mr. J. M. MacLaren, to proceed with the work.

SUSSEX ARCHÆOLOGICAL SOCIETY.

The annual general meeting of the Sussex Archaeological Society is fixed for Thursday, August 19th, and will take the shape of an excursion to Bexhill, Ninfield, Penhurst, Normanhurst, and Hooe. At Bexhill the party will inspect the church, and also an ancient memorial stone recently brought to light. Ninfield will be next visited, and the interesting old church shown. Proceeding by "God's Providence House" and Standard Hill, the party will visit Ashburnham Vicarage and Court Lodge to view some interesting articles collected for inspection, and be shown the furnace which was the last smelting furnace at work in Sussex, and is, therefore, an interesting relic of the extinct Sussex iron industry. The Rev. R. F. Whistler will next conduct the party over Penhurst Church and the Manor House. Tower Creep will also be visited, and the party will then repair to Normanhurst to dine in the grounds, by the kind permission of Sir Thomas Brassey, who will take the chair. The return journey to Bexhill will be by way of Hooe.

The Proposed Hospital for Small-pox Patients.

At the meeting of the Metropolitan Asylums Board on Saturday last a report was received from the Committee for General Purposes recommending that the Local Government Board be asked to at once issue the order promised in their letter of July 12, 1884, authorising the managers to raise on loan and expend the sum of 116,000l., being the amount which it is estimated will be required for the erection of the proposed hospital for convalescing small-pox patients, on the managers' estate at Bexhill. Captain Galton moved the adoption of the recommendation, and detailed the progress of the scheme. The Local Government Board raised a question as to whether it would be better to erect temporary buildings instead of permanent structures. He urged that brick buildings should be erected for the proposed hospital, on the ground that wooden huts presented a great danger from liability to fire, were more difficult to keep at a good temperature, were liable to become saturated with infection, and would cost a large proportion of the sum of 116,000l. required for the building of brick huts. The money for the erection of brick buildings could be borrowed and repaid at the rate of 6,000l. a year for thirty years. He moved the adoption of the recommendation. Some opposition was offered, but on a division being taken thirteen voted for the adjournment of the question and twenty-six against it. The recommendation was then confirmed by a large majority.



The Last of the Old Treasury House at the Tower.

THE LAST OF THE OLD TREASURY HOUSE AT THE TOWER.

This sketch shows all that was left a few days ago of the Old Treasury House at the Tower of London, referred to in our article of last week (p. 157, ante).

Illustrations.

DESIGN FOR PROPOSED NEW CHURCH, TEDDINGTON.

THE above design, which was exhibited on the walls of the recent Academy exhibition, is from a drawing by Mr. Ernest C. Lee. The design was originally made for a church for Teddington, though not, we believe, ultimately adopted.

WAREHOUSES, ROCHESTER-STREET, WESTMINSTER.

THESE premises are situate at the corner of Rochester-row and Rochester-street, Westminster. They are built for Messrs. T. & W. Farmiloe, lead and glass merchants, and have frontages in Rochester-row and Rochester-street of 45 ft. and 85 ft. respectively.

The two elevations are faced with red bricks, supplied by Mr. James Brown, of Broad-street Buildings, and Portland stone is used for the cornices, window-heads, cills, &c.

The floors are constructed of 11 in. by 3 in. wood joists, carried on 12 in. by 6 in. rolled iron joists, 10 ft. apart, supported on cast-iron columns. The whole of the ironwork used is of English manufacture, and was supplied by Messrs. Young & Co., of Eccleston Iron Works, Pimlico.

There is a large hydraulic lift in the back portion of the premises for raising and lowering goods, which was supplied by Messrs. Easton & Anderson.

The building was designed by Messrs. Isaacs & Florence, and carried out under their superintendence by Messrs. Prestige & Co. Mr. R. Mann acted as clerk of works.

The cost of the building was about 6,000*l.*

NORWICH REGIMENTAL DEPÔT BARRACKS.

THE illustration which we give of a portion of this barrack comprises the officers' quarters and mess establishment, the quartermaster's quarters and stores and commissariat stores, the orderly-room and paymaster's establishments, militia offices, arms-store, and guard-house.

The barracks have been designed to accommodate one field officer, eight officers, thirty-two sergeants, and 256 rank and file.

The barrack-rooms are of special type, being capable of division by self-coiling steel shutters so as to render the rooms more comfortable when, as is sometimes the case in depôt barracks, they are only partially occupied.

Each man has 600 cubic feet of space and 56 ft. superficial area in the barrack-rooms, and 5 ft. superficial of window space. Each sub-division of each room will be warmed by an open stove emitting warmed fresh air and provided with a small oven for keeping messes warm, and racks for drying great-coats. These stoves have been specially designed for the War Department by Messrs. Yates, Haywood, & Co.

An important feature in the arrangement of the buildings is the position of the drill-shed, which is so placed as to afford efficient cover to the men when going to or from the various accessories, such as cook and bath houses, straw-store, &c., which are placed in rear of the barracks.

The married sergeants and soldiers will each have a quarter containing two rooms and a small kitchen or scullery; and the warrant officers will have still more accommodation.

The recreation establishment will consist of recreation, reading, and coffee rooms,—each connected with a central bar,—a kitchen and accessories, a shop for groceries, and a manager's quarters.

The canteen, although attached to the recreation establishment, is kept distinct from it by a party wall, and the access to it is by a separate entrance on the far side of the building.

The water-supply will be from a well purposely sunk within the War Department boundary, from which source it will be pumped into a 4,500-gallon tank placed in the clock-tower

whence it will be dispersed to the sewers throughout the buildings.

The site has been well chosen, and occupies one of the highest plots of ground in the neighbourhood of Norwich. It was presented to the War Department by the Mayor and Corporation, and the building we illustrate will overlook the city. The soil is gravel, and, as may be seen, the ground in front is broken and picturesque. The most has been made of this peculiarity, as, instead of the usual unsightly boundary-wall, a retaining wall has been substituted, on which some of the buildings stand, giving a bold and defensible effect to the structures.

The style, with its gables, red brick walls, and tiled roofs, will harmonise well with the prevailing architecture of the city, and Mr. Andrew Clark may be congratulated on the numerous improvements he has introduced, which are exemplified in this new type of barrack construction.

The cost of the undertaking, including the hospital, will be about 54,000*l.*

The contractors are Messrs. Kirk & Rand of Woolwich.

The buildings were commenced in May, and will be completed within two years, the date of signing the contract.

A VILLAGE COFFEE-TAVERN, &c.

WE illustrate a perspective sketch of a building that was to be erected in the village of Street, in Somersetshire, but was modified before execution, as the acquirement of a public-house in the village and its conversion into a coffee-tavern, rendered it unnecessary to embody the latter in this block.

The large archway gives access to the hotel and also to stables at rear, and the hotel rooms are at this end on the first and second floors. The hall is over the men's and women's dining-rooms, whilst its platform would be the fire-engine shed.

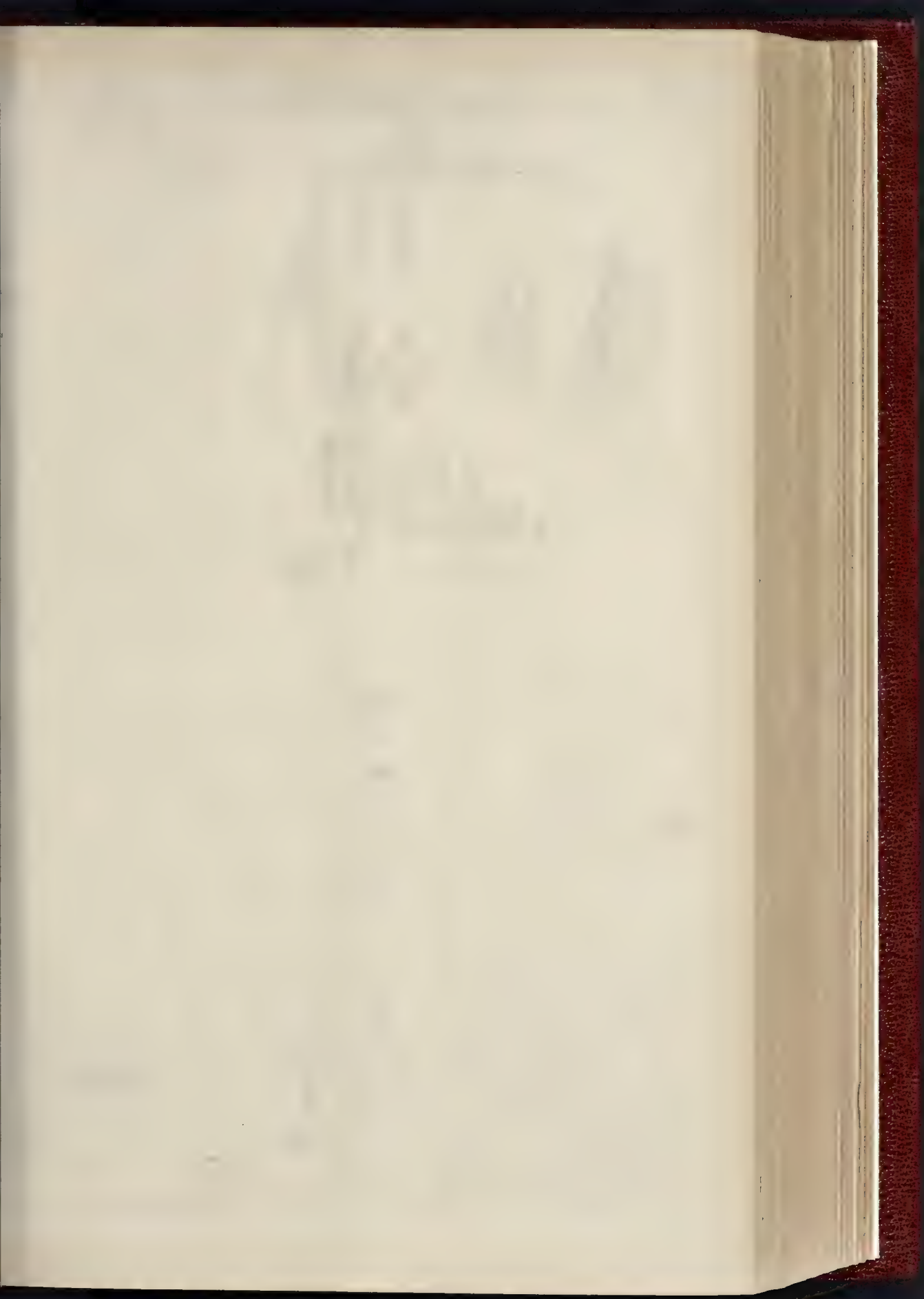
The materials proposed are local blue stone, Ham Hill dressings, and Broseley for roofs.

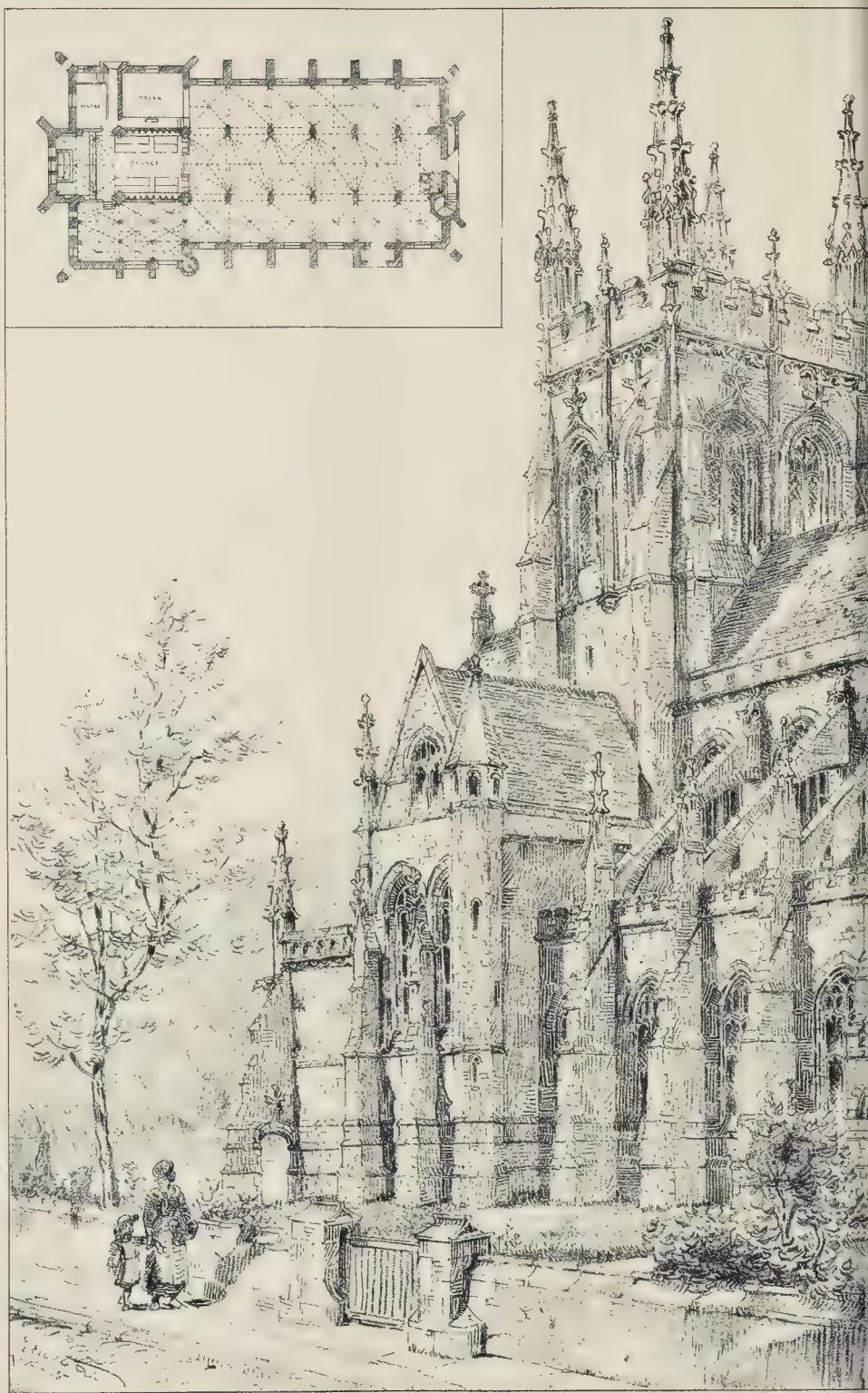
The architect is Mr. George J. Skipper of Norwich.

TWO HOUSES, TWICKENHAM.

AS will be seen by the plans, the two houses are dissimilar both in size and arrangement, and externally have been treated in a manner giving in perspective the appearance of a considerable block, without the obvious divisional lines in the building. The plan shows the garden front. The work is carried on in bright stocks, with red brick bay windows, arches, &c. The roofs are covered with red plain tiles, the bays and porches in the front are in wood, the bays in view of brick. The details have been carefully carried out from the architect's designs, and the whole, complete, ready for occupation, was 1,680*l.* Messrs. T. & W. Hickinbotham, Teddington, were the builders, and the architect was Mr. Thos. R. Richards, of King's Cross, Cheapside.

The Roman Baths at Bath.—A quarterly meeting of the Bath Town Council was held Tuesday, the ex-mayor (Mr. Handel Cossin, M.P.) presiding, in the absence of the mayor, Alderman Murch asked if the Baths Committee had communicated with Lord Carnarvon, some other eminent archaeologist in order to ascertain whether the old Roman bath would in any way be interfered with by the building of the new baths.—Alderman Wilkinson said communication to Lord Carnarvon had been sent, but he believed no reply had yet been received.—Alderman Murch thought there was a necessity for carrying out the resolution of Lord Carnarvon or some other archaeologist should give their opinions as to the extent which any of the old Roman baths would be interfered with.—Alderman Wilkinson said he certainly intended to invite Lord Carnarvon or some other gentleman before they proceeded to build upon the foundations of the houses to be taken down.—The ex-mayor said he valued improvements and alterations about to be made in the baths, but he should very much deprecate them if they were done at the sacrifice of the old Roman baths. He hoped every step dealing with these baths would be before the Council.





DESIGN FOR PROPOSED CHURCH.

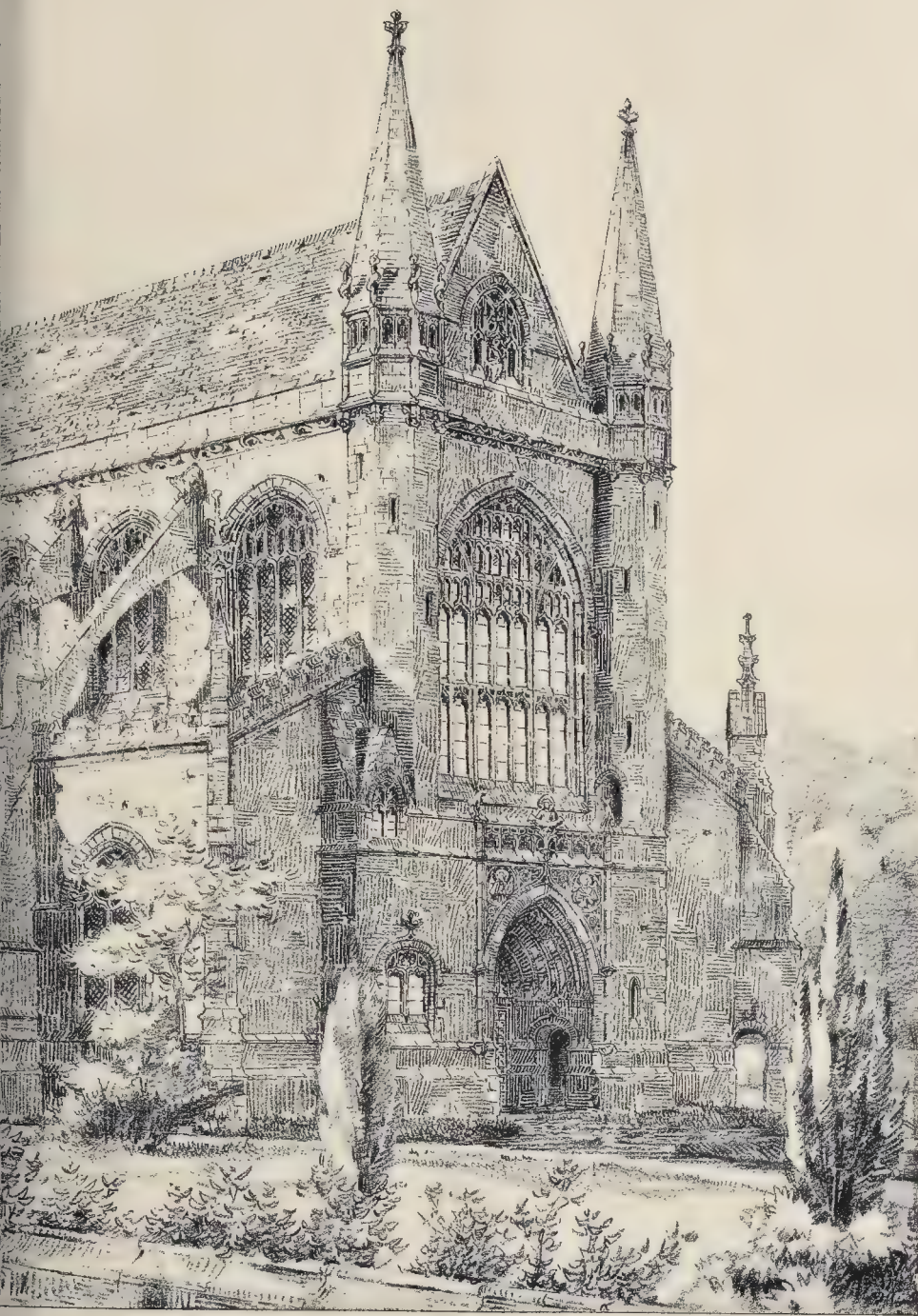
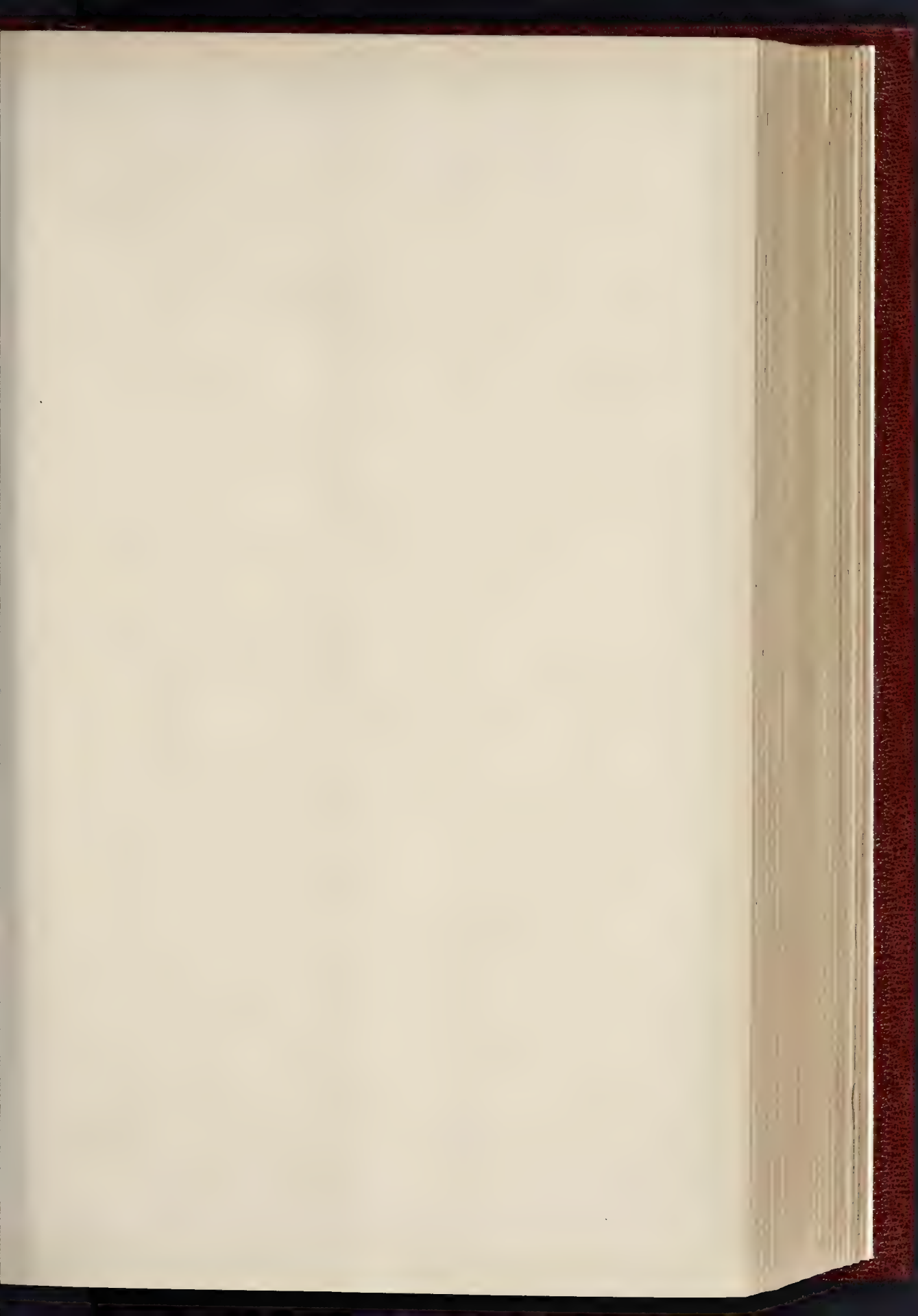


PHOTO SPRAGUE & CO LONDON

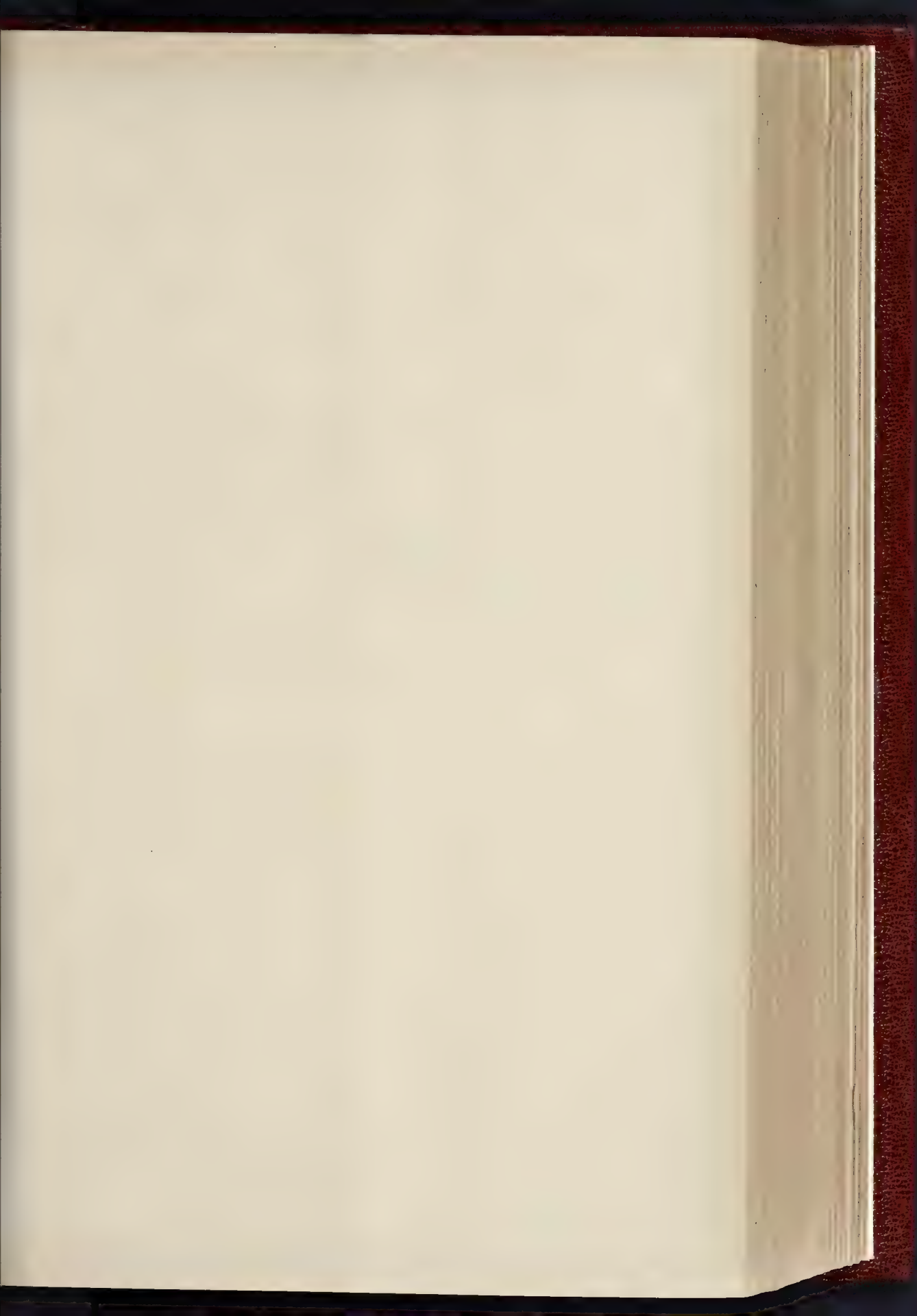


THE BUILDER. AUGUST 7. 1886

**THE VILLAGE COFFEE-TAVERN
TEMPERANCE HOTEL-HALL-ETC.
GEORGE J. EXETER, Architect.**



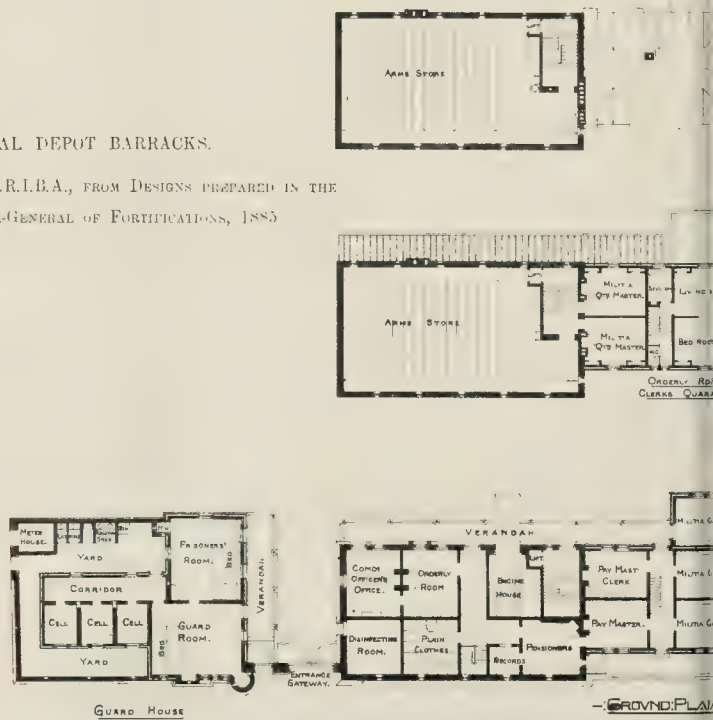
Aug 1. 1886. 1886



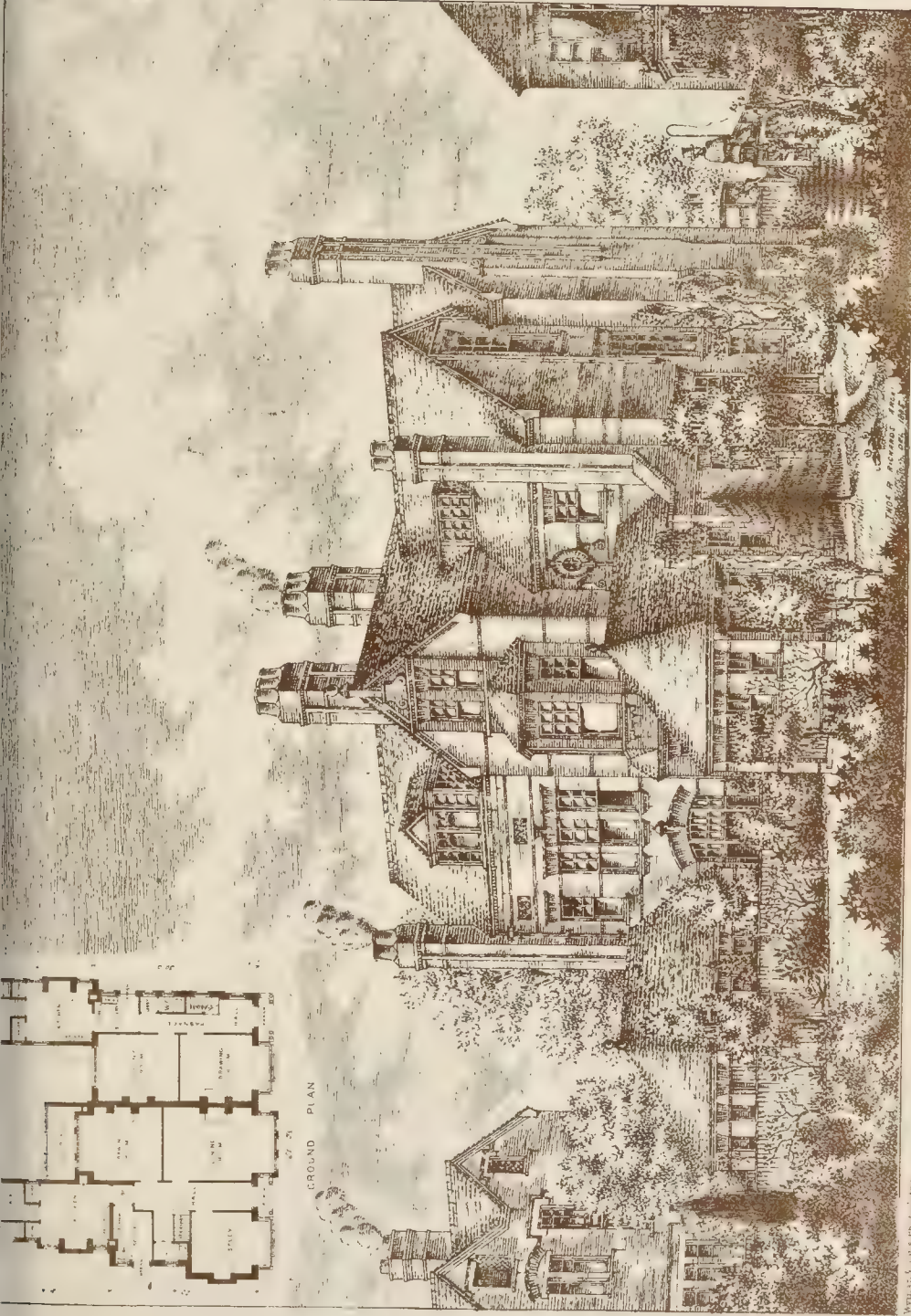


NORWICH REGIMENTAL DEPOT BARRACKS.

DRAWN BY MR J. MECHLEN ROGERS, A.R.I.B.A., FROM DESIGNS PREPARED IN THE
WAR OFFICE UNDER THE INSPECTOR-GENERAL OF FORTIFICATIONS, 1883

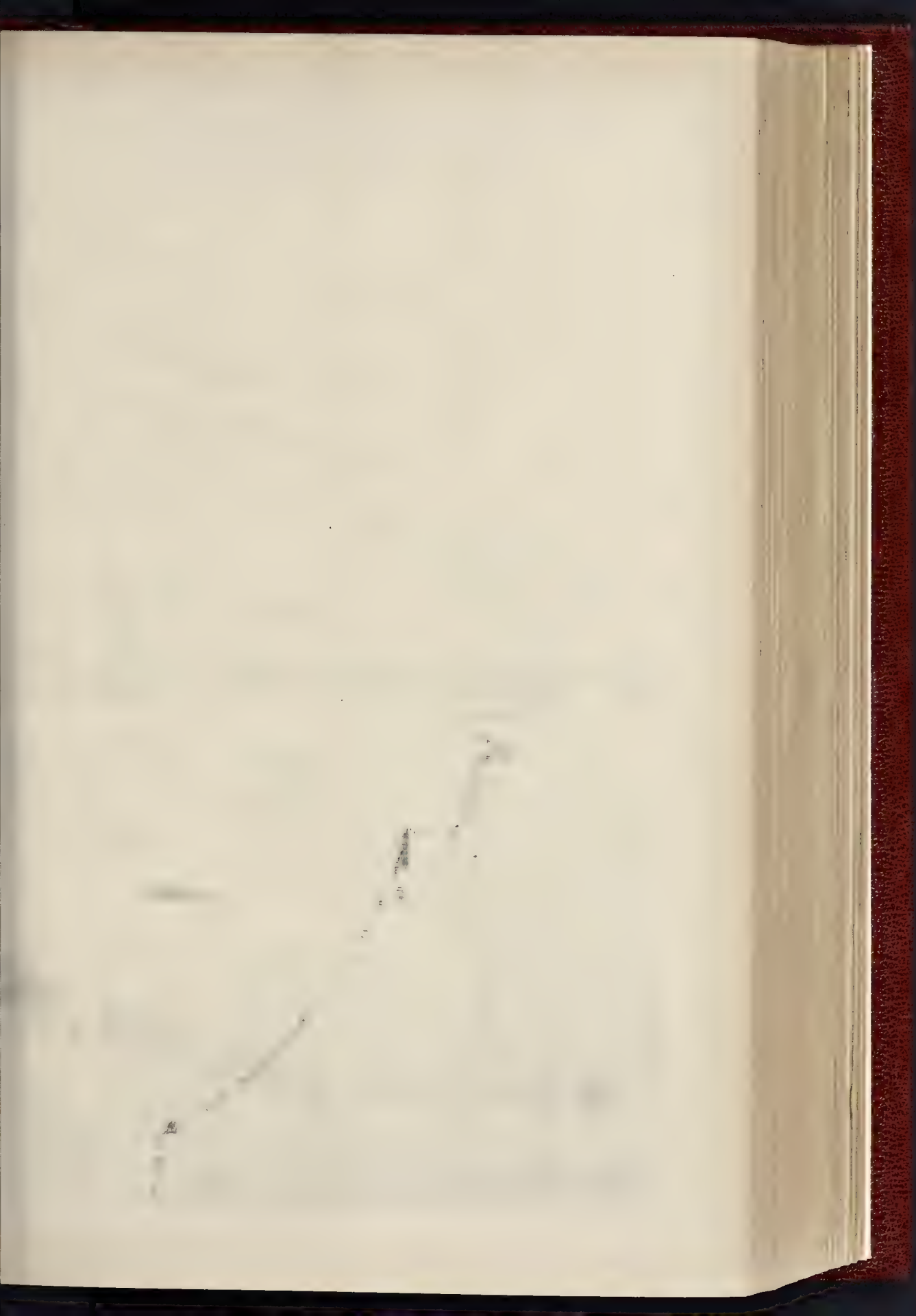


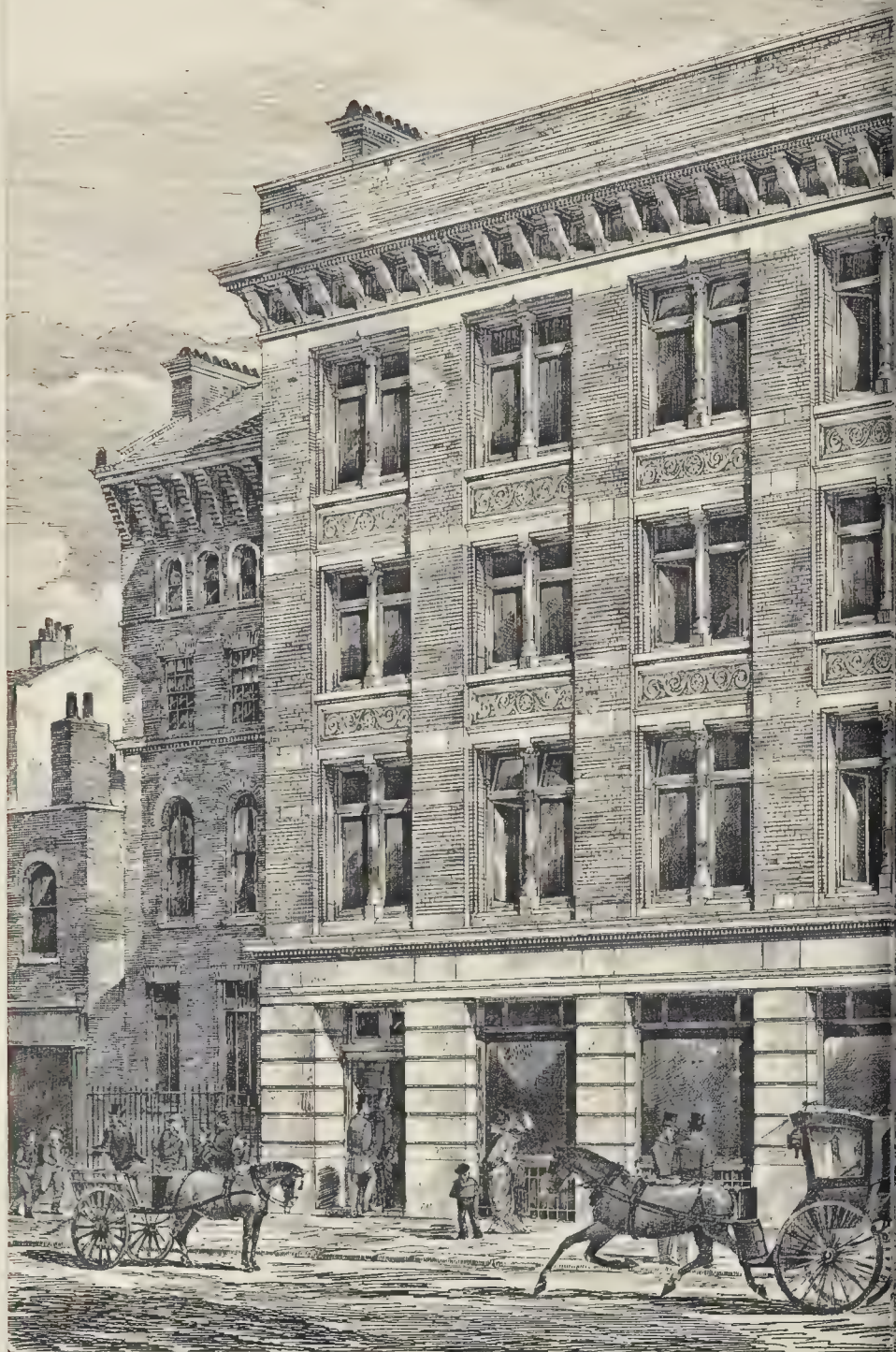




WILLIS & SONS LTD LONDON

TWO HOUSES, TWICKENHAM.—MR. THOS. R. RICHARDS, ARCHT. & T.





WAREHOUSES, ROCHESTER STREET





The Bickersteth Memorial Hall, Hampstead.

THE BICKERSTETH MEMORIAL HALL, HAMPSTEAD.

This building, of which we recorded the laying of the foundation-stone a few weeks ago, to form the completion of a testimonial to the Right Rev. Dr. Bickersteth, Bishop of Ely, who was for thirty years vicar of Christ Church, Hampstead. The plan includes a large hall, capable of seating 300 persons, three class-rooms, &c., and will cost about £10,000, exclusive of site. The architect is Mr. Alfred J. Hardcastle, and the builders are Messrs. E. C. Howell & Son, of London and Bristol.

BERKSHIRE ARCHÆOLOGICAL AND ARCHITECTURAL SOCIETY.

THE second summer excursion of the Berkshire Archæological and Architectural Society took place on the 20th ult., the places visited including the interesting old town of Wantage, and some picturesque villages in its vicinity, together with Lockinge House, the residence of Lord Wantage, and Hendred House. The latter throughout the day was charming, and the drives through the pleasant tract of country included in the day's programme were much enjoyed. The number of the buildings and other objects of interest to be inspected was large, and the time devoted to each was necessarily limited. Admirable arrangements, however, been made by the honorary secretary of the society (Mr. S. Slingsby Stallard), and the rather crowded itinerary was carried through well within the allotted time, though not without fatigue to some of the enthusiastic members of the party. The excursionists, who numbered upwards of fifty,

left Reading by the 9-50 a.m. train for Wantage.

On the arrival of the party at Wantage, Mr. Stallard read an interesting paper on the lands and church, in the course of which he said:—Wantage, anciently Wanting (an appellation still retained in the name of the hundred), was in Saxon times one of the palaces of the kings, and here, in 849, Alfred was born. He died in 900, and, by will, gave the manor to his wife, Ealswith, daughter of Ethelred, Earl of Mercia; after her death it reverted to the Crown, and at the time of the Norman Survey it was reckoned as part of the Royal demesne. The Fitzwarrens, lords of the manor of Wantage, were the original founders of Wantage Church in the thirteenth century, and they were doubtless intimately associated with the several alterations which took place at various periods up to the middle of the fifteenth century. There appeared to be about the church no work of earlier date than the middle of the thirteenth century, but it was known that work of the Norman period did exist in the remains of a building which up to a few years ago stood in the present churchyard. Leland, in referring to Wantage, says that "it is remarkable as having two churches in one churchyard." One of the "churches" here named must have been the ruins of this building, the north doorway of which,—of the Norman period,—had been rebuilt at the new Grammar School, and was a very fine specimen of the work of that date. Within the church itself the earliest work which he had been able to discover was in the north transept, a fine clustered shaft, with cap and base, dating about A.D. 1250, which occupied a position seeming to have no relation to its immediate surroundings, and which

was all the more curious from the fact that a portion of the arcade work just above, but in no way connected with it, belonged also to the thirteenth century. To the same date must be assigned the font, the mouldings of which were enriched by the tooth ornament, which was very characteristic of the period. Of the thirteenth century also was the great central tower, with its very massive pillars; the columns and arches forming the nave arcades; the arcade on the east side of the south transept; and also the arches between the nave and transepts, all of which belonged to the time of the reign of Edward I. Doubtless on the completion of the thirteenth-century work the general plan of the church was much as it is now, for although the side aisles of the nave and all the work eastward of the transepts as now existing belonged to a much later period, they were for the most part works which had taken the place of previous erections. The chapel on the south side of the church appeared to have been erected about 1450; the ceiling over a portion of it was boarded with oak, and had carved bosses, which were well worthy of careful study. The chapel on the north side was somewhat later, the mouldings to the caps and bases of the arcading between this chapel and the chancel seeming to belong to the latter part of the fifteenth or early part of the sixteenth century. There was on the east side of the north transept some curious and very interesting mingling of work of three different periods in connexion with the arcade and adjoining walling. The present north and south aisles of the nave belonged to the fifteenth century, and doubtless it was at the time of their erection that the old roof of the nave was removed, the present clearstory built, and the fine oak roof added. This roof was a splendid specimen of fifteenth-century carpentry. The stone corbels supporting the principals were carved in a manner very characteristic of the date, and upon one shield at the termination of the hammer-beams were the Fitz-Warine arms. Within our own day the nave of the church had undergone changes, having been lengthened some 15 ft. by the addition of one bay to the arcading. The windows at the west end of the nave were composed mainly of the old stones of the former windows. A greater change has taken place in the south aisle, the porch, with the priest's chamber above and the staircase leading up to it, having for some reason been pulled down some four years ago and reconstructed at a point some 15 ft. from its original position. The church possessed some fine ancient woodwork in the chancel stalls with miserere seats elaborately carved and in excellent condition. Here were also screens between the chapels and the chancel, portions of which were of the fifteenth century, the remainder a restoration. In the chancel were the remains of what must have been a fine alabaster tomb. Some small portions of the elaborate canopy existed, the character of the work upon them indicating that this tomb belonged to about the middle of the fourteenth century. There was no inscription, but the effigies were believed to be those of Sir William Fitz-Warine and his wife. The knight was represented cross-legged, with the order of the garter round his left leg; and the lady wore a head-dress of the fourteenth century. This Sir William Fitz-Warine was the forty-seventh Knight of the Garter in succession from the first institution of the Order. Upon the wall of the north transept was a remarkably fine brass to the memory of Sir William's son, Sir Ivo Fitz-Warine,—who died September, 1414. In its proper recumbent position it represented the figure of a knight with his head resting on his tilting-helmet, his feet on a lion. He would direct their attention to this brass, as in the whole county of Berks there was only one brass in memory of a knight of prior date to this, and that was to Sir John Foxle, at Bray, dated 1378. This Sir Ivo Fitz-Warine attended the Earl of Buckingham at the siege of Nantes in 1381. Upon the wall in another part of the north transept was a brass of earlier date; it was a fine half effigy of a priest, nameless, and undated, but it might be assigned to about the year 1320; it was one of the earliest brasses to the memory of an ecclesiastic which Berkshire possessed. In the south aisle of the nave, also upon the wall, was a later brass, dated 1522, to the memory of Walter Tawbot and Alice his wife; beneath was a representation of their five sons, but originally there were four daughters represented also. Some other brasses

of minor interest existed, and several which existed many years ago were lost.

The various features of interest in the church having been inspected, including the fine oak stalls and modern embroidery in the chancel, the party proceeded to "The Ham," the residence of Mr. W. L. Nash, who had kindly invited them to luncheon. On the way a call was made at the Grammar School, where the Norman doorway referred to in Mr. Stallwood's paper is now placed, forming part of the new school buildings.

Returning to their carriages the party drove to Lockinge Church, which is undergoing extensive repairs and additions. Mr. A. B. Allin, of Wantage, the architect of the new works which are in progress at the church, proceeded to give some history of the Lockinge lands and church. Lockinge, or Laking, as it was called in the Saxon times, and Lachinges, in the Norman Survey, was granted by charter of Queen Adelunith to the Abbey of Abingdon, in the ninth century, and was held by the Abbey until 1538, when it was placed at the disposal of the Crown. In 1546 the Manor of East Lockinge, together with many other lands, was granted to John Wynchcombe, son of the celebrated Jack of Newbury. His son, Thomas Wynchcombe, alienated this and other estates, and the Manor of Lockinge then passed to the family of Doe, whose names appear in the earliest part of the parish register, which commences in 1516. In 1853 the church, which was in a very dilapidated condition, underwent considerable alterations and repairs under the direction of the late Mr. Street. The chancel was not touched, with the exception of the roof, which was boarded. The south aisle, which was entered by one Perpendicular arch from the nave, was extended westwards, having the two present arches introduced in the place of the Perpendicular one; the walls and roof were also new. The nave underwent somewhat the same process, the old roof and walls being replaced by new, and a north and south porch were added; but the doorways retained their original position. It would thus be seen that the only portions of the church left untouched were the chancel walls and the tower. The chancel, which was almost entirely of the Decorated period, contained one or two features of an earlier date. There was the credence, or ambry, as it might have been, though he (Mr. Allin) thought that if it had been the latter there would be some signs of the books for hanging the door. There was the squint, half blocked up, and the outline of a double sedilia, or sedilia and piscina. The credence and squint were of the same date as the Transitional arch leading to the vestry, which had two grotesque corbels. The other arch into the south aisle was Perpendicular, and had what was said to be an altar-tomb. The old tie-beams were all that remained of the fourteenth-century roof. The east window was plain Decorated, but the two north windows had very nice tracery heads, and on looking at them first he thought they were "low-side windows," which were supposed to have been so placed for the convenience of cripples or lepers who could not enter the church. Such windows were, however, always unglazed, and fitted with a shutter, of which there were no signs, and on a careful examination he came to the conclusion that these windows were removed from elsewhere and placed in their present position. As to the question of the object of the recesses on either side of the east side of the chancel, he did not agree with Mr. Parker's opinion that they were probably squints. He believed that the chancel arch, which was of the same date, same mouldings, and same bad and chipped jointing, was also brought from elsewhere, and this would account for the misfit of the recesses, which, no doubt, suited their original position well enough, and being part and parcel of the actual moulded stones of the arch, had to be fitted in as best they could. Probably these recesses were part of an arcade, but certainly not squints, as they would be useless for that purpose. In the south aisle the Decorated east window was the only remaining old feature, but in 1853 there was a Perpendicular west window, which was destroyed when the aisle was lengthened.

From the church the party proceeded to Lockinge House, where, by the courtesy of Lord Wantage, they had an opportunity of seeing the pictures, tapestries, and articles of vertu which adorn the principal apartments. The butler conducted the excursionists through

the rooms, calling attention to the tapestries and the chief pictures, which include fine examples of Murillo and Gainsborough. They subsequently visited Ardington Church, West Hendred Church, East Hendred (where Mr. Stallwood read some notes on the parish and the chapel), Hendred House, Harwell Church, and Hagbourne Church.

YORKSHIRE ARCHÆOLOGICAL ASSOCIATION.

THE annual excursion of the Yorkshire Archæological and Topographical Association took place last week, when Kirkham Priory and Malton were visited by the members.

At Kirkham Priory, Mr. J. T. Micklethwaite described the buildings. He said the gate-house was almost unique in its design, and, he was happy to say, was in very good preservation. It used to be longer and deeper through than it now was. The date of the gate, he should say, and he was told it fitted very well with the heraldry, was about 1300. It was a very beautiful work indeed, and he should say it was done under Kentish influence; it was more like Kentish than Yorkshire work. The carving of the heraldry was some of the most perfect he had ever seen. After reference had been made to the cross standing near the gateway, a move was made to the west front of the church. Here Mr. Micklethwaite pointed out that the church was turned a good deal to the north, which was done, no doubt, for the purpose of making the most of the ground. Proceeding to near the site of the pulpitum, Mr. Micklethwaite remarked that when at Bolton he said something about the custom of canons building churches without aisles. An antiquary from the North had found fault with him about that. His real statement, however, had been mistaken. He meant that the twelfth-century canons' houses were nearly always laid out without aisles. There, as they would see by the plan, the church had actually no aisle to the nave. That was only exposed a short time ago by the diggings of Mr. St. John Hope, and they had Mr. Hope's plan, which was the most perfect that had yet appeared. On the north side of the cloister was the transept and choir, the extent of the latter being marked by a beautiful fragment at the end. The first work after the foundation would be the building of the choir. Mr. Micklethwaite then gave a detailed description of the cloister and outer buildings, pointing out the position of the flight of steps near the outer parlour, which, he thought, must have taken almost the whole width of the west corner of the cloister.

At the conclusion of Mr. Micklethwaite's interesting and graphic description, Colonel Brooke read a letter which he had just received from the Rev. C. B. Norcliffe, of Langton Hall, Hutton, in which the rev. gentleman gave an account of the heraldry on the outer gateway.

Colonel Brooke then in the name of the Society, expressed their thanks to Mr. Savory, of Kirkham Priory, for allowing them free access to the grounds.

The Dean of York wished to add their regret that Mr. Savory was not able to be with them owing to ill-health.

The visit to Kirkham Priory having been brought to a close, the visitors proceeded by special train to Malton, and at once went to the Talbot Hotel, where luncheon was partaken of. The Dean of York presided, and after lunch he proposed health and prosperity to the Association, in whose name Col. Brooke responded.

Immediately after the luncheon, the company visited St. Michael's Church, where a short stay was made, and after inspecting the building they drove to Old Malton Priory, where a very pleasant half-hour was spent.

The Rev. E. A. B. Pitman, vicar of the parish, read an historical account of the structure. In the course of his remarks he said the history of the Gilbertines, one of whose finest houses was Old Malton Priory, must always be a source of the greatest interest to the archæologist and antiquary. That was so for the reason that the Gilbertine was the only purely English order known. The church was only a fragment of what was once a noble minster with three towers. The monastery was designed to contain thirty-five men. In its integrity the Priory Church possessed a transept, with eastern chapels, a choir with aisles, and a short presbytery. The changes in the structure of the church had evidently been made

by a sordid pulling down of faulty portions piecemeal, till the present miserable residuum only was left. The central tower was taken down, it was believed unnecessarily in 1636. In 1728 the church was two bays longer than at present. The two bays and the clearstory must have been removed in 1738 or 1734. During the dark age of architecture which attained its greatest density under the Georges, the remains of the Priory suffered awfully. The structure was looked upon as a free quarry for the neighbourhood, and whoever required building material repaired thither and found stone ready to his hand. The sides of the lock and mill dam were built of the stones of the church, and when the foundation of the mill dam was removed last year he rescued many of the carved stones. In 1840 some alterations were made in the interior. In 1877, finding that the south-western tower was falling, he called in Sir Gilbert Scott, who pronounced it to be in a most dangerous state, and advised that it should be under-pinned and tied. That was done by Earl Fitzwilliam at a cost of 3,000. The roof was now in a most insecure and dilapidated state, but he hoped very soon to see a new roof taking its place. Whatever was done would not have regard to restoration, but to preservation, and, with his consent, not a single feature of the church would be interfered with.

At the close of the rev. gentleman's account Mr. Micklethwaite described the architectural features of the building, and expressed a hope that, whatever might be done, they would leave the old walls as they were, so that instead of destroying the old history they would simply be adding a new chapter to it.

BRISTOL AND GLOUCESTERSHIRE ARCHÆOLOGICAL SOCIETY.

ON Tuesday, a three days' meeting of this society commenced at Dursley. At half-past twelve o'clock a numerous company of the local committee assembled in the town-hall, for the purpose of receiving the visitors. Amongst those present were the President, Sir Henry Barkly, K.C.B., Sir W. V. Guise, Bart., president of the council; Major-General Vizard, chairman of the local committee; Sir John Maclean, Colonel Forbes, local secretary; and the Rev. W. Bazley, M.A., general secretary.

Major-General Vizard, as chairman of the local committee, begged, on behalf of the committee, to welcome the Bristol and Gloucestershire Archæological Society to Dursley, and asked the retiring President, Sir Brook Kay, to take the chair.

The report of the Council for the past year was read by the Rev. W. Bazley. It stated that ten years had passed away since the society was formed for the study of local archæology. During the decade many changes had, of course, taken place in the roll of the society's members. Many who took an active part in the formation of the society had been taken from their midst. It was a source of consolation to them that a record of their labours and researches had been preserved in the Society's Transactions. During the last year they had lost ten members by death. Amongst them they might mention the Rev. Henry Thomas Ellacombe, M.A., F.S.A., who died on the 30th of July, 1885, at the ripe age of 86. His chief study was campanology, and in 1881 he published "The Church Bells of Gloucestershire" and "The History of the Parish of Bitton," from materials which he had been collecting for seventy years. These two valuable contributions to the history of Gloucestershire the society had acquired by subscription. Mr. James Herbert Cooke, who died October 20th, 1885, contributed six papers to the Society's Transactions, relating for the most part to the Lords of Berkeley, their retainers, and possessions. The number of annual members was 416, and seventy-nine life members, making a total of 495, against 510 in the corresponding period of last year, and it was a subject of congratulation that the income of the society was only a little less than it was at the most prosperous period of its existence. The number of subscribing members elected during the year was sixteen. On April 21st the balance at the society's bankers was 157l. 4s. 6d., against 156l. 11s. 11d. the time last year. When the surplus copies of the Berkeley MS. in the society's possession had been sold to the members, this balance would

largely increased. The society also had a total capital of 432l. 8s. 8d., representing the disposition fees of life members. Three meetings of the society had been held during the year—the annual meeting at Tewkesbury in July last year, an autumn meeting at Newent, and last June a visit to Dursley, with a special view of inspecting the recently-discovered Saxon chapel. Steps had been taken to ensure the protection and preservation of that most interesting relic of Early Ecclesiastical architecture.

Until very lately the chapel formed part of a dwelling-house. Abbott's Court belonged to the Ecclesiastical Commissioners, a timbered house of Tudor date being attached to it on the east and a more modern range of buildings on the west. The removal of a tree led to the discovery of a tablet inserted in one of the external walls, recording the dedication of an altar. A further search on the part of the Rev. G. Butterworth and the Ecclesiastical Commissioners' local architect led to the discovery of a Saxon chancel-arch, and Saxon windows and doorway. A great deal of interest had been awakened by communications made to the various journals and learned societies by Mr. Butterworth, Professor Middleton, and others, and a committee, consisting of the following gentlemen, had been appointed to superintend the work thought necessary for the preservation of the chapel:—Sir W. V. Guise (President), Sir John Maclean, F.S.A., Mr. J. Reginald Yorke, Mr. S. R. Dowdeswell, Mr. Algernon Strickland, Mr. W. M. Baker, Mr. J. T. Agg-Gardner, Mr. Professor J. H. Middleton, Rev. E. J. Power, Mr. S. H. Gael, Rev. F. E. Broome (Vicar), Rev. G. Butterworth, and the Rev. W. Guise, General Secretary of the Society. A dedication had been presented by Mr. Collins, of Tewkesbury, for the repair of the chapel, which met with the approval of the committee, and Mr. Whins was prepared to complete the work for 120l. The visit of the society to Ashchurch in May, 1885, had led to the proposed restoration of the very interesting village church, fragments of which were scattered here and there. The cross, when restored, would be about 13 ft. 6 in. high. It was certain that any Gloucestershire village and churchyard crosses, besides those which Mr. Pooley had somewhat imperfectly delineated and described in the "Old Crosses of Gloucestershire," were still extant, and it was to be desired that the example set by the inhabitants of Ashchurch might be followed elsewhere. The Ancient Monuments Protection Act, 1882, had given facilities which it would be well for the society to avail itself of. The schedule of the monuments brought under the Act might be considerably enlarged in Gloucestershire, and it was hoped that owners of property on which there were such monuments would hasten to place them under the guardianship of the Commissioners of Works.

The Rev. S. Davis proposed, and Mr. Falconer seconded, the adoption of the report, which was carried, and other business having been transacted, Sir Henry Barkly took the chair, and delivered his presidential address, which was entitled "The Early History of Dursley."

The company after luncheon reassembled in the parish church of St. James, where they were received by the rector, the Rev. Canon Adam, M.A., who read a paper upon the story of the building.

Under the guidance of the Rev. C. C. Murray-Browne, M.A., and the Rev. W. R. Pitt, the party next proceeded to the celebrated road well (or Ewelme), which attracted considerable attention. The ancient building adjoining, known as the Nunery, was also inspected, after which a visit was made to the priory at the bottom of the town, a house supposed to have been built about 1500, and which in a good state of preservation. A remarkable fire-place here attracted much attention. The way of Long-street the party then proceeded to the supposed site of the old Dursley Castle, under the guidance of Gen. Vizard and the general secretary.

The annual dinner of the society took place at the Old Bell hotel in the evening. A temporary museum for the exhibition of local and other antiquities was opened in the Town-hall.

At the evening meeting the following papers were read:—"The Decay of the Clothworkers," by the Rev. C. C. Murray-Browne; "Notes on the Town and Neighbourhood of Dursley," by

Mr. F. Madan; and "Kingswood Abbey," by Mr. V. Perkins.

On Wednesday morning a large party started from Dursley Town-hall for their first carriage excursion in the direction of Tetbury, through some beautiful country. After passing Kingscote, the first object of interest inspected was Calcot Barn, which was described by the Rev. A. K. Cornwall. The Calcot Barn was built by the Abbot of Kingswood, in the reign of Edward I. Within the doors was a bas-relief called "Balaam and his Ass." Bigland's MS. referred to the barn as being 130 ft. long, and as being capable of holding 900 loads of corn. The visitors then drove on to the old castle of Beverstone, where the general secretary (Rev. W. Bazeley) read a brief paper on its history. The excursion arrived at Tetbury at one o'clock, where, after a luncheon, the town-hall, the church, and the ruins of the old abbey were inspected.

SOMERSET ARCHÆOLOGICAL SOCIETY.

ON Tuesday, the annual meeting of the Somerset Archaeological Society commenced at Yeovil. There was a large and distinguished company present; but the President, Lord Carlingford, was prevented by ill-health from attending. On the motion of the Right Rev. Bishop Hobhouse, Mr. John Batten, of Aldon, was elected President for the ensuing year. The President-elect thanked the members for the honour conferred on him. Mr. Green then read the thirty-eighth annual report of the Council. We quote a few passages:—"The steady increase in the number of its members, amounting at the present time to 520, is a proof that the society continues to receive a cordial support. The state of the finances, although apparently not so favourable as that shown in the last report, is sound and satisfactory. The balance in the hands of the treasurer at the close of 1885 was 9l. 9s. 11d., as compared with 76l. 10s. 11d. at the close of 1884. But this diminution is owing to the fact that the 'extra expenses incurred in re-arranging the contents of the Geological Room, and in painting and fitting up the Ethnological Room,' announced in the last year's report, have been paid out of this year's income. The liability on the Castle Purchase Fund now amounts to 311l. 16s. 7d. To this must be added the deficit incurred in the reconstruction of the Geological Room, viz., 258l. 0s. 7d., making the total debt 569l. 17s. 2d., as compared with 553l. 13s. 9d. at the end of 1884. Your Council, considering that the library has recently become of sufficient importance to warrant them in extending its usefulness, appointed a sub-committee to draw up a scheme for the loan of books to members, and also to prepare a catalogue of the rules. The rules suggested by them are appended hereto. . . . It is with sincere regret that your Council refer to the recent death of two of the society's most valued members, the Rev. F. Brown and Mr. Wm. Long. Mr. Brown, who for a short time was one of the society's hon. secretaries, had made the genealogies of the county of Somerset his special study, and by his extensive and accurate knowledge of them, often enlivened by touches of anecdote, contributed much to the society's excursions, and furnished many valuable papers to its volumes. Mr. Long was president of the society in the year 1869."

The report and accounts having been adopted, the vice-presidents were appointed, the name of the Right Hon. Lord Carlingford being added to the list. The other officers were re-elected, and the name of the Rev. Prebendary Buller, of Chard, added to the list of local secretaries. A local committee was also appointed, and about twenty new members elected.

Mr. Green drew attention to the fact that Taunton Grammar School had been advertised by the Charity Commissioners for sale at only eighteen days' notice. The announcement had caused some consternation, and it was suggested that the Society should take some action upon the matter. Mr. Bourdillon said the date of the school was 1522. In the course of a conversation it was suggested that an effort should be made to interest some Taunton friends in the matter, with the view, if possible, of getting the sale postponed. Mr. Bourdillon said if the school buildings were destroyed it would be a scandal to the whole neighbourhood. He thought the Society ought not to sit quietly still under the circumstances. He moved that the Society memorialise the Charity Commissioners to postpone

the sale in order that steps might be taken to save the building, or at least to prevent it from falling into improper hands. Bishop Hobhouse seconded, suggesting that they should merely ask that the sale should be postponed. The resolution was amended, and the chairman, in putting the resolution, expressed the hope that the Taunton people would bestir themselves in the matter. The motion was carried.

The President then delivered his address, which dealt with the principal historical features of the town of Yeovil. It was listened to with the greatest attention, and was well received.

After the meeting the members and others assembled visited the Old Timber inn, the Chantry-house, and Yeovil church. Carriages were then provided, and the company were conveyed to Aldon, where luncheon was supplied by the President. After luncheon the society visited Brympton church and house, a description of which was given by Mr. Chisholm Batten; and then drove to Preston, to examine the Mediaeval house and barn; through Ilchester, to Limington, Ashington, and Mudford, and back to Yeovil for the evening meeting.

On Wednesday the society visited Odcombe.

SUPERINTENDING ARCHITECT, METROPOLITAN BOARD OF WORKS.

SIR,—As you well point out, none of the candidates for the appointment would fill Mr. Vulliamy's shoes. Is not the failure due to the extremely short notice given,—less than a week,—leading many architects to suppose that it was a purely formal announcement, and therefore hardly worth while making an application which would involve troubling others for testimonials, &c. If it really be an "open event," why not start again after the recess? The Board would then find they had no lack of good candidates.

ABOVE BOARD.

. We notice on the agenda for this week's meeting of the Board that the Works and General Purposes Committee have resolved to recommend to the Board "That Mr. George Vulliamy be appointed Superintending Architect for a further period of three months, namely, from the 29th of September until the 25th of December next."

PRESSURE IN WATERPIPES.

SIR,—Can any of your correspondents give me the formula for ascertaining the pressure to which 24-inch pipes would be subjected? The entire length is 1,500 yards. The outlet is sometimes 16 ft. below the surface of the water; the intake or upper end is 8 ft. above the highest level of water at the outlet. There are two vent pipes in the first hundred yards, and two at the second hundred yards, each 10-in. bore. The fall of pipes is uniform. Can there be any holding up of the water by the air inside? If so, for how long, and what pressure would overcome it?

M. A. R.

PROVINCIAL NEWS.

Bath.—The corner stone of the new baths was laid on the 23rd ult. The *Bath Chronicle* says that the stone is laid directly on the colossal masonry of the ancient baths, which has stood 15 ft. or 16 ft. above the ground, and forms the southern boundary of the King's Bath. Mr. Wilkinson having spread the mortar, the stone was lowered to its bed, and declared to have been well and truly laid. The conventional bottle containing records and coins was dispensed with, but the ceremonial is duly recorded on the face of the stone in the following inscription:—

On July 23, 1886,
Under the Mayoralty of ANTHONY HAMMOND,
The Hot Mineral Baths Committee
(J. J. WILKINSON, Chairman)
Have laid on Roman Masonry Seventeen
Hundred Years old the Corner Stone
Of new Baths,
THUS CONNECTING IN WORK AND
OBJECT THE MODERN WITH THE ANCIENT WORLD.

The Committee, noticing an important omission from the inscription, the name of the architect (Mr. Davis, the City Architect), a formal resolution was passed directing that it should be supplied. The builder is Mr. J. Long.

Douglas (Isle of Man).—The foundation-stone of a new hospital and dispensary for the Isle of Man was laid in Douglas a few days ago, by Mrs. H. B. Noble, who, with Mr. Noble, has given the site and 5,000l. for the erection of the building. The new hospital is in a commanding and elevated position, and will be called "Noble's Isle of Man Hospital." Accommodation will be provided for fourteen male and fourteen female patients in the general wards

and there will be accommodation also for four patients in smaller wards, and private wards will be likewise provided. The building will be faced with red pressed bricks and terra-cotta dressings, from the works of Mr. J. C. Edwards, of Rnabon, and the contract is being carried out by the executors of the late William Gradwell, of Barrow-in-Furness, for the sum of £4,038l., from plans and designs made by and under the superintendence of Messrs. Bleakley & Cubbon, architects, Birkenhead.

Edenbridge (Kent).—The new Odd Fellows' Hall at Edenbridge has been opened. It has been erected at a cost of about 1,200l. by the members themselves, many of them being connected with different branches of the building trades. Mr. W. S. Fox is the architect.

Exeter.—On the 29th ult., the Mayor of Exeter formally opened the Belmont Pleasure-grounds, St. Sidwells, which are five acres in extent. They were lately acquired by the Municipality of Exeter from Mr. Huxtable. The grounds will be a great acquisition to the inhabitants of this part of Exeter, as Mr. Councillor Harry Home, Chairman of the Public Grounds Committee, well pointed out on the occasion of the opening ceremony.

Hartlepool.—The foundation-stone of a much-needed improvement, the Hartlepool Headland Protection, was laid by the Mayor (Mr. James Rawlings, J.P.) on the 2nd inst. The wall commences at the Corporation-road and terminates at the Lighthouse, having a length of 3,400 ft. In addition to protecting the face of the cliff from the inroads of the sea, the scheme includes the reclamation of about three acres of land and the construction of a promenade, which will measure 20 ft. at the narrowest part. The top of the wall will be 18 ft. above high-water mark, and the cliff between this and the Moor level will be terraced, the promenade asphalted and protected by iron railings, thus forming one of the finest marine promenades in the country. Near to the Hough Battery, where a large area of ground is reclaimed, it is proposed to place a sea-water swimming-bath, with penstocks so that the water can be renewed each tide. At intervals inclines are to be constructed, placing the foreshore and Moor in communication. The wall is to be constructed of concrete blocks, varying in size, and will weigh from three to five tons each. The foundation blocks which are let into the limestone rock will be protected by an apron. The contract was signed by Mr. T. A. Matthews, Bolton, on the 27th of January last, his tender being 23,319l., and the interval has been occupied in laying down a railway and making blocks. Mr. H. Mair is the engineer for the work, and it is being carried out under his superintendence.

Hull.—At a meeting of the special committee appointed to deal with the resignation of the Borough Engineer of Hull, Alderman Leake in the chair, the ten candidates selected at the previous meeting attended and stated their qualifications. The following gentlemen were selected to appear before the Town Council for final selection:—W. Harpur, Borough Engineer, Cardiff; E. J. Mawbey, Borough Engineer, King's Lynn; J. Stafford, Borough Engineer, Burnley; A. G. E. Thoms, Borough Surveyor, Wolverhampton; A. E. White, Assistant Borough Engineer, Hull; J. F. Worth, Borough Engineer, Burslem.—Alderman Stuart moved, and Sir A. K. Rolitt, M.P., seconded, "That having seen the ten selected candidates, and being of opinion that none of them possess qualifications superior to those of Mr. White, Hull, it be a recommendation to the Council to offer Mr. White the appointment at 400l. per annum." Eight voted for the resolution and six against, and it was carried. The salary offered in the advertisement was 500l. per ann.

Keymer (Sussex).—The new railway station at Keymer, on the Brighton main line, is now opened. It is situated about 150 yards north of the old station, and close to the World's End Arch. The line runs considerably above the natural level of the earth, and consequently a large expenditure has had to be incurred in banking up for the new station. The station is approached on either side by long flights of steps. The ticket-office is on the east side, and communication between the platforms will be established by means of a short subway. The ticket-office is below the level of the platforms, and is built of pitch-pine, painted stone colour with chocolate decorations. The platforms are of great length, and are built on the standard height introduced by Mr. Stroudley. The facings are of brick and the surface chiefly

of gravel. The contractors were Messrs. Longley & Sons, of Crawley, and the building of the station was superintended by Mr. Jones, of Brighton.

Kingston-on-Thames.—The building known as the Old Grammar School (but really the Free Chapel of St. Mary Magdalen, built by John Lovekyn in the middle of the fourteenth century) has been re-opened for use as a school-room in connexion with the Grammar School. Owing to the removal of the adjacent school-house, and the decay of the external stonework, the building was in a dilapidated and dangerous condition, and required extensive repairs, which have been executed by Messrs. Oldridge & Sons, under the supervision of Mr. A. J. Style, A.R.I.B.A. The chapel is internally about 38 ft. by 17 ft., with windows at both ends and at the sides, and octagonal turrets at the eastern angles. It is built of flint and chalk, with dressings, &c., of Surrey fire-stone. Great care has been taken to preserve the original stonework, and the stones used for the repairs to the windows, &c., was procured from quarries near Reigate. The Surrey Archaeological Society have taken active steps for the preservation of this building, and a very complete history of the chapel and its founders has been written by Major Heales, F.S.A. The cost of the repairs to the chapel and the class-rooms, and erection of boundary walls, &c., amounted to more than 600l., which has been raised entirely by voluntary contributions through the energy of Mr. Guilford, of Surbiton, the chairman of the Governors of the Endowed Schools.

Newcastle-under-Lyme.—The memorial stones of a new Temperance Hall here have been laid. It is proposed to erect the hall, as high as the first floor, of blue bricks with stone dressings, the basement being occupied with rooms for committee and lodge meetings, kitchen accommodation for tea meetings, &c. Above this will be erected an iron building, which has recently been used as a church. This building is 68 ft. long and 33 ft. 6 in. wide, and will accommodate from 500 to 600 persons. It will have a bell-turret and porch at the front in Bridge-street, and the interior will be fitted up and seated in pitch pine. Mr. E. Jones, architect, will superintend the erection of the hall; the contractors being Mr. Whitehouse, of Silverdale, for the brickwork; Mr. Rhodes, of Newcastle, for the stonework; and Mr. J. Bennett, of Newcastle, for the woodwork. The total cost will be about 450l.

Ramsey (Isle of Man).—A new landing-pier has just been opened at Ramsey. It has been erected by Messrs. Head, Wrightson, & Co., of Stockton-on-Tees, under the direction of Mr. R. Knolly, their resident manager at that port. The plans were prepared by Sir John Coode, and were carried out under the superintendence of Mr. James Walker, resident engineer on the island under the Harbour Commissioners. The abutment of the pier, which was constructed by Mr. John Looney, is of great strength, and is composed of dressed stone, capped with Port St. Mary limestone, and the bulwark is a solid mass of concrete and large quarried stones laid on edge. There is a strong open grating of iron over the bulwark, so as to allow heavy seas to pass through at high water, without inflicting any injury to the deck of the pier. The columns in the open part of the pier are built of sectional wrought iron, and are hollow. They have been screwed into the clay to a depth of about 15 ft., by hydraulic pressure, and are strutted with double T-iron struts, and are tied with 2½-in. tie-rods, with right and left handed unions on the rods. The columns are capped with heavy cast-iron caps, forming a bed for the girders, which are built on the lattice principle, on a span of 40 ft. each. The centre girders are stronger than the others, being double-plated at the top and bottom, the increased strength being requisite in order to sustain the weight of the tramway which will run along the middle of the deck. There are forty-nine of these spans, of 40 ft. each, and in addition there are six spans of 20 ft. each, which form the stiffening bars, and are 18 ft. wider than the other portion of the pier, which is 20 ft. wide. The open work extends seawards a distance of 1,880 ft., and at the outer end is a semi-solid work, of 250 ft., which gives a total length of 2,160 ft., or 720 yards,—only 160 yards short of half a mile. The semi-solid head is composed of six rows of sectional columns abreast, similar to those in the open-work, but of heavier material, and constructed on the same system.

Rotherham.—The first or north-east corner stone of the new ward of the Rotherham Hospital and Dispensary has just been laid with Masonic ceremonial. The addition consists of a centre ward situate on the south side of the present building, and gives accommodation for twenty additional beds. The floor will be of polished oak, and the walls plastered for painting, with open-timbered roof. Ventilation is provided by Sturtevant's inlet ventilators, Boyle's extractors. The walling is to be Thryb-rgh stone, and the roofs will be covered with blue slates. The work, which is estimated to cost 1,000l., is being carried out by Mr. W. Seales, contractor, of Rotherham, from the plan and under the supervision of Mr. H. L. Tacom, architect and surveyor, Rotherham.

Scarborough.—A few days since Mr. Arnold Taylor, one of the Inspectors of the Local Government Board, held an inquiry at the Town Hall, Scarborough, to consider the application of the Town Council for sanction to borrow 27,000l. for constructing a sea wall and marine drive, and 1,100l. for public walks and pleasure grounds. The Town Clerk (Mr. G. Dippie) explained the application for the loan of 27,000l. for the North Cliff Improvement, and reminded the inspectors that a provisional order had been granted in 1883, enabling the Corporation to purchase the North Cliff land and lay it out in pleasure grounds. That order was granted after inquiry by Mr. Taylor himself, and he would remember that one of the grounds of the application was that as a large portion of the cliff had fallen down and endangered the Bleunheim-road, the Corporation then had deemed it necessary to purchase the whole of the cliff. Eventually it was done at a cost of 3,700l., but the purchase had been a good deal delayed, as well as the carrying out of the works, from the fact that the Scarborough and Whitby Railway Company contemplated making a railway tunnel through the cliff. That had been abandoned, and what the Corporation now wanted was to carry out the works of the sea wall, &c., which had been so delayed. Mr. Dippie then explained what course had been taken by the Corporation, and the petitions presented urging them to carry out the long delayed work, and he also referred to the plans prepared by Sir John Coode for constructing a sea wall and public promenade, including the North Cliff, and passing round the Castle Cliff, and said that the plan now proposed and for which the loan was asked, was part of that scheme. In February last, the matter was again before the Council, and it was unanimously resolved to go on with the work, and subsequently Mr. Elliott, engineer, was engaged to prepare the necessary plans. Up to this time no memorial of opposition had been presented or offered on the part of the South Cliff people, but at a subsequent meeting a deputation from the South Cliff ratepayers attended, and presented a memorial praying that the time was impatient to carry out works involving so great an expenditure. Subsequently amendments were proposed in the Council, but negatived by a large majority. Mr. Dippie concluded by stating that the Corporation had for a long time contemplated this work on account of its necessity, from the wearing away of the cliff by the action of the sea, and the Borough Engineer would show how much had been washed away during recent years. He added that the work would not be a burden to the town, as they had power to borrow double the amount of the rateable value, which was 163,000l., and their indebtedness was only 75,000l.

Stratford-on-Avon.—At the quarterly meeting of the Town Council, held on the 3rd inst., the Sanitary and Highways Committee produced a detailed report from a sub-committee recommending that the work of laying out the Bancroft property, near the Memorial Theatre, should be proceeded with, the estimated cost being 900l. The work comprises the pulling down of the old buildings at present standing on the property, and the laying out of the grounds as a place of public recreation, the details of the manner in which it will be done to be decided later on. The time named for the completion of the undertaking is November of next year.

Staines.—The pumping-engines at the Staines Waterworks have been duplicated by Messrs. Merryweather & Sons, the machinery consisting of horizontal 30-horse boilers, with engine and pair of improved deep-well pumps.

CHURCH-BUILDING NEWS.

Dalby.—Dalby Church, near Terrington, was opened by the Archbishop of York on the 1st ult., after restoration, prior to which it is in a very damp and neglected condition. The massive chancel walls have embattled parapets, strong buttresses, and a barrel-vaulted roof. The other roofs are plain, and were covered with red tiles (now replaced with Welsh ones), which gave to the building a most pleasing appearance. A new south porch of a timber work has been erected, and a new one built on the west end, and the interior of the church has been refitted with new doors, in pitch-pine seats, new pulpit, reading-desk, and reredos. The work has cost over 300*l*. The architects were Messrs. Demain & Brierley, &c. The contractors were Mr. Wood, mason, Walsby; Messrs. Lacy & Son, carpenters, Walsby; Messrs. Reid & Sons, joiners, Leeds; Mr. Geo. Hodgson, plumber and glazier, Wingham.

Easton (Bristol).—A site for the new church in the proposed new district of St. Thomas the Apostle, Eastville, has been secured through the generosity of a member of the committee. The church is intended to serve for a population of 5,500, of whom nearly 5,000 will be taken of the parish of St. Mark, Easton, and the remainder out of the parish of Fishponds. The site will embrace also a small portion of the parish of Stapleton. It is proposed to build a church accommodating 780 persons, the estimated cost of which, according to the plans prepared by Mr. H. C. M. Hirst, architect to the committee, will be about 6,000*l*. This is to be carried out in two sections, the former of which is estimated to cost 3,800*l*, and to contain accommodation for 430 persons.

Walsford.—On the 29th ult. a vestry meeting was held to take into consideration the state of the church roof, more especially with reference to that of the nave. The vicar explained that during the process of "cobbling" the roof it was discovered that one of the rafters was loose, and upon closer observation symptoms were discovered which, in the opinion of the vicar and churchwardens, called for a closer examination. Having called the trustees of the church lands into consultation, it was determined to ask Mr. Edwin, builder, to make a survey, and he, after most careful examination, made a report, which was to the effect that practically little of a new roof was required. Mr. Baldwin produced a rough sketch, showing what parts of the roof were most decayed, namely, the gables and some of the principals. Some two or three of the rafters which were taken down were also produced; they were in a state of decay amounting to rotteness. Ultimately a committee was appointed to further consider the matter.

The Wills and Gloucestershire.—The Wills and Gloucestershire Advertiser, from whose columns we extract these particulars, does not make mention of any defect having been consulted in the matter. **Good Easter.**—The parish church of Good Easter, which was nearly destroyed by a fire Sunday, March 22nd, 1885, has just been opened by the Bishop of Colchester. So much damage was done by the fire that, practically, a new church had to be built. Much time was allowed to elapse after the catastrophe before Mr. F. Chancellor, architect, Chelmsford, was commissioned to get out the plans, and the tender of Mr. Walter Letch, of Brantree, for 1,850*l*, was accepted. The plans included a new oak tower and spire, to a total height of 109 ft., a new open-roofed roof to the nave and south aisle, a west wall, and the restoration of the south chancel. The chancel was re-tiled, the plaster taken off outside, and the interior had to be re-erected. The old character of the church and spire have been adhered to, except that the spire has been covered with oak shingles instead of boarding. Messrs. Warner & Co. recast and rebung the three bells. The church is now heated by one of Porritt's apparatus. While the work of the church was in progress two arches were discovered and laid out on either side of the present chancel arch, and in one of them some old thing is discernible. The total cost of the restoration was about 2,300*l*.

Kentington.—A new pulpit has just been installed in the Church of St. John the Divine, Kentington, which was built some years since from designs of the late Mr. Street. The pulpit, which, including the pedestal upon which it

stands, is entirely of oak, was designed by Mr. Hunt, of Upper Baker-street. It is octagonal in plan, the several panels being elaborately carved with full-length figures of the twelve Apostles, arranged in pairs, at the top and bottom of each angle. On the south side, at the top, is St. Peter carrying the keys, and below him is St. Andrew. In the next division at the top is St. James the Great, represented as a pilgrim with a staff, and below him St. John, represented as holding the chalice and eagle. In the adjoining divisions, in front of the pulpit, are St. Philip bearing a cross, St. Bartholomew, St. Thomas, and St. Matthew. In the divisions on the north side are figures of St. James the Less, St. Jude, St. Simon, and St. Matthias. In the panels which form the background of the pulpit, and beneath the octagonal canopy, are figures representing the four great doctors of the Latin Church. On the north side, at the top, is St. Jerome, and beneath him St. Augustine, carrying a pastoral staff and wearing a mitre; and on the south side, at the top, is St. Gregory the Great, carrying a book in the right hand and a crozier in the left, and below him is St. Ambrose of Milan, wearing a mitre. The work has been carried out by Mr. Robinson, of Bloomsbury.

Middleton (Yorks).—A few days since, the Archbishop of York re-opened the parish church of Middleton, near Pickering, one of the oldest and most commodious village churches in the district. The restoration included both the exterior and interior of the church. The work began, we believe, in 1881, and at first was mainly directed to the nave and the exterior. Up to 1884 the church was very damp, and had become dilapidated in places, hence a most important improvement was first effected in taking up the old pavement, clearing out the wet soil, and putting in a layer of concrete. A solid wood block flooring was laid within the stalls, and neat stone-paving in the passage-ways. New oaken seats have replaced the old ones, and in this particular care has been taken to match the four fourteenth-century stalls, which have been retained in the chancel. The arch dividing the nave and chancel was rebuilt, the tower arch repaired and cleansed, the fine south doorway restored, and other internal work was done to the nave, the restoration of which was kept almost separate from that of the chancel, in order to interfere as little as possible with the services in church. The chancel was the last feature restored, and Mr. C. Hodgson-Fowler, of Durham, the architect, has given particular attention to this section of the restoration, as the old chancel had been altered, subsequent to the year 1600, to a form not at all in keeping with the original style. Some of the walls were also in very bad condition, the roof decayed, and the basements damp, hence it was determined to raze and rebuild the chancel completely. This has just been done to a new design in the Late Decorated style. The new roof is of oak, double-boarded for warmth, and is covered with Westmoreland slate. The floor has been treated in the same manner as the floor of the nave, and is now dry and comfortable. New seats and desks of oak have also been inserted. The cost of the whole restoration has been about 1,700*l*. The contractor for the earlier works was the late Mr. T. Wood, of Pickering; for the chancel, &c. Messrs. Dennison, of York, and Messrs. Brown & Oldfield, builders, of Malton. Mr. C. Hodgson-Fowler, F.S.A., of Durham, was the architect.

Rodmersham.—An oak reredos has recently been erected in Rodmersham Parish Church. In design it harmonises with the oak sedilia, parclose, and chancel screens, for which this church is noted. The sedilia are of fourteenth-century work, with a baldachino or crested canopy, and the principal features of the new reredos are a central projecting canopy or baldachino, based on the lines of the old sedilia, with foliated gablets in front, terminating with a bold carved finial and a carved returned cornice, surmounted by brattishing on each side of the gablet. The work has been executed by Messrs. Jones & Willis, at their Birmingham works, from the designs of Mr. W. Leonard Grant, architect, of Sittingbourne.

Stafford.—An effort is now being made to complete the restoration of St. Chad's Church, Stafford, by building the north transept. The architect is Mr. R. Griffiths, who has prepared plans on the line laid down by Sir Gilbert Scott, and the work is being rapidly pushed forward so as to be finished by All Saints' Day,

November 1st. During the excavation, an old wall was found running the whole length of the tower, which (says the *Staffordshire Advertiser*) proves almost without doubt that there was a transept originally. The new transept will be Norman in character, and will be connected with the choir with a Decorated arch, similar to the one at the entrance to the chancel; there will also be another entrance to the church from St. Chad's passage, which will be a great convenience. The work is in the hands of Messrs. Lowe & Sons, of Barton-on-Trent. There will be accommodation for sixty-seven people, and the whole cost of the work will probably be about 700*l*.

Weymouth.—The corner stone of the new aisle of Holy Trinity Church, Weymouth, has been laid by Mrs. Wordsworth. The architects are Messrs. Crickmay & Son, the builder being Mr. A. Clarke.

DISSENTING CHURCH-BUILDING NEWS.

Beverley.—On the 3rd inst. the foundation-stone of a new Congregational Chapel was laid at Beverley, by Mr. Edward Crossley, M.P., of Halifax. The new building is to occupy the site of a chapel just taken down. It will accommodate about 500 people, and the design is Decorated Gothic in style. The material will be of red brick, with Ancaster stone dressings. Mr. B. Thompson, of Hull, is the architect, and Mr. R. Potts, of Beverley, the builder.

Burton-on-Trent.—On the 24th ult. the memorial stones of a new Baptist Chapel in Derby-street were laid. The plans have been prepared by Mr. A. T. Greening, architect, Birmingham, and a contract has been signed with Mr. H. C. Mellors, of the Borough-road, to execute the work, the price being about 1,800*l*. The chapel will be about 55 ft. long by 38 ft. wide, and a gallery will be carried round the two sides and front end of the building, accommodation being provided for 600 people. The building will be of brick with Bath stone dressings.

Eastbourne.—The new Baptist Chapel in Ceylon-place has been opened. It is built of red brick with stone dressings, and provides accommodation for 680 persons. Mr. J. Wills, of Derby, is the architect. The cost of the building has been 4,000*l*.

STAINED GLASS.

Ripon Cathedral.—Last week Messrs. Burdison & Grylls, of London, commenced the insertion of a new west window in Ripon Cathedral. Those who are familiar with the interior of the cathedral know that though a large sum was spent in inserting the present geometrical tracery in the west window, its effect was scarcely noticeable, and there has long been a desire to fully complete the cathedral restoration by placing in the west window a prominent Scriptural subject. The window now being fixed will commemorate the two late Bishops of Ripon.—Archbishop Longley and Bishop Bickersteth, and will consist of two tiers, each containing five lights. In the lower tier the parable of the wise and foolish virgins is represented as follows:—In the south side light the ten virgins are seen sleeping. The north side light represents their awakening: the five foolish virgins, who were surprised, eagerly asking for oil. In the adjoining light on the north, the five foolish virgins are going to buy oil, while correspondingly on the south side the wise virgins are setting out to meet the Bridegroom. In the centre the striking scene of the closed door, and the despair of the foolish virgins, is forcibly represented. In the higher portion of the three central lights in this tier are seen the bridal party going into the feast; the bridegroom going to the bride and marriage feast. In the upper portion of the central of the higher tier of lights our Lord is represented in majesty, while in the two lights on each side are angels with musical instruments. The middle portion of the three central lights is devoted to "The Queen in gold of Ophir," "The Archangel St. Michael with trumpet," and "The daughter offering with the rich their gifts." The lower portion of these lights is filled with companies of faithful worshippers. In the south-side light "the blessed" are represented "entering the Heavenly City," while on the north "the wicked" are seen "driven away by angels."

St. Giles's Cathedral, Edinburgh.—The Bruce memorial window, which has just been placed in the west end of the nave of St. Giles's, is a very marked addition to the decoration of the cathedral. It is by Cottier, of London. The subject of the window is "The Prophets,"—"These are the prophets of whom our fathers spake," as is inscribed on a scroll in old English characters. The window has five lights with a transom in the centre, giving ten compartments, in each of which the counterfeit presentment of a prophet is placed. The tracery above has been filled in with prophetic emblems,—such as Ezekiel's wheel, &c. Reading from south to north, there appear in the upper compartments of the window, Isaiah, Jeremiah, David, Ezekiel, and Daniel; and in the lower set, Amos, Jonah, Elijah, Zechariah, and Malachi. In the faces and habiliments of the figures something of the characteristics of the several prophets mentioned have been reproduced. The Shepherd King, attired in royal robes, plays on his harp; Jeremiah, in sombre raiment, laments over Israel; while the herdsman of Tekoa appears in peasant's costume, and carries in his hand a shepherd's crook. The figures are about 7 ft. in height. An inscription disposed along the pedestals on which the lower figures stand tells that the window is "In memory of Fanny, wife of R. T. Hamilton Bruce, and daughter of John Bruce. Died 8th August, 1881; aged 24."

The Student's Column.

STONE QUARRIES.—VI.

DEVON AND CORNWALL GRANITES.

THE granite quarries which we propose first to describe are those situated in Devon and Cornwall.

Granite has been used in Cornwall from time immemorial for building and monumental purposes, but the process of raising it from quarries is of recent origin. Until within the last sixty years the only granite used was obtained from boulders upon the surface of the ground; but for all export purposes at least, quarrying has entirely superseded this primitive method, and is now a prominent industry in the county. The quarries produce very large blocks, whilst the fact that both fine and coarse grained granites are obtained is sufficient to render it capable of being used for either architectural or engineering work.

We may remark, however, that the vast majority of the granites of Devon and Cornwall are coarse-grained, with large felspar crystals scattered throughout, and that fine-grained varieties are not so common as in some of the other districts to be described. Haughton has shown that some of the white mica of the Cornish granites is lepidolite (lithia mica), whilst the black mica in the same rocks is often lepidomelane (iron-potash mica).*

The principal granite quarry-owners in the districts under consideration are Messrs. John Freeman & Sons, of Penryn, and we are indebted to Mr. Wm. Geo. Freeman, of that firm, for much valuable information respecting the quarries, and also for placing a number of samples from the principal quarries at our disposal, for examination. This firm alone has upwards of sixty quarries in Cornwall, situated principally in the large district near Penryn, embracing the parishes of Mabe, Stithians, Constantine, and Wendron; also in Penzance, Luxullian, and in the district north of Liskeard. There are shipping-places at Penzance, Penryn, Port Navas on the Helford river, Par Harbour, and Looe. In these quarries rocks weighing from 100 to 2,000 tons in solid masses, are frequently detached from their native position. The process of quarrying has gradually developed from the most primitive methods, until now, steam cranes, rock-drills, and other labour-saving appliances are in use.

The granite areas of Cornwall and Devon may be conveniently divided into five districts, and a glance at the following map will show their position, and the names we propose to call them.

Several patches of granite which are detached from these main masses need not here be taken into account, and any quarries in them will be referred to the nearest main mass.

1. Dartmoor District.

The great mass of granite in this district is coarse-grained, having quartz, felspar, and mica,

* Proceedings Royal Society, vol. xvii., p. 209.

the last mineral being sometimes white, at others black, and occasionally they are found together. The stone is very frequently porphyritic, and here and there schorlaceous,* but the latter character is chiefly confined to the outskirts where the granite adjoins the metamorphic rocks. Schorlaceous granite, however, is occasionally found in the interior of the mass, and there is a very gradual passage between schorl-rock (schorl and quartz) and ordinary granite, in some parts. As a rule, the mica disappears as the schorl becomes abundant. Rarely, the rocks are composed of quartz, felspar, mica, and schorl in about equal proportions. After the mica has disappeared, the felspar generally goes. The mass is much more variable in composition at its outskirts than anywhere else.

The following are some of the granite workings of the district, about which we have gleaned information.

Troublesworthy Quarry.—This quarry is situated in the western part of Dartmoor, and is worked by Messrs. John Freeman & Sons. The stone is of a red colour, being the only "red" granite we know of, in any quantity, in the south-west of England.

Its rather inaccessible position, and the irregularity of the structure of the rock, render its introduction into the market on a large scale impracticable, but it is a very beautiful stone.

Haytor Quarries.—These are situated about fourteen miles south-west from Exeter, and are worked by Messrs. J. Easton & Son, of that city.

A large portion of London Bridge was built of it, and in those days the granite was shipped at Teignmouth, being carried thither on a granite tramway for five miles to a small canal, whence barges conveyed it to the ships.

We may call attention to the fact that at least two or three authors state that the Haytor quarries have ceased working,* and although the stone is not worked as extensively as formerly, it is incorrect to state that they are closed.

Blackstone Quarry.—This quarry is near Moreton Hampstead, about eleven miles west of Exeter, and has been worked by Messrs. J. Easton & Son for forty years. The stone has a fine base, composed of felspar, of two colours, light pink and light green. The proportion of quartz does not appear to be very large; black mica is fairly abundant, being scattered about rather evenly. But the character of the stone is chiefly marked by the large porphyritic orthoclase felspars, of a light pink colour. In some cases these felspars do not appear to be so well defined as in the Haytor stone, occurring rather as patches of a broken appearance than clean crystals.

The stone splits easily with wedges, and worked into copings, kerbs, steps, gate-posts and rollers.

Fogginton, Great and Little King Tor, Smea Tor, Crip Tor, and Inga Tor, are quarries situated on Dartmoor, near Princetown, and worked by Messrs. Pethick Bros., of Plymouth. They are about fourteen miles from Plymouth, the port of shipment, and are connected with



The earliest quarrying operations in Dartmoor "Forest" on a large scale were at Haytor, and very large quantities were sent to London by the Haytor Granite Company. The company, after several years abandoned, these workings and removed to Fogginton, near Prince Town where it carried on extensive works and raised large quantities of granite, but eventually wound up some twenty years ago. Since then, however, the quarries have been re-opened, as we have seen.

The stone at Haytor appears to have a fine-grained base, of a light greenish grey colour; the felspar is of two tints, white and light green, being distributed evenly over the stone. Mica is very plentiful, the prevailing colour being black, but it approaches brown in places. The quartz is of the ordinary clear crystalline character. Much of the rock quarried at Haytor is wholly composed as above, but a considerable proportion has, in addition, some fine large orthoclase felspars distributed porphyritically. These spars are frequently 2 in. or 3 in. in length, are white, usually exhibit twinning, and seem to lie in some cases approximately in the same direction. Very large stones may be obtained, and some time since, a piece about 45 ft. by 12 ft. by 12 ft. was shifted. It is worked principally for monumental purposes, but may also be utilised for steps, kerbs, &c., being taken to Bovey station, about four miles, and sent by rail to Exeter.

* I.e., having schorl (a black mineral) in addition to the three essential minerals.

the Princetown railway, which runs by a siding direct into the quarries.

The granite from the Smea Tor quarry is of two colours, grey and blue; the blue appears to be a good hard, compact stone, and is largely used for street work, kerbs, &c.

The breakwater, fort, and defences around Plymouth are built of Dartmoor granite.

Between the Dartmoor and St. Brevard districts is a little patch of granite generally known under the name of *Kit Hill*. On it Kit Hill, Tamar, and Gunnislake quarries are situated, and although nothing very large has been done in the way of raising the stone, many people know of it by reason of the circulars issued to the public giving a full account of the prospective work. The grain of the rock is fine and the position of the quarries, near Tamar, no doubt looks tempting for work as easy carriage; but the uncertain quality, and being so full of joints, has hitherto debarred extensive use.

2. St. Brevard District.

The mineralogical composition of this mass is very similar to that of Dartmoor, being principally made of quartz, felspar, and mica. It is frequently porphyritic, not particularly schorlaceous, though small crystals of schorl are sometimes found, chiefly towards the south. Near St. Clear all four minerals are present.

* See "Guide to Mus. Proc. Geol.," p. 26, quoted in Hull's "Building and Ornamentation," p. 35; and Rivington's "Build. Const.," part iii., Materials, p. 18.

The *Cheesewring Quarries* comprise the heesewring quarries proper, and Kilmar and earah Tor. They are all worked by Messrs. J. Freeman & Sons, on the property of the Duchy of Cornwall, being situated about six miles north of Liskeard. The produce is sent direct to the shipping-port of Looe over the Liskeard and Caradon Railway, which is connected with the quarries.

The stone is coarsely crystalline, each mineral being easily distinguished, and although the orthoclase felspar in places is rather large, it is not so large as in some of the other regular crystals exhibit twinning. The mica is black, white, and brown. Of these the first is most abundant. Quartz is clear and asparagus.

The compact manner in which the minerals composing this stone are arranged, together with the fact that such large blocks can be obtained, renders it unquestionably one of the best granites for large engineering purposes.

De Lank or Eddystone Quarries.—These are situated near Bodmin, and are worked by Messrs. H. Shearer & Co.

The constituents of the rock are two species of felspar, one orthoclase, the other a triclinic felspar, which exhibit in some cases a somewhat unulated structure. There are two species of mica, biotite (black), and muscovite (silvery white). A large proportion of quartz is present, and here and there a very few exceedingly minute crystals of apatite. The quartzose portions consist of small crystalline grains, and are appears to be little or no hornblende, no pyrites, and magnetite if present is only represented by a few exceedingly minute specks.

The following is the approximate mineral constitution of the De Lank granite, by Mr. Frank Rutley, F.G.S., of the Geological Survey, Army-street, S.W., arrived at by an adaptation of Delesse's method:—

Orthoclase felspar.....	30
Triclinic do.....	6
Magnesian mica (biotite).....	7
Potash mica (muscovite).....	11
Quartz.....	46
	100

Its colour is of a uniform light grey, and are is little or no tendency of the stone to become porphyritic, as far as we can see.

Large blocks are obtained, and the joints are so regular that they require but little labour to shift them out of their natural position. The resources of the quarries are practically unlimited, and the facility with which the stone can be supplied may be judged by the remarks of Sir James Douglass, Engineer-in-Chief to the Trinity House, in the discussion which took place on the "New Lighthouse" (built of De Lank granite) at the Institute of Civil Engineers on 27th November, 1883, when he pointed out that at the granite contractors had completed their work six months within the specified time—three years.

This granite has also been used for the walls Rock Lighthouse, and in works at Portland, Devonport, Blackfriars Bridge, &c. It is shipped at Wadebridge, on the river Tamar, within Padstow Harbour.

may collect on the upper side of the plates to drop out.

9,617, Improvements in Dustbins. J. C. Morrell.

In order to obviate the offensiveness of the removal of the household refuse from the dustbin, an ordinarily constructed, and to promote economy in the household, a dustbin, having screens or sieves, at suitable angles, is used. These screens separate the various *debris* thrown in, and cinders and ashes are also separated by them. In emptying the bin or the cases contained in it, covers are supplied to the dustmen so that they may be emptied into the cart without the dust flying about, rendering the dustman's work convenient and cleanly. The cinders are saved for re-burning.

9,519, Water-closet Apparatus. C. Winn.

The improvements are in the direction of simplifying the construction and arrangement of parts of wash-out closets, and in the means of connecting such closets to flushing apparatus, and to stack or soil pipes. The basin is of an elliptical shape, the wider end of the ellipse being at the back part of the basin. The outlet is in the front and is hidden by a projecting hood, and the front of the basin is also continued downwards as an ornamental pillar to the level of the trap, which is also flanged, and thus affords a wide base, and renders the closet self-supporting, being secured to the floor. Several modifications of the shape of the pipes and fittings are made, each of them having reference to simple means of connecting the points, or to placing them so that all parts may be readily accessible, and also afford a free and open passage for flushing out.

NEW APPLICATIONS FOR PATENTS.

July 23.—9,540, S. Alexander, Rain-water Piping.—9,544, W. Blakeney, Shop Window Fittings.—9,551, W. Reid, Hydraulic Cement.—9,552, E. & H. Lanaway, Ladders.

July 24.—9,577, J. Potts, Construction, Bedding, and Laying Drain, or Sewer Pipes.—9,584, A. Sweet, Ventilators or Windguards.

July 25.—9,612, F. Royce, Electric Bells.—9,625, Sir F. Bolton, Coverings for Roofs, &c.—9,643 and 9,644, H. Lake, Construction of Walls, Ceilings, &c.

July 28.—9,724, W. Patterson, Water Taps.—9,729, T. Bayley, Colouring Marble.—9,730, J. Siemens, Seafolding.—9,748, H. Whiteley, Opening and Closing Parapets, Windows, &c.

July 29.—9,778, A. Black, Ventilation of Drains and Buildings.—9,797, W. Hammond and J. Turner, Fastening for Revolving Shutters.—9,808, W. Thompson, Portable Plumber's Furnace.

PROVISIONAL SPECIFICATIONS ACCEPTED.

6,831, P. Davies, Stench Traps.—7,477, J. Daboe and E. Heinrich, Nails.—7,866, J. Banks, Door-bolts, Staples, &c.—7,880, J. Armstrong, Water-waste Preventing and Regulating Cisterns.—7,888, F. Stokes, Manufacture of Cement.—7,941, J. Hill, Saw-sharpening Apparatus.—7,954, T. Twyford, Water-closet Basins and Flushing same.—7,956, T. Twyford, Water-closet Basins.—8,000, J. and A. Wallwork, Traps or Seals for Drains, &c.—8,061, F. Morgan, Casement Fasteners.—8,120, S. Lowden, Portland Cement.—8,297, R. Adams, Convertible Sliding Window Sashes.—8,623, J. Royle, Clamp for Mitred Joints.—8,372, W. Potter and Others, Hinges and Door-closers.—9,143, J. Gough, Cleaning Chimneys.—6,749, G. Graham, Window-sash Fastener.—6,834, S. Rogers, Saw-sharpening Machine.—7,691, B. Whitting, Window-sash.—7,630, J. Bettsley, Sliding Window-sashes.—8,145, W. Smeaton, Sen, Water-closets.—8,146, W. Smeaton, Sen, Flushing Apparatus.—8,293, H. Cunningham, Wood Screws.—8,373, H. Whitaker, Fireproof Construction.—8,558, T. Twyford, Water-closet Basins.—8,560, G. Barlow, Wall Ventilator.—8,565, G. Oulton, Pneumatic Syphon Cistern.—9,278, R. Robinson, Brick-battling Tables.—9,296, F. Maxwell and W. Tuke, Pillars or Columns for Building, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

11,230, S. Farrar, Door-bottoms for excluding Draughts, Rain, and Dust.—11,387, J. Colbran, Cooking Ranges.—2,289, H. Hesketh, Mortise Lock Furniture.—6,519, T. Kommerell and E. Edwards, Automatic Flushing Apparatus for Drains, Sewers, Water-closets, &c.—7,712, H. Deane, Window-fastener.—11,810, J. Neild, Portable Extension Ladder.—12,380, J. Armstrong, Building Materials.—8,463, W. Horn, Latches for Doors and Gates.—8,529, J. Radford, Springless Door-latch.

Halifax.—A new high altar has just been erected at St. Marie's R.C. Church, Halifax. The altar has been designed and executed by Mr. J. A. Orr, of Roermond, Holland, and is entirely of Austrian wainscot oak. It is 15 ft. high and 10 ft. wide. The reredos presents on each side a group of carved figures, representing on one side the Nativity of Our Lord and on the other side the Adoration of the Magi. The figures are carved in linden wood, and decorated.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 24.

By WILKINSON & SON.

Southend—9 and 10, Cliff Town Parade, freehold... £1,680

JULY 26.

By A. BOOTH.

Tottenham Court-road—35 and 37, Grafton-street, freehold... 4,430

Kingston-on-Thames, Hops-avenue—Fourteen houses, and a plot of land, freehold... 1,800

By WETHERALL & GREEN.

Whitechapel—14, Leaden-street, 31 years, ground-rent 50l. 1,050

Hackney—15, 17, and 19, Mare-street, copyhold... 1,050

By G. F. JAY.

Cold Norton, Essex—Russell's Farm, 34a. Or. 12p., freehold... 445

By E. & H. LUMLEY.

Maidenhead—Two plots of freehold land... 500

By A. CHANCELLOR.

Richmond-hill—Terrace Cottage, freehold... 2,000

JULY 27.

By H. DONALDSON.

Southwark—25, Richmond-street, 42 years, ground-rent 4l. 10s. 320

Old Ford—2 to 8 (even), Hewlett-road, 69 years, ground-rent 15l. 760

By WEATHERALL & GREEN.

Fulham—Ground-rents of 10l., reversion in 61 years... 280

West Kensington—168 and 110, North End-road, 61 years, ground-rent 1l. 4s. 760

By TOPPIS & ROBERTS.

Kentish Town—4, Cathcart-street, 35 years, ground-rent 6l. 10s. 250

By CHILWICK, GALSWORD, & CO.

Stratford-on-Avon—The freehold farm called "Willkote," and 36l. 3s. 2p. 6,700

By DEBENHAM, TEWSON, & CO.

Paddington—Ground-rents of 91l., term 63 years... 1,820

Canbury—Ground-rent of 28l. 15s., a year, term 60 years... 680

By DAVIES & PEARCE.

St. Luke's—45, Baltic-street, freehold... 405

No. 3, Domingo-street, freehold... 900

By WAGSTAFF & WALMAN.

Hendon—Two plots of freehold land... 100

By C. & H. WHITE.

Kennington—6, Kempsford-road, 40 years, ground-rent 4l. 345

Battersea—104 to 112 (even), Livingstone-road, 78 years, ground-rent 27l. 10s. 550

Improved ground-rents of 16l., term 75 years... 250

By H. RUTLEY.

Chalk Farm—28 and 28, Ferdinand-street, freehold Caledonian-road—Ground-rents of 39l. 10s., term 67 years... 1,160

Ground-rents of 12l. 10s., term 85 years... 740

Ground-rents of 26l. 13s., term 66 years... 415

Hampstead-road—Ground-rents of 12l., term 38 years... 200

Kilburn—An improved rental of 89l. 10s., term 9 years... 1,630

Camden-square—An improved rental of 30l., term 12 years... 240

Hampstead-road—137, Stanhope-street, 38 years, ground-rent 6l. 600

Islington—3, Stonefield-terrace, 20 years, ground-rent 5l. 235

By MASSIE, SPELMAN.

Norwich—The freehold residence, Rosary House... 2,765

Dove-street—Two freehold houses with shops... 920

King-street—The City Café, freehold... 285

Viage-street—Two freehold cottages... 92

Ade, Damgate—Two freehold houses... 138

JULY 28.

By G. A. WILKINSON.

Oxford-street—74, Wells-street, 45 years, ground-rent 27l. 830

By A. G. THOMSON & CO.

Tottenham Court-road—4, Whitfield-street, copyhold... 895

Acton—100, Bello Bridge-road, freehold... 580

Birkbeck-road—A plot of freehold land... 80

By BAXTER, PAYNE, & LEPPER.

Bromley, near—A plot of freehold land... 365

By HOBSON, RICHARDS, & CO.

Deptford—38 and 40, Wellington street, freehold... 605

By THORCOOD & MARTIN.

Putney—11, Putney-hill, 63 years, ground-rent 12l. 12s. 1,225

No. 140, Upper Richmond-road, freehold... 630

Ground-rent of 6l. 17s. 6d., reversion in 75 years... 180

Ground-rent of 25l., reversion in 72 years... 670

Ground-rent of 92l. 10s., reversion in 51 years... 2,855

Kentish Town—48 and 48, Weedingwood, 64 years, ground-rent 10l. 10s. 370

By A. ROBERTSON.

Camberwell-road—No. 68, freehold... 1,100

By H. A. COX.

Dockhead—34, 36, and 38, Neckinger street, and 30, 32, and 34, Arnold's-place, 13 years, ground-rent 11l. 260

Southwark—169 and 171, Drummond-street, 35 years, ground-rent 4l. 10s. 480

Bernamsey—7 to 17 (odd), East-road, 37 years, ground-rent 12l. 4s. 1,210

Nos. 2 to 6 (even), Willow-walk, 39 years, ground-rent 2l. 1,020

Nos. 21 and 23, Fream street, 31 years, ground-rent 6l. 275

Nos. 49 to 46 (even), Limasol-street, 14 years, ground-rent 8l. 200

Nos. 82 and 84, Rouel-road, 28 years, ground-rent 6l. 420

No. 50, Jamaica-road, and 23, Fream-street, 28 years, ground-rent 7l. 5s. 435

Nos. 3 to 7 (odd), Neckinger-street, and 9, 11, and 13, Limasol-street, 14 years, ground-rent 18l. 425

Nos. 163 and 154, Grange-road, 31 years, ground-rent 10l. 750

JULY 29.	
Walhamston—Arundel Villa, 97 years, ground-rent 6l.	2310
By PROCTOR & MONROE.	
Sydenham, Hynde-road—Two plots of freehold land	140
By NEWSON & HARDING.	
Bethnal-green—51 to 59 (odd), White-street, freehold	1,815
Nos. 21, 25, and 28, Menotti-street, freehold	905
Long Acre—10, Batterton-street, freehold	9 0
Clypton—59 and 90, Dunlase-road, 89 years, ground-rent 5l. 8s.	410
Sole Navigation—113, Milton-road, 65 years, ground-rent 6l.	2 0
By D. YOUNG.	
Stockwell—71, Studley-road, 60 years, no ground-rent	480
By E. BROW.	
West Ham—10 and 21, Boleya-road, 98 years, ground-rent 7l.	480
Peckham—63, Chadwick-road, 70 years, ground-rent 5l. 10s.	550
By HADDS & JENKINSON.	
Edmonton—Ground-rents of 182, 183, reversion in 83 years	331
Bromley-common—Ground-rents of 124, reversion in 97 years	21
Cowper-road—Three plots of freehold land	680
By E. STIMSON.	
Har-pow-er—14, Windsor-street, 60 years, ground-rent 5l. 10s.	220
Peckham—3 and 4, Haslemere-street, 78 years, ground-rent 10l.	330
Camberwell—24, Westmacott street, 97 years, ground-rent 8l.	370
Walworth—3 and 6, Chad-street, 63 years, ground-rent 12l.	695
Kennington—41 and 43, Bowling-green-lane, ground-rent 2l.	135
Hackney—Ground-rent of 4l. term 23 years	49
Platford, Libra-road—Two plots of freehold land	90
Brixton—Ground-rents of 20, 15s., term 38 years	415
Ground-rents of 80l. 5s., term 14 years	615
Camberwell—Ground-rents of 60l., term 15 years	315
JULY 30.	
By VENTON, BULL, & COOPER.	
Goswell-road—Nos. 13 and 15, freehold	6,900
By A. BUNN.	
Gipsy-hill—The Hermitage, and 1 and 2, Malta Cottages, freehold	1,000
Teddington—No. 1, Groveside, freehold	1,080
By R. REID.	
Kilburn—35, Malvern-road, 89 years, ground-rent 10l.	635
Harrow-road—83, Portnal road, 92 years, ground-rent 7l.	240
No. 8, Portnal road, 92 years, ground-rent 7l.	245
By DALS & SOX.	
Bow—21, Carlisle-road, freehold	350
Ground-rent of 4l., reversion in 68 years	100
Reydon, Essex—Two cottages and a plot of land, freehold	430
Hall's-green—Two freehold cottages	190

Miscellaneous.

The Building Trades in Australia.—According to the Immigration Agent at Sydney, the latest quotations in the Sydney building trades' wages were: Carpenters and joiners, 9s. to 11s. 6d. per day, standard price 10s. per day; stonemasons' labourers, 8s. to 9s.; plasterers, 11s.; plasterers' labourers, 9s.; bricklayers, 11s. to 12s.; bricklayers' labourers, 8s. to 9s.; painters, 9s. to 10s.; plumbers, 10s. to 10s. 6d.; gasfitters, 10s. to 10s. 6d.; sawmill hands, 9d. to 1s. per hour. With regard to brickmakers' wages in New South Wales, he says, "The demand for bricks for building purposes in New South Wales is considerably in excess of the supply; hence brickmaking is one of the most profitable industries in that colony. Brickmakers receive from 11. 2s. 6d. to 11. 10s. per 1,000; bricklayers, 12s. per day. Where employed in connexion with machine-made bricks the remuneration is from 8s. to 10s. and 11s. per day. Pipemakers average from 2l. 10s. to 3l. per week, and potters obtain about the same rate of wages. Plimen, 7s. 6d. to 8s. 4d.; setters, 7s. 6d. to 8s.; rollers, 9s.; screeners, 7s.; burners, 10s.; kiln men, 7s.; loaders, 7s. to 8s."

Sutton-in-Ashfield.—A few days since Mr. Stephen H. Terry, C.E., one of the Inspectors of the Local Government Board, held an inquiry at Sutton-in-Ashfield, in regard to an application for borrowing powers which had been made by the Local Board in order to supply the district of Hucknall Hathwaite with water from the works now in progress. The water is obtained from the red sandstone, and is being pumped at the rate of 740,000 gallons a day. Mr. Hodgson, the engineer, stated that the demand would not be likely to exceed 300,000 gallons for some years. The application was unopposed; and the Inspector, in closing his inquiry, said he thought the Hucknall people were very much to be congratulated on having neighbours who could supply them with excellent water, and at so low a price as 7d. per 1,000 gallons, which was but little more than cost price.

Drink in the Building Trade.—The modern practice of erecting in our principal cities huge buildings with iron columns and girders of many tons' weight necessarily entails commensurate risks on those who are engaged in the works. Cranes and derricks, self-stopping pulley-blocks, and thoroughly-tested chains, while economising labour, tend to minimise the number of accidents, but also to aggravate their destructive power when they do occur. It is truly wonderful to see a granite pillar or an iron girder lifted and swung round over any part of a building area, and then deposited accurately and smoothly on any given point with singularly little help from comparatively few men. But how necessary that every one of them should be at his best, cool-headed and steady-handed. When a crash does take place, the explanation is generally found in some flaw in the machinery; but it is to be feared that every now and then an oversight or a slip on the part of any of the men may be the first cause of the break-down. It is only just to bear in mind that the building trade is a very laborious one, and that a large proportion of the men engaged in it are distinguished amongst artisans for intelligence, sobriety, and thrift. But just as the strength of the chains and ropes employed is only equal to that of the weakest link or strand, so at a critical moment the efficiency of a band of workers is only equal to that of the individual man; one failing may imperil all. Dust and labour, often over-long hours in working under contract against time, make men thirsty and tired; and if any one watches a great building, he often sees men slip out for a drink at the nearest public-house. It is only occasionally that the building area can be completely enclosed and placed under the charge of a trustworthy gatekeeper, but something might always be done to provide the men on the ground with cooling and invigorating drinks. Cocos, lime-juice, or oatmeal could be dispensed for a comparative trifle, and, failing these, a large water-filter and a few earthen cups might be a great comfort, and avert the temptation of rushing to the beer-barrel and the spirit-vat with a parched tongue and an empty stomach. The men, timely refreshed, would work longer and with greater power and safety, and when an accident did happen, as many sometimes do unavoidable, it would be a satisfaction to find that at the critical moment every man was at his best, mentally and physically.—*Lancet*.

Leeds and Yorkshire Architectural Society.—On Saturday afternoon a party of the members of this society visited the neighbourhood of Keighley. The Mechanics' Institute, Art, and Technical School (now undergoing enlargement by Messrs. W. & R. Mawson, architects, of Bradford), was first visited, and the clerk of works (Mr. T. A. Sugden) conducted the party over the works. West Ryddlesden Hall, an Elizabethan structure, owned and occupied by Mrs. Siddick, was, through the courtesy of that lady, next inspected. Afterwards East Ryddlesden Hall, known locally as "Old Ryddlesden Hall," was by the kindness of Mr. Bailey, the tenant, thrown open to the visitors. The latter house is described in the *Leeds Mercury* as a good specimen of the transitional period of the Renaissance, and in its essentials it remains in its original form.—A meeting of the members of the Associates' Sketching and Art Club was held on the previous evening, when the drawings produced during the past month were exhibited. Amongst them are Mr. A. Whitehead's drawings of Fountains Hall, near Ripon, and view of Kirkstall Abbey; Mr. Francis Haigh's "Tower of Fountains Abbey;" and Mr. A. E. Dixon's "West Doorway, Headingley Church."

The "Evening Telegraph" Office, Belfast.—New premises for the *Belfast Evening Telegraph*, situate in Royal Avenue, have lately been completed and opened. They have a frontage of 76 ft. 6 in. to the thoroughfare named, with a return frontage of 101 ft. 6 in. to Little Donegal-street. The building is 76 ft. in height, and the elevations are of red Dumfries sandstone and red perforated brick from the Ormeau works. The style is described as "a free treatment of Classic." The entire contract for the erection of the building has been carried out by Messrs. H. & J. Martin, Ormeau Works, Belfast, from the plans and under the personal superintendence of the architect, Mr. Henry Seaver, C.E., Belfast.

Banbury and Cheltenham Direct Railway.—This line is so far completed that trains can now be run through from the junction at King's Sutton to Chipping Norton. The entire length of the line between King's Sutton and Chipping Norton is 15½ miles, and it commences with a junction with the Great Western at King's Sutton. In addition to the stations at Aderbury and Bloxham, there are stations at Hook Norton and Chipping Norton, the latter being a joint station with the Great Western Company, whose existing station will be pulled down. At Bloxham station provision has been made for a large development of the ironstone traffic, and sidings have been laid into the adjoining fields, in which the ironstone is 12 ft. to 14 ft. deep, and extends over a large area. Just before reaching Hook Norton the heavy works commence with a deep cutting. After the line was commenced it was found advisable, in consequence of the nature of the soil, to abandon the work that had been done in this cutting, and deviate the line so as to get lower down the side of the hill where the cutting could be made much shallower. This cutting is immediately succeeded by a bank 50 ft. high, and this has been a source of considerable trouble, cost, and delay, and it has been necessary to construct heavy stone buttresses to keep it in its place, and to form the upper portion of it with ashes, which were obtained from South Staffordshire. Passing over this bank, the Hook Norton and Banbury-road is crossed by an iron girder bridge, and Hook Norton Station is reached. This, with all the buildings and yard, are on an embankment 50 ft. high at the highest point. Here a large goods shed is being erected, the station and offices having been already built. A deep valley is then spanned by a viaduct of five spans of 100 ft. each, formed of massive stone piers, 73 ft. high, and iron girders, the line then crosses another bank, succeeded by another viaduct of eight 100 ft. spans consisting of stone piers, 90 ft. high, with iron girders. Mr. William Wilson, of Dean's Yard, Westminster, is the engineer, and the works have been carried out without the intervention of a contractor under the direction of Mr. H. Holt.—*Banbury Guardian*.

The New Harlem River Bridge.—The Harlem River Bridge Commissioners have given the contract for building the new bridge over the Harlem river at 181st-street, New York, to the Passaic Rolling Mill Company, of Paterson, New Jersey. There were three tenders for the erection of the entire structure, including both the metallic and stone portions, the lowest (\$2,055,000) being that of the above firm, one other tender, by the Union Bridge Company, being very close upon that figure, the latter company tendering at \$2,058,000. The construction of the bridge is to be begun at once, and the structure is to be ready to be opened for traffic on June 28, 1888. According to the plans, prepared by Mr. William McAlpine, the new bridge will extend over the Harlem river from Tenth-avenue and 181st-street, on the west side, to Aqueduct-avenue, on the east side, a distance of 2,373 ft. The first 355 ft., however, from Tenth-avenue, will be simply grading. The total width of the bridge will be 80 ft., of which 50 ft. will be carriage-way, and 15 ft. on the each side footpath. The floor of the bridge will be 145 ft. above mean high-water mark. The piers will be sunk to the solid rock. From a central stone pier, 40 ft. thick, will spring on both sides an arch of iron and steel 508 ft. long, with a rise of 90 ft. One of the arches will completely span the river, what may be called its land end resting upon a pier on its west bank whilst the end of the other arch, which will span the railway track, Commerce-avenue, and Sedgwick-avenue, will rest on a pier placed away from the river, east of Sedgwick-avenue. The two masonry sections of the bridge will be alike, although not of the same length, that on the west side being 277 ft., that on the east 312 ft. long. The masonry portions will be faced with Westchester gneiss, laid in courses of 20 in. to 30 in. thick, the interior stone being durable limestone. It is a special feature of the design that the constructive details are so arranged that all the iron and steel portions are to be accessible for cleaning and painting, an important consideration in metallic structures, the endurance of which very much depends upon how they are protected from corrosion.

The Proposed Baths and Washhouses for Kensington.—General C. Phipps Carey, E., one of the inspectors of the Local Government Board, held an inquiry at the Town Hall, Kensington, the other day, into the circumstances attending the application of the Commissioners of the Baths and Washhouses for the Parish of St. Mary Abbott's for sanction to borrow 25,543l. for the erection of the building. There were present Mr. G. C. Harding, Clerk to the Vestry; Mr. Verity, architect; Mr. Boucher, and other commissioners. Mr. Harding said the site had been fixed at a previous inquiry of the Local Government Board, and the nature of the building decided upon. Tenders were invited for erecting the building, the highest being 500l., and the lowest 25,543l. Mr. Verity produced the plans, showing first, second, and third class men's swimming-baths, one for women, and thirty-four private first and third class baths, twenty second-class women's, with two for sixty washers and drying-houses in the under. The swimming-bath could be used for public meetings or as a gymnasium in winter. The size of the large swimming-bath was about ft. by 60 feet. There were residences for superintendent and engineer. It was also explained that the site had been fixed at the ex of Silchester and Lancaster roads, and a part of the parish frequented by the poorer classes and those likely to require the baths and washhouses. Some further details to the population, assessable value of the parish, &c., having been taken by the Inspector, intimated that he should make his report to the Local Government Board.

The London and County Banking Company (Limited).—The report of the directors, submitted to the half-yearly meeting held on Tuesday last, states that after paying interest customers and all charges, making provision for bad and doubtful debts, and for 886l. 14s. 5d. rebate on bills not due, the profits for the half-year ending June 30th amount to 197,604l. 12s. 1d. This sum, added to 20,123l. 9s. 1d. the balance brought forward from last account, produces a total of 7,281l. 1s. 2d. The directors have declared an interim dividend for the half-year of ten per cent., which will absorb 200,000l. The balance-sheet will be found printed in our advertisement.

The Free Public Library at Richmond.—The library, was re-opened on Tuesday last by H.E. the Princess Mary Adelaide, Duchess of Kent. The building, which has been closed for some time, has been enlarged to almost double its original capacity. The expense attaching to these alterations has been borne in a large measure by the inhabitants. The building, which is Gothic in character, is divided into separate reading-rooms, which are at present stocked with upwards of 12,000 books. The architect was Mr. F. J. Brewer, and the contractor was Mr. F. Sims.

The Royal Commission on Trade.—The first report of the Royal Commission appointed the Conservative Government last year to inquire into the cause of the depression in trade has been prepared, and will be issued shortly. The Commissioners will announce that they do find any evidence of depression in trade, so as depression is taken to mean the restriction of trading operations. On the contrary, they report that the volume of British trade has continued to increase more than commensurately with the growth of the population, and that the general industrial condition of the country is satisfactory. Low prices and consequent diminution of profits are held by the Commissioners to constitute the only evidence of trade depression. The Commissioners will report that there has been an unusually prolonged period of over-production, due mainly to the vast increase in wealth in the country and the competition for profits to constitute the only evidence of trade depression. The Commissioners will report that there has been an unusually prolonged period of over-production, due mainly to the vast increase in wealth in the country and the competition for profits to constitute the only evidence of trade depression. The Commissioners will report that there has been an unusually prolonged period of over-production, due mainly to the vast increase in wealth in the country and the competition for profits to constitute the only evidence of trade depression.

PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	.....ton	8	5	0	7	0	0
Teak, E.I.	.....load	11	0	0	15	0	0
Sequoia, U.S.	.....foot cube	0	2	4	0	2	9
Acacia, Canada	.....load	3	0	0	4	10	0
Birch	.....load	2	10	0	4	0	0
Elm	.....load	3	10	0	4	10	0
Fir, Dantsie, &c.	.....load	1	10	0	4	0	0
Oak	.....load	2	10	0	5	0	0
Canada	.....load	4	0	0	8	10	0
Pine, Canada red	.....load	2	10	0	4	0	0
" yellow	.....load	3	0	0	5	0	0
Lath, Dantsie	.....fathom	3	10	0	5	0	0
St. Petersburg	.....load	4	0	0	5	0	0
Wainscot, Riga	.....log	2	15	0	4	10	0
" Odessa, crown	.....load	3	7	0	0	0	0
Deals, Finland, 2nd and 1st. std. 100	.....load	7	0	0	8	0	0
" 4th and 3rd	.....load	6	0	0	7	0	0
Riga	.....load	6	0	0	7	0	0
Deals, St. Petersburg, 1st yellow	.....load	8	0	0	14	0	0
" 2nd	.....load	7	0	0	8	0	0
" white	.....load	7	0	0	10	0	0
Swedish	.....load	6	0	0	15	0	0
White Sea	.....load	7	0	0	17	10	0
Canada Pine, 1st	.....load	17	0	0	30	0	0
" 2nd	.....load	13	0	0	17	0	0
" 3rd, &c.	.....load	8	0	0	10	0	0
" Spruce 1st	.....load	8	0	0	11	0	0
" 3rd and 2nd	.....load	5	0	0	7	10	0
New Brunswick, &c.	.....load	5	0	0	7	0	0
Battens, all kinds	.....load	4	0	0	12	0	0
Flooring boards, sq. 1 in. Pre-	.....load	0	9	0	0	13	0
" pared, first	.....load	0	7	6	0	8	6
" Other qualities	.....load	0	5	0	0	7	0
Cedar, Cuba	.....foot	0	0	3	4	0	4
Honduras, &c.	.....foot	0	0	2	4	0	4
Australian	.....foot	0	0	2	0	3	3
Mahogany, Cuba	.....foot	0	0	5	0	7	2
St. Domingo, cargo average	.....foot	0	0	5	0	7	2
Brazil	.....foot	0	0	3	8	0	0
Tobacco	.....foot	0	0	4	0	0	6
Honduras	.....foot	0	0	4	0	0	6
Maple, Bird's-eye	.....foot	0	0	6	0	0	8
Bona, Rio	.....foot	7	0	0	10	0	0
Bahia	.....foot	6	0	0	10	0	0
Ror, Turkey	.....foot	5	0	0	17	0	0
Satin, St. Domingo	.....foot	0	0	7	0	0	11
Porto Rico	.....foot	0	0	8	0	1	2
Walnut, Italian	.....foot	0	0	4	0	0	5

METALS.		£.	s.	d.	£.	s.	d.
Iron—Pig, in Scotland	.....ton	0	0	0	0	0	0
Bar, Welsh, in London	.....ton	4	7	6	4	15	0
" in Wales	.....ton	4	2	6	4	7	6
" Staffordshire, London	.....ton	5	10	0	5	10	0
Sheets, single, in London	.....ton	6	15	0	8	10	0
Hoops	.....ton	6	0	0	7	0	0
Nail-roads	.....ton	5	10	0	6	10	0

COPIES.		£.	s.	d.	£.	s.	d.
British, cake and ingot	.....ton	41	10	0	42	10	0
Best selected	.....ton	42	10	0	43	10	0
Sheets, strong	.....ton	46	10	0	48	0	0
" India	.....ton	44	10	0	45	10	0
Australian	.....ton	0	0	0	0	0	0
Chili, bars	.....ton	38	15	0	39	2	6

YELLOW METAL.		£.	s.	d.	£.	s.	d.
Lead—Pig, Spanish	.....ton	12	12	0	12	15	0
English, common brands	.....ton	13	0	0	13	0	0
Sheet, English	.....ton	13	15	0	14	0	0

SILVER.		£.	s.	d.	£.	s.	d.
Silesian, special	.....ton	14	2	6	0	0	0
Ordinary brands	.....ton	13	17	6	14	0	0

TIN.		£.	s.	d.	£.	s.	d.
Barca	.....ton	0	0	0	0	0	0
Billiton	.....ton	0	0	0	0	0	0
Straits	.....ton	96	5	0	96	15	0
Australian	.....ton	96	17	8	97	7	6
English ingots	.....ton	101	0	0	102	0	0

ZINC.		£.	s.	d.	£.	s.	d.
English sheet	.....ton	18	0	0	18	5	0

OILS.		£.	s.	d.	£.	s.	d.
Linseed	.....ton	21	17	6	22	5	0
Cocanut, Ceylon	.....ton	32	10	0	33	0	0
Ceylon	.....ton	25	15	0	0	0	0
Copra	.....ton	0	0	0	0	0	0
Palm, Lagos	.....ton	23	10	0	0	0	0
Palm-out, Korad	.....ton	0	0	0	0	0	0
Rapeseed, English pale	.....ton	22	5	0	0	0	0
" brown	.....ton	20	15	0	0	0	0
Cottonseed, refined	.....ton	18	5	0	18	15	0
Tallow and Oleine	.....ton	25	0	0	45	0	0
Lubricating, U.S.	.....ton	6	0	0	10	0	0
" Refined	.....ton	6	0	0	13	0	0

TERPENTINE.		£.	s.	d.	£.	s.	d.
American, in casks	.....barrel	1	5	0	0	0	0
Tar—Stockholm	.....barrel	0	15	0	0	15	6
Archangel	.....barrel	0	10	6	0	11	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Laying Cast-Iron Water Mains	Tottenham Local Board	— De Pape	August 10th	ii.
Cast-Iron Water Pipes	Enfield Local Board	W. R. Kitteringham	August 11th	xiii.
Construction of Guard Room, Store, &c.	Admiralty	Official	August 13th	i.
Glazed and Cast-Iron Pipe Sowers	Malden U. R. S. A.	A. Stewart	August 16th	ii.
Street Improvements	Southend Local Board	F. H. Tulloch	August 17th	ii.
Painting Works, Eastern Hospital	Met. Asylums Board	T. & W. Stone	August 18th	ii.
Pipe Sowers	Uxbridge R. S. A.	J. Anstie	August 20th	xiii.
Laying and Jointing Pipes	Northwich Local Board	H. Bancroft	August 31st	ii.
Road Materials	Rochever Corporation	Official	August 24th	ii.
Balancing Reservoirs, Filters, &c.	Cardiff Cor. Water Wks	J. A. H. Williams	August 29th	ii.
Broken Currier Granite	Gravesend U. S. A.	Official	Sept. 2nd	ii.
Enlargement of Schools	Leyton School Board	J. T. Newman	Sept. 6th	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of Works	Clerk of Peace, Salop	2l. 10s. per week	August 6th	xvi.
Assistant Surveyor	Civil Service Com.	Not stated	Sept. 21st	xvi.

TENDERS.

ABRIDGE (Essex). —For alterations and repairs to the White Hart public-house, Abridge, Essex, for Messrs. Charrington & Co. Mr. John Hudson, architect, Leman- street.		
J. & H. Cocks, Mile End	£1,359 0 0	
J. Bentley, Welham Abbey	1,290 0 0	
R. Walter, Barking	1,069 0 0	
J. S. Hammond & Son, Romford	968 0 0	
G. Ransom, Walworth	835 0 0	
W. Gladding, Whitechapel	779 0 0	
* Accepted.		
BARNESBURY. —For alterations and additions in Offord-yard, Barnesbury, for Messrs. Weeden & Co. Mr. John House, architect:—		
Chant	£435 0 0	
McFarlane Bros.	429 0 0	
BRIGHTON. —For the erection of a building for the reception of eight indigent ladies, for Mrs. J. H. Macdonald. Messrs. Lainson & Son, architects:—		
W. A. & B. Field	£1,994 0 0	
G. R. Lockyer	1,740 0 0	
J. Barnes	1,670 0 0	
G. Howard	1,338 0 0	
G. Cheesman & Co. (accepted)	1,270 0 0	
CAMBERWELL. —For the erection of spire and gallery, and for alterations, at the Presbyterian Church, Camberwell. Mr. S. C. Capes, architect. Quantities not supplied:—		
Macfie	£1,017 0 0	
Kynoch	857 0 0	
Downs	836 0 0	
Smith	819 0 0	
Good	783 0 0	
Roberts	712 0 0	
BARNET. —For the erection of the Barnet Workhouse Infirmary. Mr. John Ladds, architect, Chapel-street, Bedford-row, W.C. Quantities by Mr. Thos. Ladds:—		
Williamson, Finsbury Park	£7,474	..... £150 0
A. Taylor & Co., Cambridge-road, E.	6,776	..... 200 0
W. James, High Barnet, N.	6,127	..... 160 0
Priestley & Gurney, Hammer-smith	5,990	..... 160 0
Charles Cave & Son, New Barnet	5,897	..... 165 0
Lobb & Oliver, New Southgate	5,814	..... 165 0
Brooks & Meador, Enfield	5,781	..... 160 0
Felmead & Fotheringham, Rheo-hall's-road	5,673	..... 160 0
T. L. Green, Eagle-street, Holborn, W.C.	5,543	..... 157 0
Pack Bros., Finsbury-road	5,533	..... 160 0
T. Turner, Watford	5,529	..... 165 0
Staines & Son, Great Eastern-street	5,493	..... 155 0
Stephens, Bawfow, & Co., Wandsworth	5,477	..... 150 0
E. C. Howells & Sons, Lambeth	5,394	..... 150 0
John Glascock & Son, Bishop's-Stortford	5,357	..... 160 0
Charles Wall, Chelsea	5,287	..... 160 0
W. Oldrey, Westbourne Park	5,338	..... 157 10
Gould & Brand, Camden Town	5,335	..... 165 0
J. Garlick, West Brompton	5,330	..... 165 0
Wall Bros., Kentish-town	5,219	..... 160 0
G. Parker, Peckham	5,170	..... 160 0
Foster & Drake, Burby	5,168	..... 160 0
G. Worboys, Basingstoun, near	5,140	..... 160 0
Royston	5,120	..... 165 0
Kirk & Randall, Woolwich	5,087	..... 155 15
Albert Kimberley, Banbury	5,070	..... 157 0
James Smith & Sons, South	5,070	..... 157 0
Norwood	5,013	..... 160 0
J. Currow, High Barnet	4,950	..... 160 0
Mariott Bros., High Barnet	4,950	..... 160 0
J. Church & Co., Coleman-street, City	4,625	..... 159 0
John Wilmott & Sons, Hitchin	4,599	..... 160 0
Charles Reed, Leytonstone	4,086	..... 170 0

CAMBERWELL.—For bar-fittings for new tavern, Bramble-road. Mr. Geo. Treacher, architect, Carter-lane :—

Bright	2475 0 0
Hills	470 0 0
Turtle & Appleton (accepted)	445 0 0
Drew & Cadman	440 0 0

CROYDON.—For pulling down three cottages and erection of stables and warehouses, &c., in Handover-alley, Church-street, Croydon, for Messrs. J. Thrift & Son. Mr. R. Ridge, architect, Croydon :—

Wyatt & Co., South Norwood	2263 0 0
Smith & Bullard, Croydon	539 0 0
A. Ballock, Croydon	261 0 0
D. Waller, Croydon	249 0 0
B. Page, Croydon (accepted)	224 0 0

HAMMERSMITH.—For making up and paving roads, for the Vestry of Hammersmith :—

G. Aldred	2539 0 0
Nowell & Robson	539 0 0
Mears & Co.	507 0 0
Tomes & Wimpey	498 0 0
J. Carter	469 0 0
W. C. Coats	446 0 0

[Surveyor's estimate, 578L.]

H. Porteus	555 0 0
Mears & Co.	531 0 0
Nowell & Robson	529 0 0
Tomes & Wimpey	525 0 0
W. C. Coats	463 0 0
Tomes & Wimpey	413 0 0

[Surveyor's estimate, 578L.]

J. Carter	385 0 0
Tomes & Wimpey	393 0 0
Mears & Co.	393 0 0
Nowell & Robson	352 0 0
W. C. Coats	314 0 0

[Surveyor's estimate, 548L.]

G. Aldred	269 0 0
Tomes & Wimpey	291 0 0
Mears & Co.	280 0 0
Nowell & Robson	286 0 0
J. Carter	261 0 0
W. C. Coats	253 0 0

[Surveyor's estimate, 3.6L.]

Nowell & Robson	464 0 0
G. Aldred	467 0 0
Tomes & Wimpey	425 0 0
Mears & Co.	421 0 0
J. Carter	393 0 0
W. C. Coats	391 0 0

[Surveyor's estimate, 181L.]

HASTINGS.—For new shop-fittings for Mr. Lyons, Mentone Mansions. Mr. Ward, architect, Bank-buildings :—

Sage	2578 0 0
Drew & Cadman (accepted)	625 0 0
Vigors, Hastings	497 0 0

HOXTON.—For partially pulling down and re-building premises in Boot-street, Hoxton. Mr. E. A. Lewcock, architect, Bishopsgate-street Within :—

Goodall	21,028 0 0
Shurmer	1,017 0 0
Auley	1,010 0 0
Nicholls	960 0 0
Jackson & Todd	919 0 0
Steel	915 0 0
Spencer & Co.	900 0 0
Kelvie	759 0 0
Ivory	758 0 0

ISLINGTON.—For shop-fittings for Mr. Roberts, 219, Upper-street, Islington. Mr. J. Kingwell-Cole, architect, Mount-street, W. :—

Wall Bros.	2478 0 0
Sage & Co.	410 0 0
Drew & Cadman	570 0 0

LEYTONSTONE.—For decorative repairs at The Elms, High-road, Leytonstone. Mr. E. A. Lewcock, architect, Bishopsgate-street Within :—

Mansell	2,200 0 0
Cain	175 0 0
Scars	175 0 0
Nicholls	145 0 0
Kelvie	141 0 0
Dainton	100 0 0

LIMEHOUSE.—For painting and decorating the Town-hall, Limehouse, for the Churchwardens and Overseers. Mr. James F. Wesley, architect, Forest-gate :—

E. Lovett	2732 0 0
B. E. Read, Limehouse	715 0 0
M. A. Palmer & Co.	649 0 0
W. Read, Britton	597 0 0
Jno. Walker	497 0 0
A. W. Derby	449 0 0

LONDON.—For alterations and repairs for the Royal Maternity Society, 31, Finsbury-square. Messrs. J. Reddall & Son, architects :—

Kilby & Gayford	2457 0 0
Heaps	447 0 0
King & Son	423 0 0
Woodward	345 0 0

LONDON.—For constructing vaults, &c., for new alterations, Brady-street, Whitechapel, for Messrs. Mann, Crossman, & Paulin. Mr. R. Spence, architect :—

Colls & Sons	28,390 0 0
F. & J. Wood	5,383 0 0
B. Page	5,220 0 0
Harris & Wardrop	7,584 0 0
J. Morter	7,439 0 0
J. Mowlem & Co. (accepted)	7,188 0 0

LONDON.—For re-building No. 219, Brompton-road, for Miss Jeffreys. Mr. Robert J. Worley, architect. Quantities by Mr. R. C. Cleed :—

Perry & Co.	23,800 0 0
Peto Bros.	3,790 0 0
Chappell	3,750 0 0
Lawrence & Sons	3,647 0 0
Toms	3,584 0 0
Croaker	3,573 0 0
Lucas & Sons	3,424 0 0
G. & J. Green	3,125 0 0

PADDINGTON.—For alterations to the Shakespeare Tavern, 65, Westbourne-grove, for Mr. A. T. Yardley. Messrs. A. W. Saville and W. J. Martin, joint-architects. Strand. Quantities supplied :—

R. Smith	2,388 14 0
Jackson & Todd	497 0 0
Ward & Lambie	473 0 0
Burch & Co.	459 0 0
Spencer & Co.	430 0 0
B. Cook (accepted)	418 0 0

SHADWELL.—For the erection of new offices, corner of Garth-street and Gould's-hill, Shadwell, for Messrs. Hewitt & Co. Limited. Mr. Chas. Dunch, architect. Quantities by Mr. Jas. F. Wesley, Forest-gate :—

Ashby Bros.	23,299 0 0
Ashby & Horner	2,290 0 0
Colls & Son	2,250 0 0
Mowlem & Co.	2,178 0 0
J. Morter	2,165 0 0
T. Boyce	2,160 0 0
W. Shurmer	2,124 0 0
Grover & Son	1,989 0 0
Nightingale	1,930 0 0
Harris & Wardrop	1,833 0 0
J. & J. Greenwood	1,769 0 0

TURNHAM GREEN.—For alterations to two shops, Nos. 8 and 9, Queen's-terrace, Turnham-green, for Mr. Stratford :—

Adamson	2,105 0 0
W. Horne (accepted)	91 0 0
Wilson	75 1 0

WOOLWICH.—For alterations and additions to the Prince Albert public-house, Hare-street, Woolwich, for Messrs. E. J. Rose & Co. Messrs. Wilson, Son, & Aldrich, architects, East India-square :—

Jackson & Todd	2,980 0 0
John Warne	965 0 0
Palmer & Sons	898 0 0
Kirk & Randall	890 0 0
J. & H. Mills	870 0 0
Drew & Cadman (accepted)	760 0 0

WORTHING.—For the erection of a school-house and residence for the Rev. P. Crick. Messrs. J. E. K. & J. P. Catts, architects, Southampton-street, Strand :—

J. W. Hobbs & Co., Limited	25,650 0 0
R. C. Blaker	4,953 0 0
E. Snewin & Son	4,851 0 0
W. W. Smith	4,565 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

M. O. T.—W. C. S. thanks—A. B. should be glad to see drawings.—W. S.—H. T.—H. B.—W. T.—R. & E.—G. T. B. & W.—J. W. P. A. plan for every 12. All that is published in our columns.—F. M. C.—J. W. M.—A. E. should have made out.—E. B.—T. J. L. Note this article. All statements of facts, sets of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline printing out books and gift addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications. Letters or communications depend here (occasionally) which have been duplicated for other journals, are NOT DESIRED.

All communications, including literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other matters involving business should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND, Box Ground, Combe Down,

Corsham Down, And Farleigh Down,

RANDELL, SAUNDERS, & CO., Limited, Corsham, Wilts. [ADV.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS, Box, Wilts. [ADV.]

Doubling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doubling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone.

Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Limited, Somerset.—Agent, Mr. E. WILLIAMSON, No. 16, Craven-street, Strand, W.C. [ADV.]

Doubling Free Stone For prices, &c., apply to Messrs. S. J. STAPLE, dress S. & J. STAPLE, Quarry Owners, Stoke Newington, London.

HAM HILL STONE, Quarry Owners, Stoke Newington, London.

BLUE LIAS LIME and Lime Merchants, Stoke Newington, London.

(Ground or Lump), Ilminster. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.—The Seyssel and Metallic Limes, Asphalte Company (Mr. H. Glenn), Office, & Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.

ZINC ROOFING

F. BRABY & CO.

LONDON. ** LIVERPOOL. ** GLASGOW

VEILLE MONTAGNE SOLE MANUFACTURING AGENTS.
NO SOLDER. NO EXTERNAL FASTENINGS

Particulars on Application. Chief Offices:—352 to 364, EUSTON ROAD, LONDON, N.W.

ILLUSTRATIONS.

Prince's Mansions, Victoria-street, Westminster.—Mr. Bassett Keeling, F.S.I., Architect.....	234-239
Birmingham Law Courts Competition.—Design by Messrs. John Burnett & Son, Architects.....	242-243
Birmingham Law Courts Competition.—Design by Messrs. Maxwell & Tuke, Architects.....	240-247

CONTENTS.

The Episcopal Heraldry of England.....	223	Birmingham Law Courts Designs.....	232	Light Railways, Ireland.....	252
Shadwell Hospital Competition.....	224	The Chester Meeting of the Royal Archaeological Institute.....	249	Water Supply.....	252
Notes.....	225	Surrey Archaeological Society.....	251	Provincial News.....	253
Notes in Kent, with the Architectural Association Excursion.....	226	The Grosvenor Museum, Chester.....	251	The Student's Column: Stone Quarry.—VII.....	254
The Stone Age Graves at Falkoping, Sweden.....	228	Sanitary Institute of Great Britain.....	252	Recent Patents.....	255
Sanitary Statistics of Glasgow.....	229	Proposed Tunnel below the Thames at Blackwall.....	252	Recent Sales of Property.....	255
Public Baths at Poplar.....	230	Sir John Soane's Museum.....	252	Miscellaneous.....	255
Prince's Mansions, Victoria-street and Palace-street, Westminster.....	232	St. George's Hall Sculpture.....	253	Prices Current of Building Materials.....	256

The Episcopal Heraldry of England.



UR cathedrals appeal to many tastes and sympathies as the happy hunting-grounds of the architect, the antiquary, the artist, and the religious enthusiast, while the student of heraldry finds in them an almost inexhaustible field of research. The arms of the Sees are closely connected (in many instances) with English history, and are of interest to the lover of armoury. A short account of the origin of some of these arms or the causes for their adoption, with the meaning of the various devices, may be of interest to ecclesiastical and other readers.

The See of Canterbury claims first attention, as its archbishop takes precedence of all peers of the realm who are not of royal blood.

It was founded in 596 by Saint Augustine, and at that time formed the capital of the kingdom of Kent under Ethelbert. Formerly it had jurisdiction over the Irish Sees, but precedence over York was not assumed until 1073 by a grant from the Pope. The arms are "Azure: an episcopal staff in pale argent ensigned with a cross patée or, surmounted by a pall of the second, edged and fringed of the third, and charged with four crosses formée fichée sable." From the episcopal staff to the four crosses fichée this is a truly typical coat of the Church, but the pall is the most conspicuous and historic of the bearings, being a vestment specially granted by the Pope for the use of archbishops, but not without a suitable return in the shape of a considerable sum of money. It is made of wool shorn from the backs of the sacred lambs of St. Agnes in Rome. In shape it is a circular strip worn round the shoulders, and with a strip of the same material hanging in back and front and forming a Y on each side, said to symbolise the life of man, the upright limb showing his childhood, and the two branches the right path and the wrong one, one of which he must follow. The staff with the cross-head is usually considered as peculiar to an archbishop and distinct from the crooked-head pastoral staff of the bishop; but there is just a shade of doubt on the point, and at this we leave the question.

A cross fichée (or with spiked lower limb) was carried by palmers and pilgrims, and formed at once a support on the road and an emblem for devotion when the hour came, and was stuck in the ground for that purpose; but

in the arms of Canterbury it is supposed to represent the pins by which the pall was fastened to the archiepiscopal vestments.

We may add that the practice of ornamenting the mitres of archbishops with ducal coronets is a modern one, and without the sanction of the College of Arms, but at the same time it is a very convenient one as a distinction of status, and likely to be continued in spite of its non-heraldic character.

York is the most ancient of our archbishoprics, dating from the very introduction of Christianity into England, and as early as the second century, and formerly the Sees of Scotland acknowledged allegiance to it.

In the reign of Henry I. arose that fierce contest for supremacy between Canterbury and York, and which lasted for so many years and was finally settled by the Pope declaring in favour of the former, but allowing the Archbishop of York the title of "Primate of England." The present arms are "Gules: two keys in saltire argent, in chief regal crown proper." The keys allude to St. Peter, to whom the minster is dedicated. The date of their first assumption is doubtful, but the former arms were the same as those of Canterbury. It is said that the change in the shield was brought about by Wolsey through his jealousy of the rival see of Canterbury, but what evidence there is on the point tends to discredit the assertion.

London, in early British times, was the principal of three archbishoprics, but St. Augustine, in 596, reduced it to a bishopric, amongst which it is now the chief. Its arms are, "Gules: two swords in saltire, hilts argent, pommels or." The cathedral being dedicated to the Apostle Paul will explain the two swords it bears as the well-known emblem of that saint.

The Bishop of Durham claims precedence next to his brother of London. The See was originally seated in Holy Island, or Lindisfarne. It was thence removed to Chester-le-Street, and then to Durham, in the last decade of the tenth century. Its bishops were Earls of Sedburgh and Counts Palatine, as is indicated by their mitres being represented rising from a coronet, and formerly adorned with plumes, and in one instance surmounting a helmet (the seal of Bishop Hatfield).

This combination of the "lords temporal and spiritual," or ecclesiastical and princely dignity, is of rare occurrence in England, and in 1836 the palatine jurisdiction of the See of Durham was vested in the Crown by Act of Parliament, and separated from its episcopal holders after a connexion of twelve centuries. The arms of the See are, "Azure: a cross or between four lions rampant, argent," and are those ascribed to King Oswy, its Saxon founder.

Winchester Cathedral has been dedicated at different times to various saints, originally to St. Amphibalus, afterwards to St. Peter, and lastly St. Swithin. The bishop, as prelate of the Most Noble Order of the Garter, has precedence next to the Bishop of Durham, and surrounds his arms with the insignia thereof.

The arms of the See are, "Gules: two keys endorsed in bend and rings interlaced, the upper one or, and the lower one argent, between them a sword in bend sinister of the third, hilt and pommel or." The two keys refer to its patron saint, Peter, and the sword may be supposed to be a type of the sword of the spirit.

The bishopric of Oxford is of comparatively modern foundation, owing its existence to Henry VIII. Its holder, as the Chancellor of the Most Noble Order of the Garter, adorns his arms with that illustrious ensign, like his brother of Winchester. The Royal Chapel of St. George now belongs to this See, being transferred from Salisbury, whose bishops were the original chancellors of the order.

The arms are very singular and blazoned. "Sable: a fesse argent, in chief, three demi-ladies couped proper and ducally crowned or, vested of the second: in base an or of the last, horned and hooved gold, passing a ford, barry wavy of five, argent and azure." The punning arms of the city form the base, and it is suggested that the three ladies' heads in chief were formerly those of kings referring to the Royal founders of the University, as the arms of the latter contain three crowns,—a probable solution to the enigma.

A still greater enigma is to be found in the old blazonry of the See of Chichester, founded at Silsey in 681, and removed to the former place in 1071. It runs as follows:—"Azure: a Prester John seated on a tombstone, in his left hand a mound, and his right hand extended or, with a linen mitre on his head, and in his mouth a sword all proper." This was gravely recorded at the College of Arms, and passed muster until very recently, when the figure of Our Saviour took the place of the mythical John, and gave the solution of the incongruous mystery, being, in fact, the restoration of the arms adopted by Bishop Seffrid II. as the seal of his See. This is perhaps one of the strangest perversions of a clear and appropriate "coat" that can be met with. We now find it properly recorded as,— "Azure: Our blessed Saviour, head radiant, seated on a throne or, cushioned gules, vested argent, girdled of the second, dexter arm elevated proper, issuant from his mouth fess-wise in the sinister a sword proper, hilt and pommel gold in fesse, on the dexter Alpha, and on the sinister Omega of the last."

The sword issuing from the mouth refers to

several passages in the Revelations, and is quite in accordance therewith, but to some minds the idea of treating the Saviour as a charge in heraldry will be objectionable, and even painful, and we must confess our sympathy is to some extent in the same direction.

Lincoln from its great height surveys the country round (a combination of the ancient sees of Dorchester and Sidnacester), and became a bishop's seat in 1075, and subsequently the arms became:—"Gules: two lions passant guardant in pale or, on a chief azure the Virgin ducally crowned, seated, on her dexter arm the Infant Jesus, and in her sinister hand a sceptre, all of the second."

The arms are those usually attributed to the Conqueror, in whose reign it will be seen Lincoln became a bishop's seat, but Woodward thinks their origin is rather to be found in the fact that Geoffrey Plantagenet occupied the See from 1173 to 1182. If this is so, we get an early record of the Royal Arms in Church heraldry, and on that account of great historic interest. The figure in the chief reminds us that the cathedral is dedicated to the Virgin Mary, and forms another instance of mingling sacred subjects with things mundane.

The See of Bath and Wells derives its double title from the fact of the seat of its bishop having been transferred several times from one city to the other, and that the monks of both places joined in his election. The arms of the united See are now, "Azure: a saltire quarterly, quartered or and argent."

The cathedral at Wells is dedicated to St. Andrew: hence the saltire, or X-shaped cross, on which the saint was supposed to have suffered martyrdom. The arms of Bath were, "Azure: two keys, endorsed in bend, sinister, argent and or, with a sword in bend proper." Early in the seventeenth century the saltire of Wells was placed between the sword and keys of Bath by Bishop Montagu.

Gloucester and Bristol form another united diocese in the West, and have done so for just half a century. Both Sees were created by Henry VIII. in 1541. The arms are combined in one shield as follows, "Azure: two keys endorsed in saltire, or," for Gloucester; impaling, "sable, three ducal coronets in pale of the second" for Bristol.

The abbey church at Gloucester was formally dedicated to St. Peter, and afterwards to Peter and Paul, and the arms now borne refer to the first dedication; but formerly the sword of the latter saint was added, and still appears in different parts of the building, also on the bells and the seal of the convent.

The derivation of the arms for the Bristol See is unknown, but Woodward conjectures that the three crowns may refer to the Blessed Trinity, in accordance with the dedication of the cathedral, and he adds that the same charges appear in an old stained-glass window, but upon a field azure.

The See of Devon and Cornwall became united in 1032 under the name of Exeter, but to be separated in our own day to form another distinct diocese for the former county with the cathedral at Truro. The arms of Exeter are, "Gules: a sword erect in pale argent, hilted or, surmounted by two keys, endorsed in saltire of the last," and have reference to the former dedication to Peter and Paul. In Henry VIII.'s time his favourite, Bishop Vesey, held the See, and it may be of interest to mention that this venerable prelate attained the great age of 103, and was buried in his native place, Sutton Coldfield, and is generally believed to be the only representative of the episcopacy who has found a grave in Warwickshire.

The See of Worcester was founded by a king of Mercia in the latter part of the seventh century (Ethelred); its arms, "Argent: ten torteaux, four, three, two, and one," are supposed to be derived from those of Jules de Medicis, who held it for a short period early in the sixteenth century, and have nothing symbolical in them.

It is, perhaps, worth recording as a very singular coincidence that the paternal arms of Babington (its bishop from 1597 to 1610) were exactly the same as those of the See.

The See of Hereford was formerly suffragan to the Welsh archiepiscopal diocese of St. David's, but with the spread of Saxon sway it passed to that of Canterbury. The arms are,—"Gules: three leopards' faces reversed jessant-de-lis, two and one, or,"—as borne by St. Thomas de Cantilupe, its bishop from 1275 to 1282, and, like those of Worcester, hardly suitable for the purpose, however historic in themselves.

Lichfield for a brief period enjoyed the dignity of an archbishopric, and for some time held the double title of Coventry and its own. It was founded by Oswy, king of Mercia, in 656. Its arms, "Per pale gules and argent, a cross potent, quadrated between four crosses patée, all counterchanged,"—form a very striking coat, from the contrast of colours, but the origin and meaning are unknown. This cathedral possesses a large stained-glass window in the choir filled with the arms of its bishops and the sees they were translated to, forming a perfect blaze of episcopal heraldry, and a striking and appropriate spectacular display, and worthy of imitation. Bishop Selwyn is buried here, and that beautiful constellation the Southern Cross forms the device of the arms for his New Zealand see, adorning the mortuary chamber with other records of Australasian life.

The See of Sodor and Man formerly included the Hebrides (or Southern Isles) in its jurisdiction, and although the connexion has been severed for centuries the joint names are still retained. The arms are peculiar and unique: "Gules between two pillars; argent, the Virgin Mary standing on the upper part of three ascents with arms extended, vested proper and crowned or, around her head a nimbus of the last over dexter pillar, in fesse a church proper and in base three legs armed proper, conjoined in fesse at upper part of thigh, flexed in triangle, garnished and spurred or." Woodward is of opinion that the Virgin should hold the church, and that the pillars only form part of the canopy under which saints and bishops so often appear on seals.

The three legs so characteristic of the Isle of Man Planché supposes were derived from the Normans, as the Island reminded them of the triple-mountained Sicily whose arms are also three legs, but unclothed.

As the Manxmen are in the enjoyment of "Home Rule" with a Parliament of their own, their bishop has no seat in our House of Lords.

SHADWELL HOSPITAL COMPETITION.

SOME months ago, the Committee of the Children's Hospital at Shadwell advertised a competition for a large addition to the hospital, utilising a strip of ground to the north of the existing buildings, at present occupied by some disused almshouses, and which has been acquired by the Committee. Mr. Saxon Snell was commissioned to report and adjudicate on the plans sent in, and after a rather long delay this has now been done, and the designs, or most of them, have been exhibited at the hospital during three days of this week.

Mr. Snell has "placed" four sets of plans, signed respectively "Sunshine," "Thought," "Simplex," and the fourth set being marked by a circle in the corner, the designs being placed by him in the order named. The additions to be made consisted of two new wards, one above the other; a casualty ward, to be near the street entrance and near the existing administrative portion of the hospital; a large waiting-room for out-patients, and a smaller waiting-room for new out-patients attending for the first time; two isolation wards, to be near the new patients' waiting-room and near the street; two consulting-rooms; and a dispensary, to be accessible both from the old and new portion of the hospital, in place of the present dispensary, which is too small. To this was added a complete new laundry on the top floor, and provision for the raising of the main block, and the addition of a third ward at a future time, if required. This does not seem a good way of putting it,

as this would of course necessitate the demolition of the new laundry, or at least the changing it into a ward, and moving the laundry to the upper story; in other words, planning the laundry so that it could be turned into a ward afterwards. This unnecessary difficulty interposed seems, however, to have been tacitly ignored as a thing that might be postponed to a more convenient season.

The plans placed first are, as we have already stated, by Messrs. Millard & Lewis; the names of the other three competitors who have been placed are still officially kept secret, for no reason that we know of, as we presume the authors can have no objection to their being made known.

The peculiar shape of the ground, a long and narrow piece, and the general requirements, as issued to competitors, have led to a considerable unanimity in the general arrangement of the plans, all of them having a passage of access along the north side of the buildings, and placing the out-patients' waiting-rooms parallel to this, with the wards over the larger waiting-room. The difficulty in the plan consists in arranging all the rooms required within the space, which is barely sufficient for them, and at the same time getting sufficient inter-communication and avoiding an unsanitary crowding up of the ground. The latter condition is really hardly possible; the selected four can only be said to have come more or less near fulfilling it. All of them appear to us to have been (considering the matter from a purely hospital point of view) too much impressed with the wish to produce a good street front on the main (west) side by carrying on the architectural design of the existing hospital (a poor quasi-Gothic affair, neither good architecturally nor suitable for a hospital), thereby blocking up the site much more than need have been.

The plan by "Sunshine" is in the main the best, but the authors have got out of one difficulty by ignoring the instructions as to the size of the consulting-rooms, and have made them a good deal smaller than specified in the instructions. It is not a very important defect, for the specified size, 20 ft. by 20 ft., is rather unnecessarily large. The provision of separation-lobbies between them and the waiting-rooms is a good point. The water-closet wings are not sufficiently cut off from the wards, having a window to the open-air on one side of the lobby only, consequently there is no cross draught. The consulting-rooms, one for medical and one for surgical cases, ought by rights to have been equally accessible from both the waiting-rooms, though the instructions give no information on this point; the promoters apparently thinking, like other medical authorities who promulgate hospital competitions, that architects are to find out by intuition their method of working their establishment. The inlet ventilation of the wards is by air introduced vertically through the window-boards after passing hot-water coils in the recesses under them: as good a way as could be. The exit of foul air is through the ceiling, but where it goes after that the drawings alone do not make clear, and the architects' reports were not appended to the drawings, as in justice to the authors they should have been. We made inquiry on this head, but got no reply except a curt statement that the architects "had expressed no wish to have their reports appended." Probably they supposed that common-sense would have dictated to any committee or secretary that if the drawings were exhibited for public inspection, the authors' descriptions should go with them to explain them, as has been done in every competition exhibition we ever heard of; but Shadwell Hospital seems to be strictly tied up in red tape, and the most reasonable thing cannot be done without an official order. The enclosed court surrounded by buildings, just in rear of the street block, is very small, and a point of danger in the plan, though this is much worse in one or two others of the designs.

In "Thought" the planning of the out-patients' department and the lobbies communicating with the dispensary and the consulting-rooms is very good; ample inlet

ntilation is provided by large iron tubes, ular in section, opening vertically into the ards and other rooms. There is a large tract or exit ventilator with louvers in the of, but whether it is actuated by any special ans is not indicated on the drawing.

ntilating grates are used in the wards. "Simplex" has attained simplicity in part making his out-patients' waiting-rooms r too small for the number they are to ntain; in fact they would not hold the umbers in any comfortable or wholesome nner at all, and there are internal courts funnels surrounded with building that are rry small and would be receptacles of foul r. There appear to be air-inlets near the or, as shown on the longitudinal section of e ward, but, as in other cases, the working e ventilation system is not clearly pparent from the drawings.

"Circle" places prominently a special note his plans—"All w.c.s. entirely disconnected m main building by open lobbies,"—as if s were a new invention, instead of, as it ght to be, a kind of truism in hospital anning; and another note placed against e gratings near the ceiling in the section of iting-rooms, "openings giving ventilation o sitting-rooms," leads to the conclusion that e author is tolerably unsophisticated in ese matters, or he would have stated or own whether these were inlets or outlets, ow he meant them to work. We ought e getting rather past the times when chitects thought it enough to cut a hole a wall or a ceiling and label it "ven- ator." The laundry plan shows also a nt of practical knowledge; the washing- om is much too small, and the drying-room uch too large, and merely a large room with o drying-horses or drying-closets shown at l. Indeed, we can hardly see why this plan as placed, unless for the perspective view, hich is a large and bold one.

A cursory look at the remaining designs ood suggest that there are one or two among em better in most respects than the fourth aced one, accompanied by some very poor e absurd ones. But we think the best plan as been chosen, though "Thought" runs it ery close, and is more business-like in some epects. If we have not done justice to the authors' intentions in regard to heating and ntilation they must put it down to the absurd ition of the authorities in keeping the archi- ects' own explanations of their work carefully at of sight.

NOTES.

HE detailed accounts of the Panama Canal, of the general outcome of hich we gave an abstract last week, are published in the *Bulletin u Canal Inter-oceanique* of August 1, in e usual form of the *inventaire général*, as well as an abstract in the report itself. The ode of dividing the cost into *dépenses faites our la construction du canal*, and *actif suivant stimation*, is not one which commends itself o the English reader, and it is necessary to efer to previous accounts in order to under- tand that rendered on June 30 ult., which nly comes down to June 30 in the previous ear, 1885. As such it may be massed as ollows:—

The Company Debtor (Passif).

To Share Capital	£12,000,000
To Loans, three emissions	23,825,840
To Interest and Sundries	788,976
Total	36,614,816

The Company Creditor (Actif).

By Purchase of Panama Railroad ...	£3,755,128
By Financing, Management, Inter- est, and Payments to Con- cessionnaires	16,794,985
By Hotel and Furniture at Paris, and Buildings and Furniture at Panama	1,015,445
By Plant and Stores	2,831,968
By Works and Management (Panama)	3,524,447
By Cash and Realisable Assets, less acknowledged Debts	8,692,893
Total	£36,614,816

In the above the expenses of management at Panama are included with the cost of the works. The cost of the "central manage- ment" is 66,136*l.* per annum. Out of a total expenditure, including rebate on loans, of 27,921,923*l.* (to June 30, 1885), only 3,524,447*l.* has been expended in works and local manage- ment. The salary of the Director General is stated by M. Rodrigues at 20,000*l.* a year, besides house, horses, and carriages.

THE Cambrian Archeological Association, which meets at Swansea on August 23, is not likely to want interest during its five days' wanderings in a district so unusually full of architectural and archeological remains. The first day's excursions will include Margam, the seat of Mr. Talbot, M.P., in whose grounds is the ruined chapter-house of the ancient Cistercian abbey founded by Robert of Gloucester in 1147. The west end of the abbey church forms part of the present parish church. Contemporaneous with Margam, and, indeed, the work of the same architect, is Neath Abbey, which, defaced and begrimed as it is by copper smoke, still deserves Leland's description as "the fairest abbey in all Wales." The Peninsula of Gower, which will occupy the three last days of the meeting, is in itself an *embarras de richesse*. In North Gower are the castles of Webley and Llandymor, the famous cromlech of Arthur's Stone, dominating the country from the summit of Cefn Bryn, the churches of Llanrhidian and Llangenydd, the latter with a peculiar side tower and blocked Romanesque arch, the maenhir of Samson's Jack on Mansellod farm, and the camp on Harding Down. South Gower has its bone caves (some of which have yielded very early pottery), Oxwich church and castle, Penrice and Pennard castles, the churches of Ilston and Bishopstone, the Court-house of Land-grove, and the chamber-tumulus of Park-le-Breos. Swansea, with Bishop Gower's castle, St. Mary's Church and monuments, the Hospital of the Blessed David, and a visit to Mr. Llewellyn's charming seat at Penllergare, will furnish ample materials for a long and interesting day's research.

M. DEPREZ'S experiments on electrical motive power, which have now been carried on for some time at Creil at the expense of Messrs. Rothschild, seem to be in a fair way of bearing important fruit. According to the results, it appears that M. Deprez can, with only one generator and one receptor, transmit to a distance of thirty-five miles a force of fifty-two horse-power, and that the machinery is now working regularly and continuously. The maximum electro-motive force is 6,290 volts, though prior to the construction of M. Deprez's apparatus, the maximum force did not exceed 2,000. This is a high rate of tension, though, to judge by the experience of the past six months, it does not seem to be attended with danger, no accident of any kind having arisen; and it is perfectly feasible to leave the transmitting wires uncovered on poles, so long as they are sufficiently high to be out of reach of the hand. The cost of a circular line of seventy miles for a fifty-horse power of transmission is estimated at about 5,000*l.*, though this price would be much diminished if the machines were frequently constructed. It seems probable that a new and very practicable motor power will shortly be available for industrial purposes.

THE seventy-fifth section of the Metropolis Management Amendment Act, 1862, says that an order of a magistrate for the demolition of a house or part of a house shall be made "in writing on" the owner who is directed to take the building down, and that the work shall be done within such time as the justices shall consider reasonable. In the case of Barlow v. The Kensington Vestry, to which we have more than once referred, it appears (from the now printed report of the case in the House of Lords) that no such written order was ever served on the owner of the house, but that a copy was served on him, or came to his knowledge. However, eight weeks were allowed for the demolition of the building, and the order

only came to the house-owner's knowledge on the last day of this period. Apart, therefore, from what may be called the merits of the case, on which the House of Lords decided against the Vestry, this tribunal considered that there had been no valid service of the order, which should have been in writing and served on the house-owner at once. Thus said Lord Watson, "in that view no time whatever was allowed for implementing the order to demolish, and that circumstance itself would be sufficient to vitiate the order." It is obvious, therefore, that local bodies should watch carefully the procedure under this Act, or they may, even when they are in the right on the merits, waste public money by irregular proceedings.

THE Institute of Architects have prepared, as proposed some time since, a card intended to facilitate the access of members to notable buildings for the purpose of sketching or examination. The card requests "all those whom it may concern to allow Mr. —, whose signature is on this card, and who is travelling for the purposes of architectural study, to sketch, measure, or otherwise examine any ancient or notable buildings or monuments under their charge, and to afford him such reasonable facilities and assistance as may lie in their power." The card is stamped with the seal of the Institute, and on the back is a translation into French, German, Italian, and Spanish.

THE Court of Appeal have settled a point of some interest to communities which supply their own water and are not supplied by a private company. For in the case of the Dewsbury Waterworks Board v. The Assessment Committee of Penistone Union, the Court has decided that where a public Waterworks Board is empowered to raise the funds for supplying a district with water by means of water-rents, and is also empowered to levy rates in order to make up any deficiency which may occur from the rents being insufficient, this rate is to be taken into consideration in estimating the rateable value of the property of the Waterworks Board. Clearly the power to levy such a rate in aid, and the fact that it had been employed, is an advantage which the hypothetical tenant would consider in estimating what he would give for the property.

THE Wiltshire Archeological Society, at their annual meeting at Swindon on the 10th, took into consideration the condition of Stonehenge, and the desirability of protecting it by a sunk fence so as to exclude carriages, and the appointment of a caretaker, who should only admit people under proper regulations. Though such an ordination would deprive "the stones," as they are called in the district, of part of their effect as they now stand unfenced in the midst of the plain, we can well understand, from what we have seen going on there, that some such measures may be absolutely necessary to preserve this most remarkable of English antiquities from defacement and injury. Rabbits also, it is reported, are doing serious mischief in burrowing near and under the stones, and loosening the ground they rest on. The deputa- tion who had been appointed by the Society to visit and report on the subject also advocated the restitution into its original position of the trilithon which fell in 1797, the former position of which was, it was said, accurately known. We are rather doubtful about this. Unless the position can be absolutely fixed, it seems better to leave them as they fell to tell their own tale. But we hope something definite will be done to protect this mysterious relic of the remote past from being made the mere playground of careless and vulgar holiday crowds, as it is more and more becoming.

THE Edinburgh University, designed by Robert Adam, remains incomplete, the dome which he intended as its culminating feature never having been erected. Some years ago the money required to effect this addition to the building was left by the late Mr. Robert Cox, Writer to the



Signet, and to Dr. Rowand Anderson has now been entrusted the carrying out of this improvement. From the position occupied by the building this additional feature in the skyline will be an effective element in the views of the Old Town as seen from different points, and when the campanile of the medical class-rooms appears (which it is said there is some likelihood of its doing through the munificence of one of the city's newly-elected Members), the group will have somewhat of a Venetian character. The northern façade of the University originally formed one side of a narrow lane, and is comparatively plain as regards decorative features; it is, however, symmetrically designed, and has a character of its own possessed of considerable dignity. It has been proposed to decorate this frontage, which is now conspicuous by the opening out of the broad thoroughfare of Chambers-street. We are inclined to the opinion that it would be well to let the façade remain as it is to tell its own tale. The money which would be spent upon applied ornament could be better appropriated to different objects connected with the University, æsthetic or otherwise.

At a meeting of the Building Committee for the University College of Wales, held on July 29th, a letter from Mr. Lewis Angell was read, stating that at 7d. per foot cube, the least price at which buildings of such character could be constructed (quite the least, we should say), the design awarded the first prize in the competition would cost £3,875½, the second £1,253½, and the third £2,022½. A long report was then read by Mr. J. P. Seddon, the original designer of the building which had been partially destroyed by fire, undertaking that it could be rebuilt on the original site, in a satisfactory manner, at a cost not exceeding £17,500. It was found that the two most eligible sites available in Aberystwith for entirely new buildings had an inclination of 1 in 5 and 1 in 6 respectively, a circumstance which it was considered would render them undesirable for the purpose, and would considerably increase their estimated cost. On this, after some discussion, the Committee unanimously resolved that the building should be reconstructed on its present site, and that Mr. Seddon be invited to prepare complete working drawings, and to obtain trustworthy quantities from an independent professional surveyor, with the view of obtaining from a responsible builder an undertaking to carry out the work for a sum not exceeding £17,500. Pending this, at all events, Mr. Seddon is re-instituted as architect for the re-building of the College, and, we hope, will carry it out as proposed. His original building was a remarkable one in many points, and there ought not to have been any attempt to shelve him in the matter.

We have received a pamphlet by Mr. Butterfield on the question of the provision of convenient accommodation for kneeling in church.* The object is to advocate the general employment of a fixed kneeling-board, forming part of the seat construction, in preference to loose hassocks and kneeling-pads. The latter are objected to as holders of dust and dirt, wearing out very soon, and requiring a constant eye on them and re-arrangement of them after services, so that each one should be in place for the next service. A section of the seat with kneeling-board is appended, with measurements figured, and the Incorporated Church Building Society recommends the general use of this arrangement, a full-size section of which can be seen at their office at 2, Dean's-yard, Westminster. This small but not unimportant matter in connexion with church furnishing is very practically treated, and we recommend attention to it on the part of those concerned in building new churches. There is no doubt that such an arrangement tends to render a church more cleanly and orderly than strewing the floor with a multitude of hassocks.

* Church Seats and Kneeling Boards. By W. Butterfield, F.S.A. With an Appendix, by Richard Foster, one of the Vice-Presidents of the Incorporated Church Building Society. Rivingtons, 1881.

MUCH difference of opinion exists amongst the subscribers as to the shape which the Memorial proposed to be erected in Edinburgh to the late Sir George Harrison, should take. The Town Council have come to the conclusion that a stained-glass window in St. Giles's Cathedral would serve the purpose; but it is contended that Sir George had little of the ecclesiastical element in his composition, and that a more suitable memorial would be a monumental gateway at the entrance to Blackford Hill, which he was the means of procuring as a public park, or the acquirement of Corstorphine Hill for the use of the public, a scheme he is said to have favoured. While the Town Council entertain the idea of a Memorial to Sir George Harrison, in St. Giles's Cathedral, they have come to the conclusion that the Memorial to the late Dr. William Chambers, who restored that edifice, should not be erected within its walls, as originally intended, but should consist of a statue to be erected in Chambers-street. Would not a recumbent statue in the cathedral be more appropriate?

A MEETING of ladies and gentlemen was held at the rooms of the Liverpool Architectural Society, on Wednesday last, to consult for the formation of a Liverpool Art-Workers' Guild, at which the following resolution was passed:—"That, in the opinion of this meeting, the establishment of a Liverpool Art-Workers' Guild is desirable, with a view to the diffusion of sound principles of decoration, and to the encouragement of workmen and others desiring to undertake decorative work of all kinds." A provisional council was afterwards formed to consider the way in which the resolution could be best carried into effect. The general object of the guild seems to be to find good art-workmen, and to bring them into relation with those who require their work, and also to form a collection of good examples of decorative work of various kinds. The best result of this kind of effort, perhaps, is that it tends to break down the influence of the middleman, or art-tradesman, who gets things made by routine, and stamps the name of a "Co." on what should be the individual art-workman's production. Mr. Bare, who made the principal address on the occasion (a very good one) observed that when looking over the pattern-books of a large firm of calico-printers he was assured that the ugly patterns sold quite as well as the undoubtedly pretty ones. We have no doubt they do; but will an Art-Workers' Guild alter that state of things materially? We fear not. It will be joined first by those who already know good art from bad, and they will catch a few of the heathen and convert them from a bad fashion into a good one; but hardly more. They may, however, benefit the true art-workman and find him more employment and a more sympathetic public.

In a letter to the *Times*, Messrs. G. Clausen, Walter Crane, and Holman Hunt have formulated the idea which has probably been in the minds of a good many people for some time past, that the Royal Academy on its own showing is really a private body, and had better be left to hang the works of its own members and enjoy them in private, and that a truly "national" exhibition should be started on a wider basis. More easily said than done; but the Academy as a whole certainly seems in a rather hopeless state of dotage and self-complacency, in spite of the efforts of its President to rouse the members to a higher view of their responsibilities. This year's exhibition has undoubtedly damaged their reputation very seriously with "those who know," but this does not affect the success of the exhibitions with the mass of the public, who reason the inverse way, and think a picture is good because it is by a Royal Academician. An amusing sequel to the affair was the extra letter of Mr. Hunt to the *Pall Mall Gazette* the day after, in which he suggested that Mr. Burne Jones's painting of the "Mermaid and her Victim" was really an allegory referring to the Royal Academy and the painter himself, caught

at last in their toils. If this is not true, it is at any rate *ben trovato*.

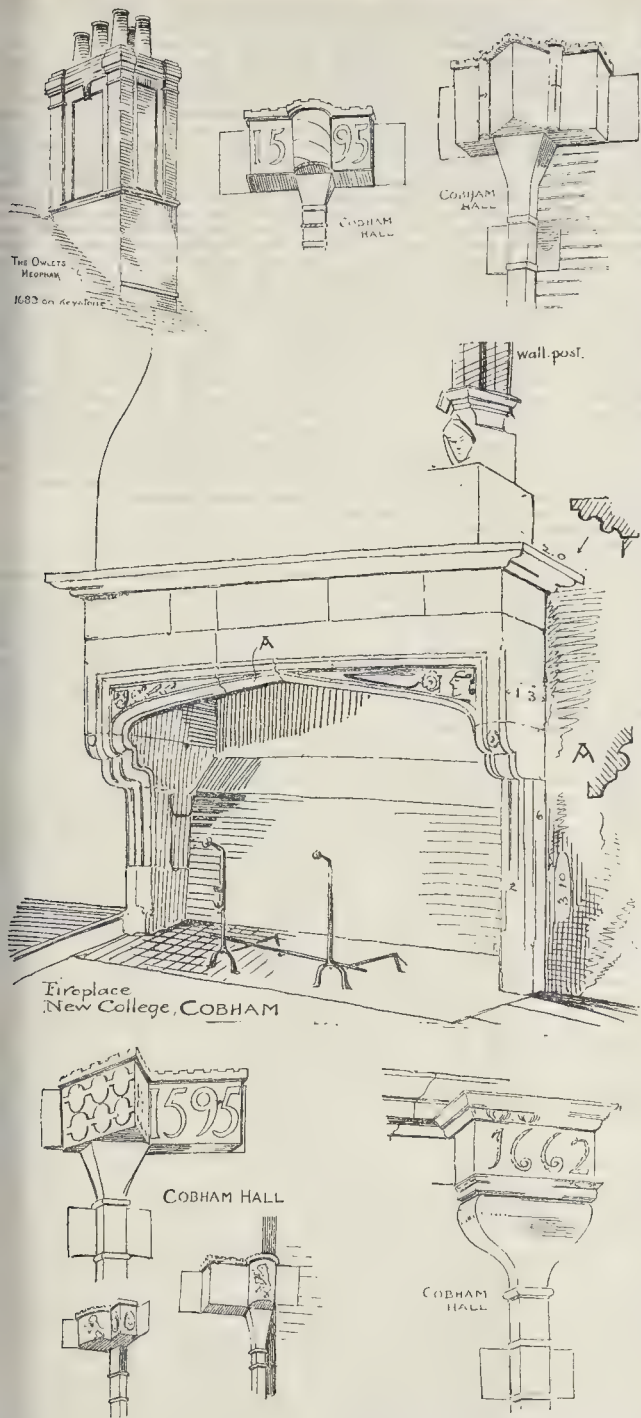
WE are sorry to find that a common colloquial phrase which we used the other day, to the effect that the Board of Works "would not fill Mr. Vulliamy's shoes," from among the list of candidates for the vacant office has been very absurdly construed in some quarters as implying some kind of insult to the collective candidates in a sense which we could not possibly have intended, and which the words do not bear. To say that a "will not fill B's shoes" is an old English metaphorical expression, merely meaning that he is not of equal abilities with B: nothing more. Our position was simply this: that, considering the important influence over London improvements which the Architect to the Board of Works may exercise, and the desirability of securing the rather unusual combination of architectural taste, practical knowledge, and administrative ability, in the same person, the list of candidates was a decidedly weak one; and we think so still. But we are very sorry to think that the chance use of an off-hand phrase should have been misinterpreted in a sense which it was never for a moment intended to bear.

NOTES IN KENT,

WITH THE ARCHITECTURAL ASSOCIATION EXCURSION.

The members of the Architectural Association met for their annual excursion on Monday at Malling, Kent, for a tour to last the week, as usual, and to include the following places: Malling Abbey, Rochester Cathedral, and Cobham Mansion and Church; Maidstone, Allington, Aylesford, and East Malling; Penshurst and Tunbridge; Boughton Place, Sutton Valence, Little Charton, Leeds Castle, and Hollingbourne; Leybourne, Birling, Wrotham, and Ightham. The following are a few notes by the way:—

Few things are more fascinating to the student of our old domestic architecture than to puzzle out the meaning of inscriptions and emblems which the builders of those days so freely lavished on their work. The emblems always have some *raison d'être*, although, especially in matters heraldic, they are occasionally so ruthlessly torn from their surroundings as to be not a little confusing. Patience, however, and a careful study of the family tree, particularly if illuminated with coats of arms, will generally triumph in the end. At Cobham, for instance, the leaden spout-heads (see sketches) have nearly all some inscription upon them, and a few have devices of meaning obscure and dark till the builder's coat-of-arms has been examined. Then it becomes clear that these devices are "charges" from the various quarterings, reproduced with absolute disregard to such essentials as the bends or chevrons, and so forth, which gave them their meaning in the original shield. The initials, too, unless one knows something of the family history, have a tendency to disconcert the inquirer. Sir William Brooke, Lord Cobham, being the builder, the initials W. C. (for William Cobham) are not difficult to account for. But what are we to say to W. C. F.? Another spout helps us. It bears W. C. and F. C., and inquiry shows that Lord Cobham's second wife's Christian name was Frances. It was, therefore, during the *régime* of the second wife that the house was built, and W. C. F. is a sort of monogram of William and Frances Cobham. Tombs are often of the greatest use in solving these problems, since they nearly always display a good deal of heraldry. The tomb in Cobham Church of Sir George Brooke, Lord Cobham, the father of Sir William, the builder, is a case in point. It glitters with heraldry, every child of Sir George being represented by a kneeling effigy, and every effigy being clad in a coloured coat-of-arms. The work of this tomb is very striking; Sir George and his lady lie on the top in the olden fashion, not reclining under an arch, or on a sarcophagus, in the stiffest of attitudes, with the hand under the cheek as if seeking a grim repose, but lying supine, as their fathers and mothers lay. Round the tomb is a series of shallow niches, before each of which kneels a child of Sir George, headed by the very Sir William to whom we owe the mansion and



the almshouse adjoining the church. A long inscription sets forth the worth of the deceased with many *sesquipedalia verba*; it bristles with such epithets as "honoratissimus," "clarissimus," "laudatissimus," "præstantissimus," "sapientissimus," and the like, and the world seems to have lost one of its noblest products when Sir George Brooke breathed his last. The brasses of the earlier Cobhams are a very fine

series, and among them is one to Joan de Cobham, the last of the first race, who carried the estates to her five husbands in succession. Close to the church is the almshouse before mentioned, in the spacious quad of which old women with sticks and old men with green-shaded eyes stand, anxious "to be took," by those who are sketching the quiet, pleasing buildings. In the large hall is a good fireplace,

with a hood carried on corbels, one of which bears an inscription, which some read as a date and some not, but which the old warden stoutly avers to be the date of the building,—eleven hundred and something. Not far from Cobham, and on the way to Meopham, stands "The Owlets," a quiet unpretending house of red brick, with some good solid chimneys dated 1683, and a good plaster ceiling over the stairs dated 1684.

At some distance from Cobham, in a bend of the River Medway and about half-way between Maidstone and Aylesford, stands the ruined Castle of Allington. Its chief interest lies in its connexion with the Wyatt family to whom it belonged early in Henry VII.'s time. Sir Thomas Wyatt, the poet, was born here; and it was his son who raised the Kentish Rebellion in 1554, the first year of Mary's reign, and thereby lost his life and estates. The present building must, however, have been built before the Wyatts came in, judging by such detail as is left, which is not much. The general plan can be deciphered, but the particular uses to which the ruined chambers were applied is a matter of conjecture for archaeologists rather than for architectural students.

The entrance gateway still retains its doors and the groove for the portcullis. Over it was a large room and adjoining on the ground floor was the guard-room; but the walls which once resounded with the clash of arms and the heavy tread of the mailed warrior, now only echo the quackings of ducks and the loud peens of exultant hens. Here may be seen the opening of a fireplace, there a ragged aperture indicating the existence of a window, from which all wrought stonework has long disappeared. The two main courts into which the castle was divided are plainly distinguishable, and in the first or more northerly still remains the porch leading to the great hall. The site of the buttery and servants' offices is now occupied by a house formed partly with the old walls and partly built with the old materials, making a picturesque group of gables and red roofs. At the north-east end of the hall are pits and shafts, which are probably remains of the latrines. The whole place has the provoking air of being on the point of revealing its mysteries, and then baffling the inquirer when he prosecutes his searches. The only detail of note left is in the porch of the hall, and some corbels of a fireplace in the remains of the tower at the south-west corner of the southern courtyard. A pleasant hour or two might be spent in puzzling out the plan and wandering in the gardens that surround the ivy-covered walls, but the interest would be distinctly archaeological.

There is even less of Leybourne Castle remaining. Here, too, the gateway is left with the doors and the groove for the portcullis; fireplaces may be distinguished and a few plain windows, and here, too, at opposite angles of the structure are remnants of the latrines, but beyond this there is nothing but ruined walls of varying height. Some century or so ago the place seems to have been habitable, judging from an old print in Harris's "History of Kent," but it was in the same fashion in which Allington is now habitable; that is to say, there was a dwelling-house constructed partly on the old walls and partly out of the old materials, but bearing no true relation to the original structure. Leybourne was the home of a family of the same name from very early times till the reign of Edward III., when the race was represented by an heiress called the "Infanta of Kent," from her vast possessions. She piously gave Leybourne to the king "for the endowment of religious houses," and the king gave it to the Abbey of St. Mary Graves in London, from whom it passed at the dissolution to various secular hands, and finally came to the Hawleys, of racing celebrity. The church is not more interesting than the other churches in that part of Kent, many of which are called "interesting" in the guide-books; but this term must be taken in a strictly comparative sense, the standard not being very high. It may be safely asserted that it is always better for an architect to go inside even the meanest-looking church than not. If he does so here, in addition to the actual structure, which consists of a nave, chancel, north aisle,—usually narrow, and separately roofed, with a very narrow span,—and tower (recently rebuilt), he will find in the said north aisle a Decorated niche of unusual, and wital poor, design, in which some years ago a heart was

found, enclosed in a leaden box. For those to whom early work and other irreproachable architecture is a burden, there is a pleasing Jacobean pulpit.

At Birling, a little further on, there is a church with a wide chancel, which gives a pleasant spacious feeling to the interior, and the tower is one of the most picturesque objects which the programme afforded.

Maidstone can boast the possession of a fine group of buildings in the Church of All Saints, the old Hospital, and the Archbishop's Palace, standing, as they do, just above the river, and presenting a medley of gables and towers and windows and red roofs, set off with the green foliage of eight fine trees. A closer inspection is somewhat disappointing. The church has been very much restored, and the other buildings offer but little detail. Their charms can best be rendered in water-colour; pencil sketches do not do them justice. Nevertheless pencil can reproduce some of their essential qualities—simplicity of design and breadth of treatment. The old parish church, according to Harris's history, was called St. Faith's, but in his day only the chancel remained, and that seems now to have disappeared. All Saints is now used as the parish church. The party saw Maidstone under the guidance of Mr. J. D. Sedding, from whose description of the buildings we extract the following:—

"Rising from a terrace some 30 ft. from the face of the stream is the church,—once Our Lady's, now All Saints,—with its sturdy breadth, lofty tower, and low-spreading gables, filled with Perpendicular windows. On the south, with its gardens stretching down to the river, is the College, or Hostel of All Saints, with its towers and gateway and long roofs and gables; and on the north, is the Archbishop's palace. Altogether this is a fine group, a composition ready made, where the sketcher has before him the pearl of grey stone walls, the greenest of ivy, the most golden lichen stains upon purple and brown roofs, red weather-tiling, and a medley of towers, turrets, gables, chimneys, and roofs, the whole drawn together by the blue sky above, and the grey-green river below.

There was an old church upon the site, but all that remains of it is a patch of encaustic tiles of thirteenth-century date, now affixed to a board in the chancel. The present church is assigned to Archbishop Courtenay (1381-96), who obtained the king's licence to convert the parish church of St. Mary into a Collegiate Church, dedicated to All Saints. Perhaps the air of spaciousness one sees in the structure is due less to deliberate design than to the exigencies of the scheme of its ground plan. For, unlike ordinary Gothic buildings, this is set out in squares and definite proportions. Thus, the nave, including aisles, is a square of 92 ft., and the chancel, a square of 62 ft. The chancel has three bays, the nave six, so that the largeness of windows, the span and loftiness of arches, the thick walls and ponderous buttresses follow as a matter of course. The church is a bold structure, but there is no play of fancy anywhere to rave about. It is Transitional work, neither "Decorated" nor "Perpendicular," yet both; but we miss the delicate detail and refined finish of the Perpendicular, such as we have in the later examples.

The walls of the nave arcades are 3 ft. 6 in. thick. The arcades have a peculiar effect, as only the inner order of the arch is stopped by a capital; the rest of the mouldings run unbroken to the ground.

There is a clearstory window of two lights over each arch, and although there is a chancel arch the nave and chancel roofs are continuous. The parish is to be congratulated on having Mr. Pearson as the architect of the church; he has just re-roofed the building with magnificent oak roof, richly tracied, and this and other excellent works have been carried out at the cost of about 12,000l. The easternmost arch on the south of the sanctuary is filled with a stone structure, which combines four seats and credence towards the chancel and a tomb on the other side. Above these rise three tall open canopies, capped with spires. The tomb was erected by John Wootton (d. 1417) for himself. He was first Master of the College; the brass has been removed. Altogether, both as regards ornament and general form this work is Decorated rather than Perpendicular. The arms of the see, of Wootton, of Courtenay, and of Thomas Earl of Arundel, who succeeded him in the chair of Canterbury, appear on the tomb.

The same arms occur on the choir stalls, which are twenty-eight in number, eight of them being return-stalls. The font is Jacobean, and interesting. The church is rich in fine monuments; the finest is the Astley monument, removed recently from the chancel and placed at the west end. The carved figures are good; the curious part of it is the triptych arrangement to the upper stage, the wings project 2 ft. 6 in., and the whole thing is probably a reminiscence of an old triptych. Note also the Caskare monument in the north chancel aisle, date 1639; the noble monument in the south chancel aisle (name obliterated), date 1651; also a beautiful monument to Humphrey Tafton (date 1641), on respond of chancel arch.

The College gateway is a bit of broad design such as only old-fashioned architects dared to do. It is an oblong edifice attached to other buildings, and is 55 feet long by 25 feet 6 inches outside measurements. There are two tiers of windows to the lower half, which is divided by a string-course from the upper half, where are long transomed windows. The whole is surmounted by deep battlements. A large and small archway are in the centre. This oblong box of a building, with a face as flat as a board, with no niches, no buttresses, and with no frippery of ornament, has much to teach, and much power of appeal. It is architecture not of the laboured sort, yet as full of "go" and as fine as need be. Not a little of its character is due to the casual array of windows and entrances; the windows to the upper room are not immediately above those in the lower stages, and there is a big cart door alongside of a smaller archway for foot passengers; there is some fine vaulting above the archway.

The Archbishop's Palace is of several dates; the alterations of various times which have obscured the original scheme of the building have added vastly to its picturesque quality, and no pleasant subject for a colour sketch than this ramshackle old building could be found in all Maidstone.

The Barn, north-east of the church, is of fifteenth-century date, and is a fine building. Of old houses in the town I will mention Chillington House, in St. Faith-street, now the Museum. Mr. Nicholson's printing-office, in Bank-street, should not be missed, for its fine treatment of carved plasterwork of Jacobean date. For a fair-sized brick house, date 1720, go to Knight Rider-street. Here and there, in by-streets, are pleasant relics of old days.

Aylesford, which lies on the Medway a few miles below Maidstone, retains its old fourteenth-century bridge, of which two of the arches have been thrown into one in the endeavour to meet the exigencies of modern traffic. There is something particularly fascinating about an old bridge. It speaks of so many generations who have come to the same place for the same purpose. Churches have changed with the changed ritual, or have been restored out of all knowledge; castles have crumbled down till, as at Allington and Leybourne, it is hard to realise their original purpose; houses have slowly altered to suit the advancing civilisation of each succeeding tenant; but an old bridge generally remains to-day as it was in the beginning, and is a witness to a long-established civilisation, and the community of human interests. The church at Aylesford by no means rouses the same train of thought as the bridge: it is a fine building, well kept and cared for, but restoration has effectually removed the old atmosphere. Not so with the other building of note in the place, the Friary. Here the interest has certainly changed with passing centuries, but it has not died out altogether.

The greater part of the buildings were originally erected for the Order of the Carmelites, but at the Dissolution they were granted to Sir Thomas Wyatt, of Allington, and were subsequently forfeited by his son on his attainder. Elizabeth granted them to Sir John Sedley, and by one of these owners they were transformed into a dwelling-house, the old cloisters and other parts being worked into the new scheme. Sir John Sedley has left his mark on one of the doors under the archway of the entrance lodge, where a shield occurs bearing the date 1590 and the initials I. S. Subsequent owners made many alterations, and the house seems to have been remodelled and coiled and panelled throughout about the year 1700, at which time Sir John Banks was the owner. There are many picturesque corners about the place, but the same remark holds good here that may be applied to

nearly all the views that Kent has to offer, that, to do the buildings real justice in a sketch, colour is essential.

THE STONE AGE GRAVES AT FALKÖPING, SWEDEN.

STOCKHOLM, bright, lively, and gay as Paris in its splendid bridges crowded, its water gleaming in the sunlight, bands playing, is an ancient city, founded in very remote times by Birger Jarl; the famous Riddarholm church was built by his son Magnus Ladulås, who, with his brother Valdemar, carried out their father's designs, and made Stockholm even then worthy of being placed among the cities of the kingdom. Upsala is still older; indeed, it is scarcely known when Gamla Upsala, Odin's pagan-seat, took its beginning, and besides Upsala there are "modern" towns in Sweden, Lund, Skara, Skövde, Västana, Strängnäs, Vesterås, and others, of very great age, while Sigtuna is little more than a ruin, and Björkö is only known from the rich "finds" that have been made in this once flourishing city, from the last years of Paganism and the beginning of the Christian period. Wonderful indeed have been the finds at Björkö, consisting of about everything that can be found in the earth, proving that there was once a large and thriving community there. The upper part of the island is said to be completely covered with *ättahögar* (giant mounds), and other graves, triangular, square, and boat-formed stone settings. "The number of such graves, visible above ground, amounts to over 2,000, and still more have been found demonstrably." Nearly six pages of the voluminous catalogue of Swedish "finds" belonging to the National Museum are devoted to Björkö. During the systematic investigations that have gone on since 1871, more than 800 graves have been examined, but of all these archaeological wonders one sees nothing from the deck of the steamer. Björkö shows nothing but gentle slopes of pine and granite, and the steamer does not slacken speed past this Northern Pompeii, literally a buried city.

Sweden has awakened in recent times to antiquarian research. It was during that regency of Carl XI., in the year 1686, that the *Antiquitets Collegium* was founded, which was commissioned "to establish a place of preservation for the treasures of antiquity that might be found in the earth," and soon began to collect relics and mementoes; some of the things that are now preserved in the State Historical Museum (the National Museum) in about 1670 formed the basis of this collection, of which we may give some more special account on another occasion.

Together with the old cities there are a great number of old churches in Sweden, many of them dating from the eleventh and twelfth centuries, the Skara, Ölsby, and Lund cathedrals, Våmbs church, Vreta cloister, and Varnhem cloister churches, Riddarholm, Västerås, &c. The latter contains so many art-objects that it can "rather be called a museum than a temple in the usual sense." But these words apply almost equally well to the Skara or Upsala cathedrals, or those at Vesterås or Lund. Sweden excels in collections. As for castles and ancient domains their name is legion. To mention Gripsholm, Skoploster, Västana, Upsala, Kalmar, Leckö, Beckaskog, Vik, is scarcely an indication of the wealth of repositories, in the shape of royal or noble domains, for the vast wealth either collected in a martial way during Sweden's period of greatness, produced through the art industry of the people or exhumed from the soil, as illustrations of the Stone, Bronze, and Iron Ages. To be methodical, one can best study the Stone Age in Skåne, Vermland, Öster and Vester-götland, Småland, and Bolmslän, but "of all Sweden's provinces," affirms Dr. Oscar Montelius, "Skåne, and especially the low lands along the coast, was most thickly peopled during the Stone Age. Out of about 50,000 relics of stone, which one now knows to have been found in Sweden, more than 36,000 are from Skåne. Only about 3,000 are known from the whole of Svealand and Norrland."

The finds from the older Bronze Age are limited to about the same localities, but from the younger Iron Age, the Viking period, has been found a mass of treasures, many of them ornaments and jewellery of silver and gold, not to speak of quantities of coin, from every province in Sweden up to Dalecarlia and Norrland, giving evidence of extremely luxurious habits of

an extensive commerce, and a high degree of civilisation.

Falköping, or Rantan, as the little station is called, lies on the main route between Stockholm and Gottenburg; Gamla Falköping, an antiquated dead town, is a few miles back. An hour or two by rail to the north-east is Skövde, a famous place of pilgrimage, and with a patron saint, St. Helena, and to the north-west is Åre, which, in pagan times enjoyed as great a reputation among the inhabitants of Göteland as Meppala among the Svear in middle Sweden. Between these two towns lies the famous Varnm's cloister church, a memento of the Cisterian order. The next large town by rail, northward from Skara, is Lidköping; and from the lake, the great Lake Wener, rises Seckö Castle, its granite island, a noble relic from Sweden's illustrious period. The scenery around Skövde and Skara is very fine, the two mountains, Hlingen and Kinnekulle, being celebrated for their luxuriant vegetation and splendid forests. Nature there gives no hint of the consummate plainness she attains in the region around Lidköping and on the great plain, broken only by low ridges, dignified by the name of Heberg and Möseberg, which is a veritable city of the dead, such a necropolis as is seldom seen.

It is more than probable that I should never have known of the existence of these wonderful graves but for a casual remark of Dr. Montelius the day, when he was showing me some Stone Age antiquities in the National Museum. "If, your travels, you are ever near Falköping, you must be sure to go there and see the graves, *gånggriffr* and *hällkistor*, of the Stone Age people." Those whom I asked near the spot and heard that there were such graves somewhere in the neighbourhood, but they could give me no idea of the locality. No one that I spoke to had ever seen them or had the slightest desire to. Starting on my hunt early in the morning, it was four o'clock in the afternoon before I reached the first grave, fortune having favoured me with an intelligent young man for a driver (he drove a private conveyance), and an antiquarian enthusiast for a guide, in the person of the son of the schoolmaster of the district, who happened to have been with the party who opened the graves, officially, vested with the august authority of the State Historical Museum, in 1872.—Drs. Montelius, Nildebrand, and the rest. He told me how they went to work and what they found in the graves. The articles from the first one we entered, the famous large passage-grave (*gånggrift*) near Karleby Church, are contained in drawer 80, in the State's Historical Collection, National Museum, and are specified thus in the Swedish catalogue,—"Amber beads, bone implements, flint splinters, &c." Another "find" described in the catalogue was in a *gånggrift* at Rantan railway station, examined in 1868, and consisted of "Eleven daggers and spear-heads, four arrow-heads, a little chisel, and a number of splinters of flint, a stone axe with a handle-hole, two slate whetstones, an amber bead, three bone needles, and three clay vessels. One of the bone needles is bent at the point, and has a large, round flat-head, which is perforated in the middle. Besides, were found here,—as in other Vestgöta graves from the Stone Age,—a quantity of unburned human bones."

We went into a *stendös* next, which is thus technically and officially described:—"A *stendös* is a sepulchre whose walls are formed by large, black stones raised on end, which reach from floor to roof, and which on the inside are smooth, but on the outside usually uneven. The floor consists of sand, pebbles, and the like. The roof is usually formed by one or several very large stone blocks, which are also smooth on the inside turned inward toward the room, but for the most part irregular. The form of the room is square, or, at most, oval, or almost round." *Gånggrifternas*, the more spacious and aristocratic stone mortem residences, sometimes called *ättstugorna* (giants' stugor), are built in the same way as *stendösarna*, but they are larger and are distinguished by a covered passage, often very long, leading towards the east or south. There are several intermediate forms between *gånggrifternas* and *stendösarna*. The chamber in a *gånggrift* is not infrequently 20 ft. (Swedish) long, or over, 9 ft. broad, and nearly 6 ft. high. The passage is narrower and lower, but sometimes equally as long as the chamber. These graves are either concealed in a mound, which then resembles an ordinary

barrow, from the late pagan period, or standing free in a greater or less degree, generally on an elevation surrounded with stones."

Those I explored were half hidden in a mound, otherwise agreeing completely with this description.

These two kinds of graves are said to appear in Sweden only, in Skåne, Halland, Bolmsläu, Västergötland, and at Öland. Besides, in Sweden they are found in great numbers in most of the coastlands of Europe and Northern Africa, as well as in South-western Asia and India.

My guide then said he would show me a particularly fine *hällkistor*, though this was some distance off, and hard to get to. We left the main road, struck a side one, and left that; struck a cow-path, and left that; then meandered along a side hill, with two wheels considerably higher in the air than the other two, and then got out and walked the remainder of the distance.

"*Hällkistor*, sometimes more than 30 ft. long, are formed of flat stone slabs, and are besides surrounded with a low bed of earth or stone. They appear especially in Västergötland, Bolmsläu, Dal, and the south-western part of Vermland." The one we went in search of was one of the best in the whole country. In it had been found,—"Thirteen daggers, of which one in particular is unusually beautiful and well-wrought, six spear-heads, four arrow-heads, a little chisel, a saw, six scrapers, and ten splinters, all of flint; five slate whetstones, two needles and four punches, of bone; two amber beads; two small beads, of bronze; and the broken-off point of a spear-head, of bronze; besides these were five clay vessels, and more than sixty skeletons in the grave. The *hällkistor* is 15 ft. long and 7 ft. wide. The south gable-stone lies underneath a half-circular opening; outside of it is a little 'entry,' and outside of this a broad, short passage."

I had now been well over the tract that is pronounced, and with good reason, "one of the most remarkable regions in Sweden, in an archaeological respect." The whole broad plain is covered with these graves, of the different varieties, few of which, however, have been opened, and every strange protuberance on the otherwise flat surface of the ground sets the imagination at work. One could scarcely see a tract that bore so distinctively the stamp of the remote past, a past that really has no record. B.

SANITARY STATISTICS OF GLASGOW.

The second part of the "Vital Statistics of Glasgow," by Dr. James B. Russell, Medical Officer of Health, contains a mass of interesting information with regard to the various districts of that city tabulated in such a manner as to be readily understood.

It seems that the defects of what are called model dwellings are beginning to make themselves felt in Glasgow as they are in London and elsewhere. In the Woodside district is Roslin-place, a *cul de sac* closed by the Lumden Model Buildings, a four-storied tenement of one-apartment houses (or, as we in England would call them, of single rooms), inside each of which was originally a water-closet. These have been abolished, but the building remains as a good illustration of what model buildings become when held by ordinary landlords, left without selection, and left without special supervision. In the Kingston District to the south of the Clyde the report observes there are isolated sanitary plague spots of little importance in proportion to the preponderating mass of houses of good character, but still exhibiting the same features of back lanes, narrow lanes, and want of free aération, which, when prevalent over a large area, are associated with high death-rates.

Gallowgate, Foundry Open, the two Dove hills, and the Old Saracen Hotel, in which Dr. Johnson put up, every bedroom in which is now a "house," are also described as bad spots. Cowcuddens is described as dense blocks of buildings packed with back tenements and intersected by narrow lanes. Lying as this district does in a hollow sloping down to the canal and smothered in smoke and obnoxious exhalations from high ground on all sides, it is much in need of reconstruction and amelioration in the physical conditions of health.

Bridgegate and the Wynds is another bad district. It lies between Stockwell-street and Saltmarket on the west and east, and Tron-

gate and the Clyde on the north and south. The Union Railway Station occupies the centre of the district. Considerable improvements have been made of late by the action of the railway company and of the Improvement Trust. Still, the Report continues, in those portions which remain we find a population the like of which for social and moral degradation is not to be found in the city. The houses, although much has been done for them, are radically bad, and total demolition and reconstruction is the only remedy. To enumerate these plague-spots would be only to catalogue all the wynds, narrow noisome streets and closes of this unhappy area, and to bring once more into public notice names which have been the heartbreak of successive generations of Glasgow philanthropists.

The Report concludes:—"We began this survey of the Districts of Glasgow with Blythwood, which embraces George-square and its vicinity and the North British and Caledonian Railway Stations, and is remarkable as having the lowest proportion of inmates per inhabited room, the largest proportion of large-size houses, the lowest death-rate, the lowest birth-rate, the lowest mortality under five years of age, the lowest proportion of deaths under one year per 1,000 born, and the lowest proportion of Irish-born; we end it with Bridgegate and Wynds, which has the largest proportion of inmates per inhabited room, the largest proportion, save one, of one-apartment houses, the highest death-rate over all, the highest death-rate under five years, the largest proportion of deaths under one year per every 1,000 born, and the highest percentage of Irish-born inhabitants."

We commend the following, from page 73 of the Report, to those who are interested in the construction of model dwellings, as embodying a truth we have often endeavoured to enforce in these pages:—"We shall be able amply to illustrate the law that the comparative healthiness of sections of population, whether they be territorially separated and known by name as distinct communities, or are merely artificial divisions of the same community, is determined by the air-space within and without their dwellings. We can classify the inhabitants of one city so as to produce four cities, which, though standing upon the same soil and exposed to the same sun and air, and general influences of nature, present contrasts in general mortality, liability to certain diseases, and other social and moral particulars capable of statistical expression, which are related to physical differences, especially as to air-space, which seem to be as effective for good and evil as separation by many degrees of latitude and longitude."

A striking illustration of the accuracy of this definition is to be found in the fact that the two districts of Blythwood and Bridgegate and the Wynds which have been alluded to as being at the two opposite ends of the scale as regards death-rate, and all other sanitary indices, are in the heart of the city, and are only separated from each other by a street,—Tron-gate.

Society of Engineers.—On Tuesday, the second vacation visit of the Society of Engineers for this summer was made to the Southwark and Vauxhall and the Grand Junction Waterworks, at Hampton. At the first-mentioned works the chief point of interest was the new engines, now nearly completed, constructed by Messrs. Moreland & Son, of London, to the design of the company's engineer. The party was received by Mr. J. W. Restler, engineer of the Southwark and Vauxhall, and Mr. A. Fraser, engineer of the Grand Junction Waterworks. A dinner was afterwards held at the Mitre Hotel, Hampton Court, Professor H. Robinson presiding, in the absence of the President, Mr. B. F. Nursey. "Success to the Society," and various complimentary toasts were proposed, Mr. A. T. Walmisley and the Chairman being especially thanked for their efforts in promoting the success of the excursion.

Edinburgh Castle.—It appears that "restorations," more or less, are to be carried out at Edinburgh Castle, in St. Margaret's Chapel, the Argyll Tower, and the Parliament House. From a description of what is intended, which has been communicated to the *Times*, it seems that a good part of the contemplated work is really making over again what has disappeared, and for which there is only documentary evidence: an unsatisfactory and doubtful proceeding. Mr. Hippolyte Blanc is the architect in charge of the work.



PUBLIC BATHS AT POPLAR.

THE works at the Poplar Baths, which will involve an outlay of about 7,000*l.*, have been completed, and the buildings, inclusive of the laundry, are once again in use.

The Commissioners, in a report laid before the Vestry in February last, stated that they wished to have authority to carry out (1) adaptations of the buildings erected in the year 1851 (from the designs of Mr. Baly) to the requirements of the time and neighbourhood,—that is, improvements and alterations of somewhat radical character; (2) modifications and improvements in those portions of the buildings which were to be kept, generally speaking, as originally built; (3) general repairs; (4) new boilers, &c. The Vestry approved the proposals, and the required sanction of the Local Government Board was obtained. The tender of Mr. John Walker, Crown Works, Stainby-road, was accepted for the building work; and that of Messrs. S. Hodge & Sons, of Millwall, for the new boilers and works in connexion with them.

The new first-class plunge-bath has a water

area of 75 ft. by 26 ft., or nearly double the size of the old bath. The depth of water at the south end is 3 ft. 6 in., and at the north end 6 ft. 9 in. The sloped floor is of glazed bricks, with blue Staffordshire bricks at the intervals. The walls of the bath are lined with white glazed tiles, with a pattern border under the slate curb. A continuous safety-rail is placed round the bath just above the water-level, which is 1 ft. below the passage-way. There are passage-ways all round the water of the bath; that at the north end, where the diving-board is placed, being about 9 ft. wide and the others narrower. In a gallery, at the height of about 10 ft. above the water-level, the passage-ways are repeated: this gallery is reached by two stone staircases. There are dressing-boxes in the gallery as well as below, making up fifty-four in all; also the necessary latrine arrangements. This arrangement was resorted to in order to avoid the necessity of purchasing land for an extension of the site. The gallery floors and the floors of the dressing-boxes are of granolithic paving, by Messrs. Bennett & Ingie. The lighting is by a lantern and roof-lights of considerable size:

the whole of the side lights are hung to open, and are controlled from the gallery level. The gas-lighting is by gas pentacles. The height from the water level to the ridge of the lantern is 34 ft. This ridge is also an antiliner. In a copper trough turned bottom upwards, and heated air thus collects at the highest point inside the building, and finds its way out through louvered ventilators. A large amount of iron-work has been used; the cast-iron stanchions, &c., were supplied by Messrs. Young, Downson, & Co., and the wrought-iron work by Messrs. Evans, Young, & Co., all being from the special details of the architects. A subway runs outside the walls of the bath, and in this subway are drains, water-pipes, &c. For supplying the bath all the water is passed into the bath, and then heated as follows:—A circulation of the water is established by bringing the water from the further end of the bath into the tank or heater at the bottom, and warming it by contact with copper pipes filled with steam. The top of the heater is placed at the level of the bottom of the bath, so that the warmest water strikes upwards through the mass of water in the bath, and a high even temperature is

Birmingham Law Courts, Second Competition.—*Plan of Design by Messrs. Marcell & Tuke.*



Birmingham Law Court, Second Competition.—Plan of Design by Messrs. John Barnett & Son.

thus obtained. Channels are placed adjoining the dressing-boxes, so that the water used in cleansing the floors may not find its way into the bath. A room for use by swimming clubs has been provided adjoining the waiting-room, and in this is a private bath, fully supplied, for use in case of accident.

The boilers were ineffective, and so two new Cornish boilers have been put in their places. Each boiler is 5 ft. 6 in. in diameter, and 2½ ft. long, and set with a wheel draught. The old boilers have been put upon iron girders above the new boilers, so as to serve as heaters for a large quantity of warm water.

The private baths have been re-modelled, Rufford's Porcelain Baths having been used for the first class, and Stevens Bros.' enamelled iron baths and others for the second class. New fittings and water supplies have been supplied

by Mr. Busby. The drainage of the whole of the buildings has been overhauled, ventilating man-holes put, and all the best modern requirements.

Mr. Buck has been the clerk of the works. Messrs. Clarkson have been the architects employed for the design and superintendence of the whole of the building and engineering works.

Crystal Palace School of Practical Engineering.—The closing meeting of the summer term was held on Saturday last, when Sir Graham Berry, K.O.M.S., Agent-General for Victoria, presided, and presented the certificates awarded by the Examiners. The Examiners for the term were Messrs. Wm. Maylor, C.E., M.E., for the Mechanical Engineering and Colonial

Sections; and A. T. Walmisley, C.E., F.S.I. &c., for the Civil Engineering Section. Both of the Examiners reported most favourably on the work of the students generally, and on the system pursued with so much success by Mr. J. W. Wilson, the Principal, and his son and staff, in the theoretical and practical instruction and training of the students. Sir Graham Berry, in addressing the students, expressed his high appreciation of the value of the work carried on in the school. The course of instruction placed the students who passed through it within measurable distance of ability to superintend the execution of important engineering and other works. His thirty-five years' experience of Colonial life enabled him to speak in the strongest possible terms of the value of the instruction given in the Colonial Section.

Illustrations.

PRINCES MANSIONS, VICTORIA AND PALACE STREETS, WESTMINSTER.

THE illustrations we give of this immense pile of buildings consist of a perspective view of the Victoria-street elevation as approached from Westminster Abbey, and a combined block and ground plan showing the arrangement of the flats and the general surroundings of the property.

Princes Mansions have been erected for a private owner by Messrs. Perry & Co., of Tradegar Works, Bow. The total building outlay for the six blocks, and including the cost of special foundations where built over the Metropolitan District Railway, will be about 168,500l.

The total area of the land (of which the Ecclesiastical Commissioners are freeholders) is 51,550 ft.; the frontage to Victoria-street, 350 ft.; to Palace-street, 43 ft.; total external frontage, 393 ft.

The buildings contain, exclusive of bath-rooms, &c., 712 rooms, grouped into seventy-five separate flats of various capacities, but the majority consist of ten rooms, forming complete and self-contained residences.

The floors and staircases are fire-proof throughout; the kitchen ranges, &c., and a large proportion of the stoves and chimney-pieces are supplied by the Coalbrookdale Company; and the hydraulic lifts by two or three of the best-known makers.

The elevations in Victoria and Palace streets are faced with red brick, with architectural enrichments of "Lascelles's Patent Fireproof Concrete Material," and which, at the suggestion of Mr. Besset Keeling, the architect, is made to resemble in colour seasoned Mansfield stone, for which many inquiries on the works during the progress of the buildings by both architects and builders show it has frequently been taken. In this, the largest application of "Lascelles's Material" in the metropolis, the great advantage has been felt of one of its best characteristics as compared with terra-cotta, especially for large works, viz., prompt delivery and accurate jointing, as, not being burned, but run cold into moulds, there are none of the risks of bad firing. As a consequence there have been very few if any blocks which have had to be condemned or replaced, and where, as in this case, the repetition of all mouldings and members is very large, the amount of detail is little more than the extra cost of the moulds. The ground floor of the block adjoining the London and Westminster Bank is occupied as the head-quarters of the Primrose League.

BIRMINGHAM LAW COURTS DESIGNS.

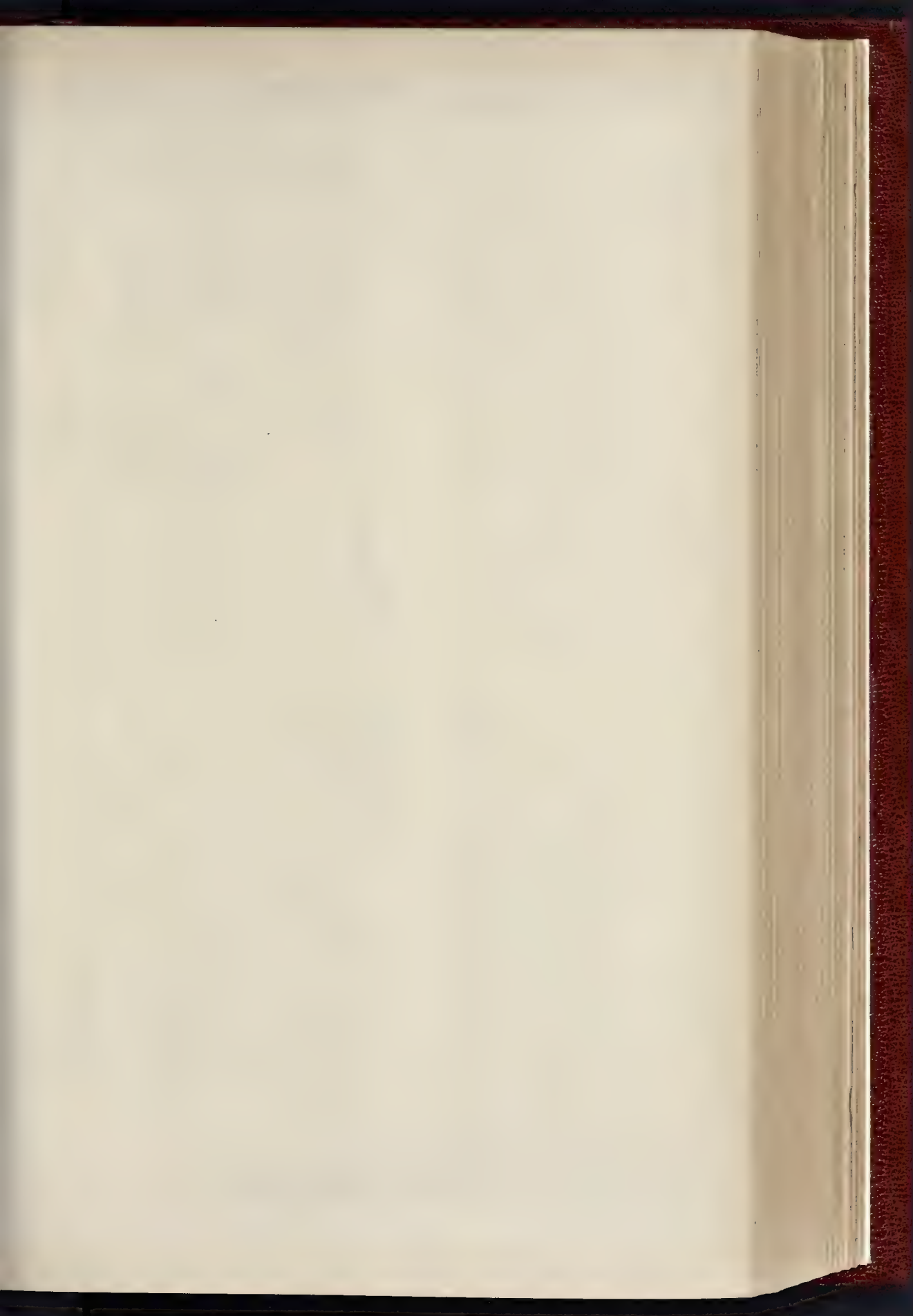
WE give this week the perspective views and the principal plans (pp. 230, 231) of two others out of the five designs which were selected for the second competition, that by Messrs. John Burnett & Son, of Glasgow (who are now Messrs. John Burnett, Son, & Campbell), which was sent in under the motto "Law and Order," and that by Messrs. Maxwell & Tuke, which was sent in under the motto "Two Judges of Assize." We commented on both designs at some length in our article on the whole exhibition of the drawings (*Builder*, July 31).

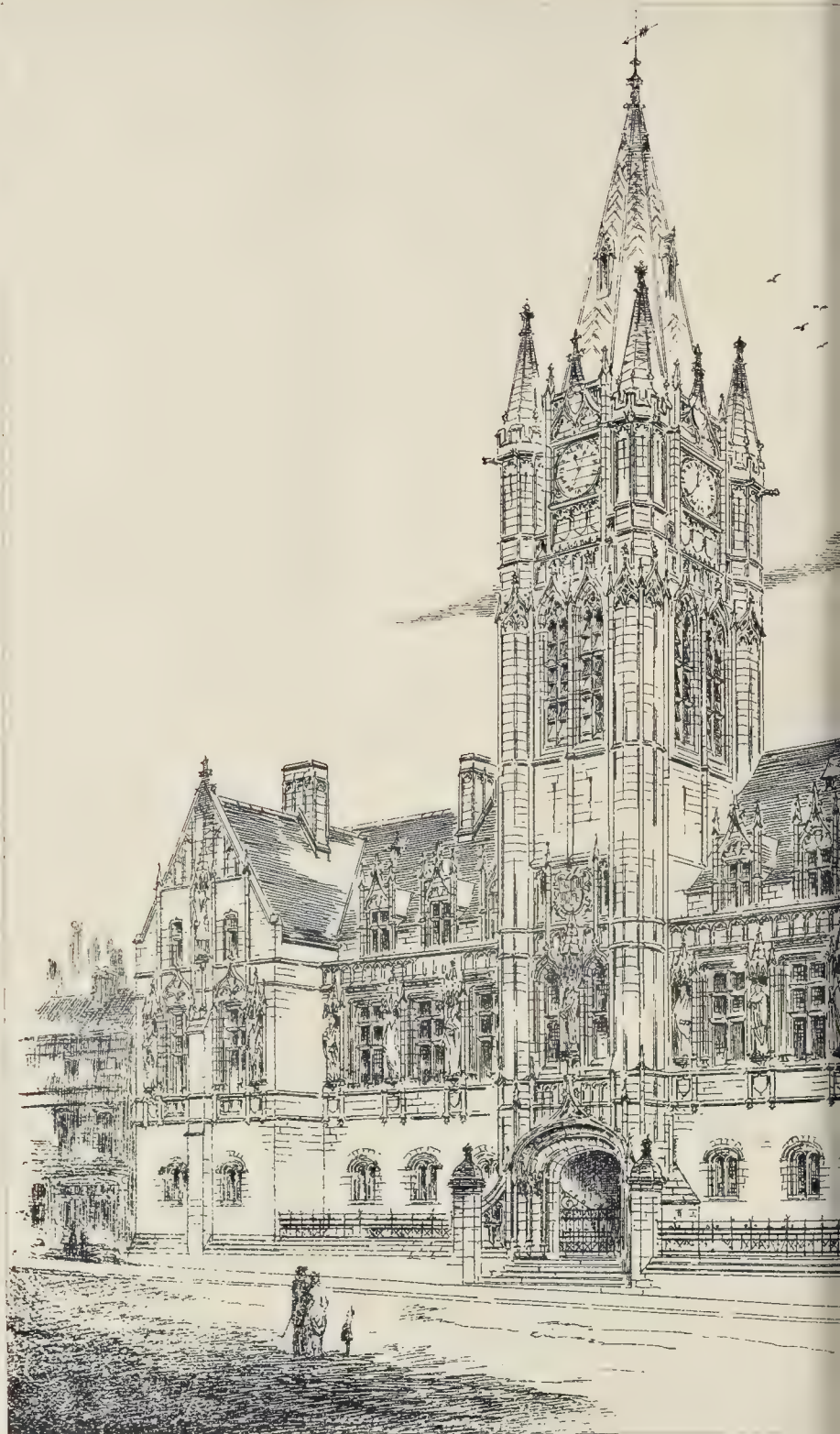
The Superintending Architect, Metropolitan Board of Works.—At the meeting of the Board on the 6th inst., the Works and General Purposes Committee presented the following report:—

"Your Committee are proceeding on the resolution of the Board of the 2nd ult., referring to them the applications for the office of Superintending Architect, with instructions to select and submit to the Board the names of six of the candidates whom your Committee may consider most suitable, with a view to the Board making the ultimate selection. Your Committee are not at present prepared to submit their report upon this reference, and as they will not be in a position to do so before the date at which, as at present ordered, the resignation of Mr. Vulliamy would take effect, namely, September 29th next, they think it desirable that Mr. Vulliamy should be requested to continue to hold the office for some little time longer, and with this view they beg to submit the following recommendation:—That Mr. George Vulliamy be appointed Superintending Architect for a further period of three months, from the 29th of September until the 25th of December next."

The recommendation was unanimously adopted, without discussion.





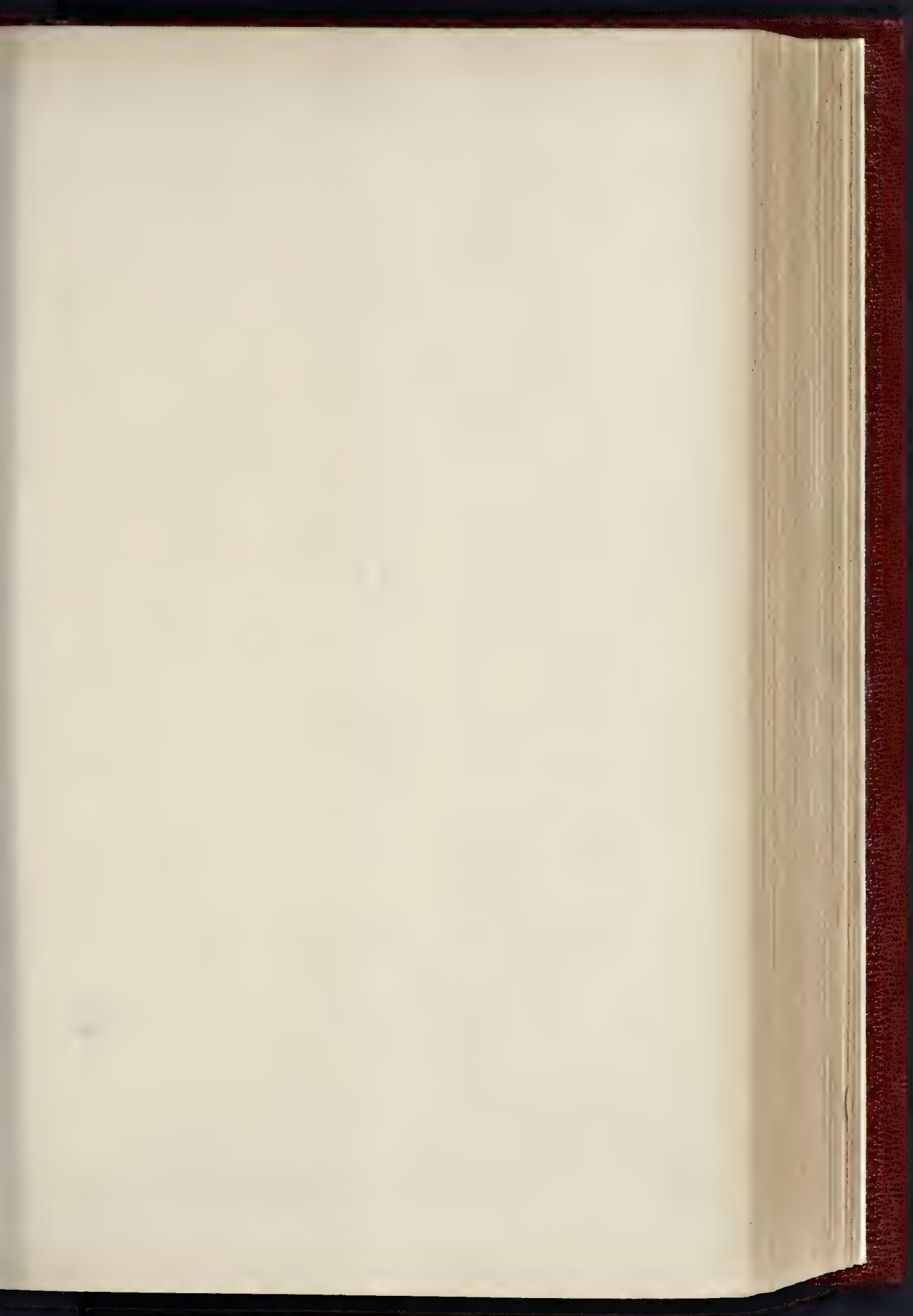


BIRMINGHAM
DESIGN SIGNED 'LAW' AT



PRINCE'S MANIONS,
VICTORIA STREET, WESTMINSTER, S.W.
MR. BASSETT READING, ESQ., ARCHT. & C.







BIRMINGHAM
DESIGN SIGNED "TWO JCDG"



who met him,—a learning which was on the one hand profound, and was, on the other, always so modestly put forth. He was quite sure that could the Dean but be amongst them, he would be rejoiced to know that the heartiness of the welcome which he would give them had been given by others in that room, and he sincerely trusted and fully believed he expressed the feelings of the members of the institution when he said that they were considerably gratified on learning that in the district of

on learning that in that district the last visit they paid was held to have done something to promote the objects they had in view. He wished to congratulate the Institute upon the benefit they enjoyed in getting the noble Duke to accept the office of president. He knew how to make such occasions as those successful, and

to make such occasions as those successful, and the interest which he always took in the instruction of his fellow-countrymen, and the interest which he showed in objects of antiquity, were proved by his so largely contributing to the formation of the magnificent museum which he opened on the previous day. He had always taken an interest in these things, and he had shown that works of restoration could be done without the destruction of remains of antiquity, as evidenced by his own magnificent mansion at Eston.

The Duke of Westminster then delivered his presidential address, which was as follows:— It is my privilege, as Lord Lieutenant of the County Palatine, to welcome to the ancient city of Chester the Royal Archaeological Institute of Great Britain. The associations of this city in which we are assembled, the "heir of all the ages" as we regard it, remind us that

archæology, "the science of past time," is, after all, a comparative term; for, though we can carry back our history for several centuries, such antiquity is comparatively modern by the side of the antiquity of Egypt, Assyria, and China, which were at the pinnacle of greatness

when the Roman power was yet in the womb of time. It is not my purpose in this address to enlarge upon the value and importance of archaeological study, the position it should hold in a well-planned system of liberal education,—its relation to historical study,—the light it throws upon the past ages,—the bearing it has upon politics, which appear so essentially a part of the present time, though a woman's thoughts will not so readily turn to the present as a man's. I cannot dissociate from the past that which it has grown, and that the study of the past can at least teach us what to avoid, if we cannot always find something to admire and imitate. Archaeology has been often the subject of some plesantry, because at times its too ardent students have given rein to their speculative genius in the region of the absolutely unknown. There is, however, abundance of

work, interesting and valuable, in seeking to establish accuracy about facts supposed to belong to the region of the known, and in discussing the conclusions drawn from those facts

in the light afforded by recent discoveries. This we may do with advantage as regards Chester, which is very much more than a mere name. I agree with the opinion that it is far more interesting to look upon a town not as a place where a church or a castle can be found, but as having its own personal history, like any

individual inhabitant, differing only in this,—that it counts its time not by decades of years, but by centuries; and that, while generations of citizens pass away and disappear for ever, the old city like a phoenix is reborn.

the old city, like a phoenix, may find ever-renewed life even out of its ashes. A glance back over the facts known of the history of this old city shows how important a place it was, as might be expected from its command-

ing position, and what stirring scenes it has witnessed during the last nineteen centuries. We are told how, so early as A.D. 43 and 48, it had its share in the military arrangements

of the Roman commanders, Aulus Plautius and Ostorius Scapula,—how it was the *point d'appui* of Suetonius in his expedition against the Druids of Anglesea,—the head-quarters of the Victorians Legion, the legion whose

of the victorious Legion, the legion whose vexillarii took an important part in the defeat of Boadicea, the brave British queen. We know that while Jerusalem, the Holy City, was being besieged and destroyed (A.D. 70),

Chester streets resounded with the tramp of Roman legions,—that tribute was being brought from the conquered British tribes, some never reaching the Roman treasury, but sinking, on its way thither, to the bottom of the river, only

its way thither, to the bottom of the river, only to be found some 1,800 years afterwards, like the pig of lead discovered the other day by the

Gasworks at Chester, the exact counterpart of that preserved at Eaton, and stamped with the date of the Emperor Vespasian, and with the name of the tribe Coangi, whose tribute it was. Our archaeological friends find traces of this occupation, not only in the name Chester, Castra, the camp *par excellence* (the Welsh called it *Caer Lleon Vawr*, i.e., the camp of the Great Legion), but also in the arrangement of the streets (St. Peter's is on the site of the *Prætorium*); the inscribed altars, which have been dug up; the hypocaust; the crocks of coins; the great roads leading to and from the city which, in a manner so characteristic of those who constructed them, still strike like arrows over hill and plain, unswervingly and perseveringly, to their point. I might be expected to have added to this list of the relics of Roman occupation, the walls. We shall hope to hear this week some authoritative opinion on the question of the walls,—how far they are Roman. The city must have had some walls. But do any traces of those Roman walls remain, and are they to be found *in situ*? We shall hope to hear from our learned visitors about the Coangi, whose home comprised three of the North Welsh counties, Carnarvon, Denbigh, and Flint; about the long dark period (476-500) which followed when the Roman occupation ended, and the Twentieth Legion and others were withdrawn finally from Britain because of the troubles near at home. Was that withdrawal (the end of the military occupation) an advantage to this country? We imagine not. The strong hand was needed then, if ever. They were troublous times, we may conjecture, from two or three facts which are known to the ordinary reader (the references to civil war among the several chieftains, and the appeals to the Romans for assistance, "The Groans of the Britons"). Then, again, about the Irish pirates (or Scots, as they were then called) who devastated the Western shores? How often must they have come with fire and sword, harrying and carrying? Was there, then, any other connexion or traffic with Ireland? Was Chester as important a trading centre in the second century as York is said to have been at that time, when the wines of the Levant, woollens of Asia Minor, the purple of Tyre, the cambric of Cos, the spices of India, the slaves of Africa, the silks of China were as abundant on the Ouse as they were on the Tiber. What about the laws and institutions after the Roman withdrawal? Were they Roman or Celtic? What was the language spoken? Did the Latin language take any hold upon the country at that time? Was the religion Christian or heathen? Were any left in Britain of those Christian soldiers converts to whom St. Paul had preached as a prisoner at Rome? We come down to the Danish occupation. The desolation when the Danes came on the scene must have been sad and pitiable. Chester was a ruined city in 895 when the Danes, flying before Alfred the Great, took refuge in it, and attempted to defend the place against the King. They soon retreated to North Wales, and left it ruined,—they were no restorers. In this ruined state Chester continued until the Amazon Ethelfloda, Alfred's daughter, "Lady of the Mercians" (who built castles at Eddisbury, Runcorn, &c.), restored and beautified it, and repaired the walls, following the line of the Roman fortifications. How far are the existing walls hers, or even of later date? Some seventy years later (971) we come to a grand epoch in our city's history. Will archaeologists come here to tell us that the tale is not true which is so flattering to our pride? Did Edgar, "the Emperor of Britain," make his six or eight feudatory princes (Kenneth, king of Scotland, Malcolm of Cumberland, Maccus of the Isles, and five Welsh princes) row him (as we read in Campbell's History of British Admirals) up the Dee in a barge to St. John's Church? Again, what have they to tell us of the course of the Dee,—was it (as in some old maps) one with the Mersey, and did it cover, near the city walls, a wider area or follow a different channel? What light is thrown by the name Ince (Ynys, Welsh for island), and the claim of the Abbot of St. Werburgh in Edward III.'s reign to the sea? We come to a better-known period,—the time of the Norman Conquest. We are proud to remember that Chester stood out to the last—"the one great city" against the Norman invader, but it was at last taken and given to Hugh Lupus on condition that he should keep the Welsh marauders in check.

But even here we have to ask: (1) What were we to believe about the story of Harold surviving his wounds at the battle of Hastings and spending his remaining days as an anchorite in a cell near St. John's Church? His wife Alghiva, we may remember, was the granddaughter of Leofric, Earl of Mercia, and Lady Godiva, and in this way he had some connexion with Cheshire. (2) Were the forests which covered so large an extent of Cheshire (not only the great Delamere Forest [of Mara] but that which made Wirral a desolate waste) until they were cleared away by the energetic prudence of Edward III. in his campaigns against the Welsh,—did these exist in Roman and Saxon times, or were they planted by the forest-loving William? Such a question suggests the difference between the Cheshire of that reign and the Cheshire of to-day. Instead of trim, well-cultivated fields, and pastures for cattle and sheep, and comfortable homesteads, a wild, half-reclaimed country with few habitations, and those few miserably built,—a huge forest reaching from above Worcester to meet Delamere,—the wild bull and boar, wolf and bear, its dangerous tenants. Stoutly though Chester resisted William the Conqueror, once brought under Norman rule, it became intensely loyal and a strong bulwark of his power. Few places so far distant from the metropolis have been more highly honoured by visits from royal and distinguished persons, or have received more frequent marks of favour than Chester. A port when Liverpool was "a creek," Pennant speaks of Chester as "a constant rendezvous for troops and *place d'armes* for every expedition on this side." Thus Edward I. visited Chester in 1282-3-4. Here in 1300 he received the final submission of the Welsh. In 1394, Richard II. selected 2,000 Cheshire archers as his body-guard. But loyal as Chester folk were, we must not forget that the population became somewhat mixed. An asylum or sanctuary was established to which felons flocked. So great a nuisance did it become that in Henry IV.'s reign complaint was made to the King of "the many murders, robberies, batteries, and other riot done by the people of the county of Chester to divers of the King's liege people in divers counties of England." Lewis Glyn Cothi, a Welsh bard, describes Chester as "the habitation of the seven deadly sins." We may well congratulate ourselves on the peaceful times of Queen Victoria,—thankful that law and order prevail; that the intolerable miseries and sorrows of the poorer classes in these times have been abated; that the sense of insecurity removed; that it would not be necessary now to fear, as in 1130, the irruptions of the Welsh which made Pulford so unpleasant a residence for the monks that they migrated to Dieulacres, or to qualify leases and warranties (as may be seen from deeds in the Muniment Room at Eaton of the time of Edward II.) with the condition that "peace continued." [The lessee in 1299 was bound to keep up the buildings *nisi tempore guerre fuerint combusta*, unless they were burned in time of war; and rents were payable only *tempore pacis*.] The arrangements for the excursions of the members remind me that the present area of Cheshire is much circumscribed. Once a part of the great kingdom of Mercia, ruled at one time by Penda, the champion of heathendom before whom one Christian king after another had fallen,—later by Offa (757-819), on equal terms with Charlemagne, by whom he was styled "the mightiest potentate of the West,"—then by Edgar, of whom we have spoken, this city could not fail to have been the scene of many battles and sieges. Under the Palatine Earl, if not before, the county included a portion of Wales within its jurisdiction. When, therefore, we visit Rhuddlan Castle, we shall not be going out of the boundaries, if we may say so, of Old Cheshire. Rhuddlan was given by Hugh Lupus to his warlike lieutenant, and in later days was held by a Cheshire knight, Randall, with a motley following of fiddlers and musicians, against Llewellyn and his Welshmen. Mold, too, which was another dependency of Hugh Lupus, came into unpleasant collision with Chester on more than one occasion. In 1465, it was held by a daring marauder, Reginald Meredith Griffith, who plundered all who were obnoxious to him, and who made the Chester people the special objects of his unwelcome attention. A number of tradespeople from Chester repaired to Mold fair to dispose of their wares. This was an excellent opportunity for Griffith. A quarrel was raised,

—swords were out at once,—blood was spilt. Griffith captured the worthy Mayor of Chester, Robert Browne, who had attended the fair as a draper. Mr. Browne paid the penalty for his fellow-citizens. Hurried up to the Tower after the fight, he was hanged without ceremony on an iron staple fixed in the ceiling of the great wall. Shortly afterwards an attempt was made by Chester men to avenge this murder. Two hundred stout and active men left Chester, but they were entrapped into Griffith's house, which he himself set on fire, and they were all but a few killed without mercy. Such were the relations between Chester and Mold in 1465. Our proposed visit will be much more peaceable. If we carry back anything it will be, I hope, some voluntary offering for the Museum which was opened yesterday. We have succeeded at last in raising a commodious building, which will be most useful as a receptacle for curiosities and antiquities connected with the district, which might otherwise be lost. Architecturally it will be a handsome addition to our public buildings, and if the well-considered designs of the committee in connexion with the teaching of science and art in their various branches are carried out it will enable Chester to take a high position as an educational centre, and thereby confer a great benefit upon an extensive district. I have said nothing in this address about the ecclesiastical or the literary history of the city, the Mystery Plays of Higden, the names of the eminent and famous men who have been born in the county,—Chancellor Egerton, Prynce, Bradshaw, and Jeffreys. But may I refer to the able work on "Roman Cheshire," which is being brought out by Mr. Thompson Watkin, author of "Roman Lancashire," and which promises to be a valuable supplement to the standard works of Ormerod, Earwaker, and Baines; and the useful pamphlet on "Inscribed Stones," brought out by Mr. Williams? I will conclude by repeating the cordial welcome which it gives me great pleasure to offer to the members of the Archaeological Institute on behalf of the county of Chester, and to assure them that we shall look with interest for the instructive papers which they are doubtless prepared to read before us.

On the motion of Earl Percy, seconded by the Mayor, and supported by Mr. W. Beaumont (Warrington), a vote of thanks was given to the Duke of Westminster for his address.

In the afternoon the visitors made the circuit of the city walls, visited St. Mary's Church and the Castle, and examined some of the interesting old houses of the city. In the evening the Historical Section was opened by its President, Dr. E. A. Freeman, who gave a brilliant address on the history of Chester.

On Wednesday a party, numbering about 130, visited Valle Crucis Abbey, Llangollen, Chirk Castle, and Wrexham. In the evening the Antiquarian Section was opened by the Bishop of Chester with an address; and in this same section an interesting address was read by the Rev. G. F. Browne. In the Historical Section, Mr. H. Taylor read an interesting paper on "Grants of Land in Wales to Englishmen by Edward I.," and Sir James Picton followed with an equally interesting one on "On the Ancient Commercial Relations between Chester and Liverpool." Of the papers we will make further mention in our next.

The annual meeting of the Institute was held on Thursday morning, when Salisbury was definitely decided upon as the scene of next year's meeting, Norwich being mentioned for 1887. Subsequently the Architectural Section was opened by its President, the Right Hon. A. J. Beresford Hope, M.P., who delivered an interesting and humorous address, depicting the difficulties of reconciling all the wishes of archaeologists with the paramount claims of sanitation. We necessarily defer our report of this address until next week.

The assembly-room of the Town-hall is apart for the display of an interesting collection of antiquities, to which we shall make further reference.

Sir Philip Magnus.—The honour of knighthood has just been conferred upon Mr. Philip Magnus, in recognition of the important work which he has done during the last few years as Director of the City and Guilds of London Institute for the Advancement of Technical Education.

SURREY ARCHÆOLOGICAL SOCIETY.

The recent excursion of this Society, as briefly mentioned in the *Builder* of the 6th inst., was to Guildford, under the presidency of Mr. John Mason, Mayor of that town.

St. Mary's Church, Trinity Church, Mr. Bull's house in the High-street, Abbot's Hospital, and the crypt under the Angel Hotel, were thrown open during the morning for the inspection of those who arrived by the early trains. St. Mary's Church, situated on the declivity of a hill, will be found described in the *Builder*, July 14th, 1885, on the occasion of former visit of this Society.

Trinity Church, a large red brick structure, contains the altar-tomb of Archbishop Abbot. The church is now proposed to be enlarged, and drawings, by Mr. A. W. Blomfield, were shown to the visitors. The suggested treatment of the church is described in another column.

Mr. Bull's house in the High-street was formerly a fine mansion of the Jacobean period, was converted into a shop. The old carved oak staircase, ceiling, and wrought ironwork, and other courtyard are still to be seen.

Abbot's Hospital was inspected, as also an ancient stone crypt under the Angel Hotel, which is now "undergoing restoration." The numbers and visitors now assembled in pretty long numbers, and were conducted by the Mayor to a quadrangle at the rear of the old Royal Grammar School, where, after a few words of welcome, he congratulated the town and the Society on the recent purchase of the castle. He supposed some of the old Guildford people would almost as soon sacrifice their eyes as see their castle go; and he was sure the Corporation of Guildford would have been very unwise indeed if they had not purchased that historical ruin. He concluded, by producing Mr. D. McLure Stevens, who read a paper on the "Royal Grammar School." He said, before the time of Henry VIII. there appeared to be no free school in Guildford, and he wanted of one attracted the attention of Robert Beekingham, a wealthy citizen and member of London, who, during his lifetime, gave to "the mayor and approved men," a house of tenements near the castle ditch, and by his will proved in 1509, devised a rent charge upon lands at Bromley, Kent, and Newington, Surrey, the purpose of erecting and maintaining a school in the borough of Guildford. The under does not appear to have lived in Guildford; he was probably interested in it through the Austen family. John Austen was one of executors to his will. In 1520 "the mayor and approved men" gave a large piece of land to the house given by Beekingham, in Quarry-street, and on this piece of land a school-house was erected. In 1550, Henry Polstead gave messages, near the pillory, in the parish of St. Mary, towards the maintenance of the old school. Through the instrumentality of William, Duke of Northampton, of Guildford Park, Sir William More, of Loseley, King Edward became a benefactor. The grant from the Duke bears date January 27, 1552-53. The appointment of the master and undermaster is by this charter vested in the mayor and approved men and the warden for the time being of the King's manor of Guildford. It is noted that the charter fixes the date of the foundation of the school; therefore, the date over the front entrance of 1550 is a mistake. "In 1557," says George Austen, in his manuscript, "the mayor and approved men, at their own costs began the large room, now the schoolhouse, with the great chamber and garret, on the same, and the same healed with ashm stone, and therein made many varied windows of freestone, well glazed, the walls of which schoolhouse are all of brick and stone, of a very strong, statelike, and faire designe. The charge was above 400 marks." In the same year one Thomas Bignold, in the quaint language of Austen, gave an acre of land the common field of Shalford, near Poyner's, "and took it again in lease for 999 years the yearly rente of xxd." This sum is duly paid to the trustees by Colonel Godwin-Austen. Mr. Stevens said, in 1574, died John Parkhurst, Bishop of Norwich, who by his will gave 20l., and all his Latin books to the school. Parkhurst was born in the parish of St. John, Guildford, and was educated in the old school in that parish. In addition to his gift to the Royal Grammar School, he bequeathed to the mayor and approved men

of Guildford his best basin and ewer of silver, which have been carefully preserved. In 1581, Simon Talley, vintner, and Mayor of Guildford in 1576, finished the usher's lodgings at a cost of 10l., and in the following year, 1582, Robert Broadbridge, clothier, twice mayor of the borough, did substantially glaze the windows belonging to the usher's lodgings. In 1586, the master's lodgings and the library were completed at a cost of 72l. 6s., which sum was collected by George Austen from county and other ladies and gentlemen. After quoting other legacies, Mr. Stevens said the original copy of the statutes for governing the school is still in the custody of the Clerk to the Trustees; they are written bookwise on parchment, which is in excellent preservation, dated September 21st, 1608, and bear the signature of Thomas Bilson, the then Bishop of Winchester. Mr. Stevens concluded by giving a catalogue of the Masters, from Manning and Bray, and enumerating a few of the many great and distinguished men who received the ground part of their education at the Royal Grammar School: among them being Robert Abbot, Bishop of Salisbury; George Abbot, Archbishop of Canterbury; Sir Maurice Abbot, John Parkhurst, Bishop of Norwich; Henry Cotton, Bishop of Norwich; William Cotton, Bishop of Exeter, &c.

The Mayor next conducted the company to the old Guildford Castle, where in the Castle keep Mr. Ralph Nevill, F.S.A., in an able extempore address, fully described the ruins and their history, which are tolerably well known to readers of the *Builder*. Carriages were then in attendance, and the whole party were driven first to Shalford Mill House, where the present occupier, the Rev. S. C. Musson, said this house was chiefly interesting for its splendid old carved oak staircase, panelled rooms, doors, &c. On one of the panes of glass was scratched the name of "Dr. Swift," which was believed to have been done by Dean Swift when he lived at Farnham. From Shalford the company proceeded to the old Manor House at Tangley, which was so ably described and illustrated by the late Mr. Charles Bailey, architect, in the fourth volume of this Society's collections. The house bears the date 1582 on the front, and there is reason to believe that some parts of it are of earlier construction. All that is left of the original house consists of the old hall and the adjoining spacious panelled drawing-room. The hall had been open to the roof; the screen and a massive trussed king-post beam are to be seen, the latter in one of the bedrooms. On one of the diamond-shaped panes of glass is the name of "John Evelyn," with the date, 1641. Having re-crossed the moat, the members and visitors proceeded to Chilworth Manor House, and walked thence up a hill to St. Martha's Church, which was open for inspection. This church of Norman date was restored about twenty years ago. From St. Martha's the party descended the hill to Titing or Tything, and returned to Guildford. The proceedings of the day were carried out under the management of Mr. Thomas Milbourn, hon. secretary; Mr. D. M. Stevens, local hon. secretary; and Mr. W. P. Ivatts, the collector of the society.

THE GROSVENOR MUSEUM, CHESTER.

APPROPRIATELY enough, the first public proceedings in connexion with the opening of the Grosvenor Museum of Natural History and Archaeology (the building also affording accommodation for Schools of Science and Art for Chester), took place on Monday last, on the eve of the opening of the Chester meeting of the Royal Archaeological Institute. The building has been designated the Grosvenor Museum in recognition of the munificence of the Duke of Westminster, who has contributed largely to the building fund. It was but fitting, therefore, that the opening ceremony should be performed by the Duke. A very good exhibition is arranged in the several galleries, comprising not only local antiquities and unique specimens pertaining to natural history, palæontology, and geology, but a very good collection of pictures and other works of art, lent by the Duke of Westminster, the Royal Academy, and the Science and Art Department of the Government, the contribution of the Department being very large and excellent, especially in the domain of pictures in water-colours.

The new building is in every way excellently adapted to its purpose, and reflects credit upon

its architect, Mr. T. M. Lockwood, of Chester. The following detailed description of the building has appeared in a Liverpool paper:—

"The façade on the Grosvenor-road is in a style peculiarly suited to the general picturesque character of the ancient city, being designed upon the lines of the old Dutch Renaissance so prevalent in the street buildings of Holland in the seventeenth century, before the Mediæval mullions had given way to the more stately but less picturesque characteristics of the severer Classic style. The quaint form of the gables and the cupola to the octagon window at the end of the building also help to diversify the character and add to the picturesque outline of the building. The front entrance is through a semicircular archway nearly 8 ft. wide, filled in with wrought-iron gilded gates, and surmounted with carved and enriched archivolts, having its spandrel filled in with bas-reliefs of female figures representing science and art; the frieze over this has carved and ornamental panels, with the arms of the county and city inserted, whilst the pediment over contains the Grosvenor arms. The slight projection of the porchway is carried up to the top of the building, and is there finished by a quaintly-formed stone gable filled in with bold carving suited to its position, flanked on each side by carved griffins. The whole of the windows are of great width for abundant lighting, and are broken up by mullions and transoms, with internal divisions of window bars, which accord with the style. The upper lights excepting those to the Art School, are filled in with leaded lights and stained glass. The upper story of the building is divided into bays formed by stone pilasters with carved capitals, and the cornice surmounting the whole is bold in character finished with balustrade on the top, and a carved and enriched frieze below, the whole being broken up by the two gables before named and the octagon turret, which also serves to veil what would otherwise be an awkward angle caused by the irregular shape of the site. In the front a good balance of colour is shown by the variety and adjustment of the materials, which are of red Ruabon brick for the walling, whilst its cornices, pilasters, and other ornamental features are of Grinshill Hill stone, which form a pleasing contrast in colour. The whole of the carving and sculpture to the front and throughout the building has been well carried out by Mr. Edward Griffith, of Chester, from the designs of the architect, and its execution is of a very high character. The entrance to the building is through a vestibule 9 ft. in width, up a flight of seven steps, upon the landing of which is placed a screen filled in with lead lights and stained glass of good colour and character. Immediately beyond is a large entrance-hall and staircase, 23 ft. in width, with circular end. This staircase hall gives a pleasing importance to the building, and is of a highly ornamental character. The floor is laid with mosaic tessellated pavement of small tesserae, with ornamental border round the hall, with a central ornament in which the arms of the city are introduced, a small mullioned window at the end giving light to the ante-room through stained glass, in which the arms of the city and county are emblazoned, with a quaint motto wrought into the lower panes:—

"The education forms the common mind.
Just as the twig is bent the tree's inclined."

The staircase, which goes round the circular end of the hall, is deserving of a passing notice. It is formed of concrete, supported internally by means of wrought-iron girders built into the wall in the centre of each step, and is thereby much stronger than if built of solid stone. Each step is covered with a hard York stone tread. The balustrade is specially designed and ornamented in a characteristic manner. The entrance-hall and the first flight of stairs are finished with a dado of mosaic work in quiet tone, to harmonise with that in the floor before named. The stairs and hall are well lighted by a top light from roof, which yields abundance of light and gives a cheerful impression on entering the building. The accommodation provided for the various societies in the building may be briefly described as follows, and is comprised on three floors, besides a number of good, well-lighted rooms in basement, available for stores and mechanical work required for the various schools, &c. On entering the building there is a reception or reading room, 21 ft. by 19 ft., on the left, and on the right is a natural history museum,

36 ft. by 25 ft.,—a well-lighted room, with stained glass in the upper portions, filled in with mottoes appropriate to this department. Beyond this is the lecture-theatre, 45 ft. by 30 ft., having two distinct entrances from the entrance-hall, besides platform-entrance and preparation-room behind on the lower story. The theatre is well lighted by large windows filled in with lead lights, and the auditorium specially arranged in steps so formed that all may have a view of the demonstrator's table at the bottom; the seats are most convenient, each being separate, and having a small falling desk to enable students to write their notes upon. From this room there is a lift to the chemical laboratory on the floor over. On the ground-floor there is a large room opening from the main hall, devoted to the exhibition of pictures, for which it is specially contrived, being lighted by a good top light, and boarded all round to enable pictures to be easily attached. This room will be temporarily used as an archaeological museum. The first floor is devoted entirely to science, excepting one room, 20 ft. by 19 ft., to be used as a library and committee-room; and one room, 25 ft. by 14 ft., used as a model-room for school of art. The chemical laboratory is 30 ft. wide, and has an area of 520 square feet, and there are two class-rooms with an area of 1,170 ft. The upper floor is entirely devoted to the school of art, and consists of a large room, 66 ft. 6 in. long and 25 ft. wide, and 20 ft. in height, lighted from the northwards; besides this there is a master's room, 14 ft. 6 in. by 12 ft., formed with bay, commanding a view of the whole of the teaching space, and also a small room with top light for the use of the master. The whole of the floors are fire-proof, with wrought-iron beams and Dennett arching, which prevents the transmission of sound between the various floors. The artificial lighting is by means of the Wenham patent gaslight suspended from the ceiling of each of the rooms, which gives a brilliant light at a most economical consumption of gas. Special provision has been made for warming and ventilation by means of Haden's system of low-pressure hot-water pipes, with coils of pipes placed in various places, and the ventilating system is by means of a large extraction shaft into which air-ducts from the various rooms are conveyed. The contract for the building has been satisfactorily carried out by Mr. Edmund Gabbatt, of Liverpool, the general contractor, the special work being executed by the following sub-contractors:—Fireproof construction by Messrs. Dennett & Ingie, of London and Nottingham; warming and ventilating by Messrs. Haden & Son, of Trowbridge; carving and sculpture by Mr. E. Griffith, of Chester; wrought-iron gates and grilles by Messrs. Thos. Wood & Son, of Chester; stained and ornamental glass by Messrs. Shrigley & Hunt, of Lancaster; locks and ironmongery by Charles Smith & Sons, of Birmingham; mosaic floors and dados by Ludwig Oppenheime, of Manchester; gasfittings by Messrs. Box Bros., of Chester; the whole work being carried out under the direction of Mr. Lockwood.

We hope to give a view and plans of the new building before very long.

A Question of Tendering.—A novel point has just arisen between the Vestry of Islington and some building contractors with regard to the legality of tendering. Tenders were invited by the Vestry for certain repairs to the Vestry Hall, and seven contractors submitted prices. Messrs. McCormick & Sons tendered 385*l.*; Messrs. Grover & Son, 349*l.*; Messrs. Dove Bros., 335*l.*; Messrs. T. Wontner Smith & Son, 319*l.*; Messrs. A. Coombes & Son, 319*l.*; Messrs. Charles Dearing & Son, 311*l.*; and Messrs. Lown & Son, 298*l.* The last-mentioned tender was accepted, but one at least of the other contractors urges that as the successful tenderer did not appear at the Vestry Hall either personally or by representative at the time of the declaration of the Vestry's decision, he was not entitled to compete. The terms of the advertisement certainly are that contractors shall be in attendance, but there is no mention of a penalty in case of default.

Guernsey Church.—We are asked to mention, as supplementary to the particulars which we gave in our issue of the 24th ult. re Guernsey Town Church, that the flooring throughout, which is of oak and darkened oak blocks, was laid by Messrs. Geary & Walker, of Charing-cross, London, on their patent system.

SANITARY INSTITUTE OF GREAT BRITAIN.

We have received the preliminary programme of the arrangements for the ninth Autumn Congress of this Institute, which will be held in the City of York on September 21st and following days under the presidency of Sir T. Spencer Wells, Bart. The Council invite papers on subjects included in the programme.

Section I. of the Congress will be devoted to "Sanitary Science and Preventive Medicine." The President of this section is Professor de Chaumont, M.D., F.R.S.

Section II., "Engineering and Architecture," will be presided over by Mr. Baldwin Latham, M. Inst. C.E., the Vice-Presidents being Messrs. Harold Copperthwaite, M. Inst. C.E., J. Vicker Edwards, C. Hodgson Fowler, M.A., F.S.A., G. B. Styan, City Surveyor, York, M. Ogle Tarbotton, M. Inst. C.E., Colonel Walker, R.E., and Professor Henry Robinson, M. Inst. C.E. The honorary secretaries of this section will be Messrs. E. C. Robins, F.S.A., F.R.I.B.A., Mr. J. Adams, and G. J. Monson, A.-M. Inst. C.E.

Section III. will be concerned with "Chemistry, Meteorology, and Geology," and will have for its President Mr. William Whitaker, B.A., F.G.S., Mr. G. J. Symons, F.R.Met.Soc., F.R.S., being one of the honorary secretaries of the section.

The closing general meeting of the Congress will be held on Friday, September 24, and on Saturday, September 25, there will be some excursions, followed in the evening by "Addresses to the Working Classes" by Mr. George Vivian Poore, M.D., Mr. Edward C. Robins, F.S.A., and Mr. James Mansergh, M. Inst. C.E. A public dinner will probably be arranged in connexion with the Congress.

As usual, a Health Exhibition will form an important adjunct of the Conference, and will be held in the Yorkshire Fine Art and Industrial Institution Buildings, Bootham Bar, from September 21 to October 16, 1886. Mr. E. L. Box will be the curator.

PROPOSED TUNNEL BELOW THE THAMES AT BLACKWALL.

At the meeting of the Metropolitan Board of Works, on the 6th inst., the clerk (Mr. Wakefield) read the following report of the Works Committee:—

"Your Committee have to report that, in accordance with the references made to them from time to time, they have considered the whole question of additional means of transit across the Thames in the eastern part of London, and in so doing they have had regard to the various requests and suggestions made in the numerous memorials and communications which the Board has received on the subject. After carefully looking at the question from all points of view, your Committee are of opinion that the Board should not allow another year to elapse without endeavouring to satisfy the requirements of the eastern districts as regards the means of crossing from north to south of the Thames. As the Board are aware, several points have been suggested as the most suitable for a crossing, each of which, no doubt, has something in its favour. Upon the whole, however, your Committee are of opinion that a tunnel or subway at Blackwall would be the best under present circumstances, and they recommend that the Board do prepare a scheme to be submitted to Parliament next year for the formation of a tunnel or subway at Blackwall, as suggested in the engineer's report of 19th August, 1882."

The report was adopted, after a long discussion, by 29 to 11.

SIR JOHN SOANE'S MUSEUM.

SIR.—When will the Trustees of Sir John Soane's Museum and Library make the collection more accessible to architectural students, it now being, under the present regulations, practically useless, as it is closed for nearly ten months in the year (as it is open for only eighty days)? It will now, at the end of this month, be closed until next April. Could not the management be vested in the Institute as to the hours of opening, &c.?

A WOULD-BE READER.

* Strictly speaking, we doubt if the Trustees have any power to alter the conditions under which the founder of the Museum bequeathed it.

ST. GEORGE'S HALL SCULPTURE.

SIR.—Permit me to correct a mis-statement into which you have been unwittingly led in reference to the sculpture of the panels at St. George's Hall.

You state that Mr. Stirling Lee had undertaken to execute them "at the very modest price of 150*l.* per panel." * This should be 450*l.* per panel, or 500*l.* each if the contract for the entire series is not carried out.

I was not present at the demonstration of vulgar ignorance at the last meeting of the Liverpool Town Council. Probably people will be surprised to hear that the whole of the designs had been already submitted and approved by the gentlemen who exhibited such a refined taste and knowledge of art as to reject what they had previously accepted and premiated.

There is, however, a further remark to be made. That the lastrian marble, which is being used for the panels, is an excellent material calculated to withstand the atmosphere of sulphuretted hydrogen to which it will be exposed, is, I believe, true; but the white colour of the insertions into the brown sandstone produces a very spotty effect, which is not pleasing to the eye, particularly as the black soot and dust gathering on the projections, and washed by the rain, forms a hard crust in the hollows, which only constant washing can obviate.

The panels were left by Mr. Elmes with a rough rock-faced projection, no doubt for future ornamentation. They might now be sculptured in situ, with some simple device which would satisfy the delicate scruples of the Town Council, and take away the unfinished appearance which the building presents.

Sandyknock, Wavertree,
Aug. 9, 1886.

J. A. PICTON.

LIGHT RAILWAYS, IRELAND.

SIR.—I shall feel obliged to any one who, through your columns, will put me into the way of obtaining a more particular description of these works. I have not as yet seen any reference to the name of the engineer or engineers. C. E.

WATER SUPPLY.

Cookstown (Ireland).—At a special meeting of the Board of Guardians of Cookstown Union, held on the 7th inst., the Clerk reported that he had received a report from the committee in charge of the Tullagh water scheme, which stated that they had received about year ago a sum of 110*l.* to experiment on the Tullagh springs, in order to find how much water they would yield. They had expended altogether 95*l.* 16s. on that object. The report then recited the various tests and results of their experiments, from which it appeared that on the original spot chosen, where the water is the driest weather keeps the road wet, the contractors Messrs. Le Grand & Sutcliffe, London met with a bed of gravel, which their tools were not suited for. They, therefore, decided to expend their funds in making other borings and testing existing springs. They found that the well opened by the miners would give constant supply of 95,000 gallons in twenty-four hours,—a supply which, if it could be depended on, would give twenty-four gallons per head of the population. They also opened two springs in the farm of Mr. Warnock, English, adjoining the other wells. These were left open, and are now flowing at the rate of 50,000 gallons per day, while a new 4 in. bore hole sunk beside the old well at Reid's gave further supply, and as it rose higher it must be independent of the old. They recommended that the opinion of an engineer be taken as to the practicability of obtaining a supply of water from these springs, and especially whether sufficient water-power can be obtained for pumping it into the town, and at what cost for establishment and maintenance of the pump.

Crediton.—Mr. S. J. Smith, C.E., has lately held an inquiry, on behalf of the Local Government Board, into the water supply of this Devonshire town. It seems that the question has been for some time before the Improvement Commissioners, the medical officers having several occasions reported that the town had inadequate supply. About two years since

* We took the statement from a report of the Town Council meeting in the *Liverpool Daily Post*,—Ed.

Highbridge (Somerst).—A few days ago, on invitation of the engineer (Mr. Alfred House) and the contractor (Mr. Augustus, of Bristol), the members of the Highbridge Parochial Committee and others met at Highbridge Waterworks to test the masonry and the mains. The works have been in progress for several months, and have now been completed, at a cost exceeding 5,000*l.* Mr. Woodhouse having given some details respecting the works, Mr. C. Ritson, J.P., Chairman of the Parochial Committee, turned on the water to fill the mains. These are altogether about four miles in length, and there are thirty hydrants, three of which were tested in various parts of the town with the aid of a pump for use in case of fire, and the pressure

Frome.—The Frome Sewage Utilisation Works are now in operation. They were necessitated through the complaints of some parishioners as to the pollution of the river by the town sewage. The cost of intercepting sewers and machinery, &c., has already been 18,000*l.*, and the work is not yet complete. The whole of the town sewage, calculated in dry weather as 250,000 gallons per twenty-four hours, is discharged under the river to a 30-in. sewer laid in Innox meadows to an outfall tank built near the pump-house. The outfall tank is of brickwork in cement covered by brick arches supported on cast-iron girders. This tank, with the sewer, will hold about 400,000 gallons of sewage.

Leicester.—Last week Major Tulloch, R.E., one of the Local Government Board's Inspectors, held an inquiry at the Town-hall, Leicester, into an application on the part of the Town Council to borrow 70,000*l.* for the purpose of laying a system of new trunk sewers in the borough. The Town Clerk said that this was an application by the Corporation to the Local Government Board for their sanction to a loan of 70,000*l.* for the execution of main sewers in the borough, but practically the work was part of a scheme which would also include extensive works outside the borough,—namely, two storm-water culverts or free outlets in times of flood, down to Thurmarston. Mr. J. Gordon, the Borough Surveyor, said that formal instructions with regard to the work were given to him by the Highway and Sewerage Committee early in the present year. He had, however, been considering the scheme for some time, and had it in this a forward state that he was in a position to lay a plan before the committee a week later. He then fully stated his reasons for recommending his scheme. The scheme was considered in committee and by the Council. He satisfied them that it was necessary something should be done with the sewers, and thought it best to adopt an entirely new scheme of trunk sewers, adhering, however, to the lines of the present sewers as far as practicable. Mr. Gordon explained his reasons for departing from the lines of the present system, and gave details of what was proposed to be done by the adoption of his new system. He proposed that the pumping station should be shifted from its

present point lower down to a straight line with Beaumont Leys, and there was a departure from the original scheme with regard to the levels in order to get a free outfall. Whilst the present pumping engines were only capable, with a very great strain, of lifting about 13,000,000 gallons of sewage,—and in reality immediately they got 11,000,000 gallons with a rainfall the present outfalls came into operation,—with the new pumping station and four engines they would have driving at the ordinary speed, they would be able to lift 19,000,000 gallons, and the storm-water outfall at Thurston would be much less often in operation than the present outfall. They would pump away a much larger quantity, and of course the more they pumped away the less would go into the river. The principle throughout the whole scheme was that the main outfall sewer was capable of discharging two inches of rainfall from the present area in twenty-four hours. But supposing that the whole area of the present borough, namely, 3,030 acres, were built upon, he calculated that the trunk sewers he intended to lay down would be capable of carrying off the whole of the sewage of the area, and, in addition, discharge by means of the storm outfalls a quarter of an inch of rainfall per hour. Therefore he considered that they had made ample provision for the future growth of the town.

Sittingbourne.—At a meeting of the Sittingbourne Local Board last week a letter was received from the Local Government Board with reference to a recent inquiry conducted by Major-General Carey, R.E., into the proposal to borrow 2,500l. for street improvements, with the result that the Board entirely approved of the schemes, except two small items, and sanctioned the borrowing of the money.

Yarmouth.—We regret to hear that recently the west and north fronts of the Town-hall of Great Yarmouth, which has only been built a few years, have shown serious signs of settlement. It is stated that near the north-west corner there are some very serious cracks, extending from the parapet almost to the base of the building. Workmen have been engaged in placing shores against the north wall; and a committee of the Corporation has had a special conference on the matter with Sir Joseph Bazalgette, who was summoned from London for the purpose.

The Student's Column.

STONE QUARRIES.—VII.

DEVON AND CORNWALL GRANITES (continued).

3. Luxullian District.

THE granite in this mass is far more variable in composition and contains much more schorl than either of the other districts described. Sir H. de la Beche, however, says that the granite in the eastern part somewhat resembles that obtained from them, the mineral composition being about the same. Mica is scarce or altogether absent on the west side of the mass, being replaced by a steatitic or talcose mineral and schorl. Dr. Boase says that, although schorl is rare in parts, it is never quite absent, and veins of that mineral are abundant, especially in the western and central portions.

In some parts of the district immense boulders strew the surface of the ground, and rest upon one another in the most picturesque positions. The late Duke of Wellington's sarcophagus was made of one of these, the stone being called Luxullianite, and composed of schorl, flesh-coloured orthoclase, and quartz. It has never been met with *in situ*.

The Cornwall Minerals Railway from Par Station to New Quay runs through this district and gives great facilities for the development of the quarries. The principal of these is the

Colereworth Quarry, which is not far from St. Austell.

The principal characteristics of the stone are the enormous size of the masses in which it is found, and the great regularity of the beds, which, contrary to the usual lie of the rock, are very nearly horizontal. The masses of stone are rarely less than 1,000 tons, and frequently 3,000 to 4,000 tons in their cubic quantity.

It is distinctly a coarse-grained granite, and the structure of the stone renders it singularly appropriate for polishing where monolith or moulded work is required. The felspar is of

two colours, white and light green, the latter being far less abundant than the former. The white felspar is very irregular in appearance; large patches of it are seen here and there, but the peculiar manner in which it fills up little cracks, and envelopes and isolates the other crystals, especially the quartz, is very marked. The latter mineral occurs in rounded grains, and in some places has a tendency to become ovoid, several little grains being joined together, making rough lines of quartz running short distances. Both black and white micas are present, the former being the more abundant. Schorl is also found in minute quantities.

This granite has been used in the construction of the Plymouth breakwater and lighthouse and in docks in the south of England and at Pembroke, &c.

Tregarden Quarry and others of less magnitude are close to Colereworth, the whole being connected with Par Harbour, whence the stone is shipped by the Cornwall Minerals Railway, and they lie not more than three miles from the sea.

Within a short distance of Luxullian, near St. Austell, is **Carn Grey**, a hill of very fine-grained granite, extremely hard, but of jointy structure. This is connected with the previously-mentioned quarries, and has been principally used for pitching and kerb.

4. Penryn District.

The granite of this district is more largely quarried than any other in Devon or Cornwall. The rock found here, in some places, is more like that of the Dartmoor and St. Breward districts, in mineralogical constitution, than that of the Luxullian, schorl not being abundant, whilst large felspar crystals render the stone porphyritic. These, however, are occasionally absent. Schorl sometimes occurs in veins, on the confines of the mass. There is a great uniformity in the grain of the granite in this district. With the exception of the Carnsew quarries and a few isolated and unimportant patches, it is a medium between coarse and fine grain. It is comparatively easily quarried, lies in large masses, though not so large as those in the Luxullian district, and the workings are carried on all the year round as the climate is favourable. The quarries lie from a mile and a half to five miles distant from the port of shipment, and are mostly worked at piece-work by gangs of men whose knowledge of the nature of the rock and skill in its manipulation are remarkable.

In 1853 Mr. Enys stated that the vertical divisional planes or joints of the granites near Penryn took a north-north-west to south-south-east direction, varying but a few degrees from these points.*

Carnsew Quarries.—These quarries, which are situated a little over a mile from the shipping quay at Penryn, have been very largely developed.

The fineness of the grain, combined with the large size of the masses raised, gives them great advantage over the other quarries: consequently the rock is employed for the more important parts of engineering works, and also largely for monumental purposes.

The colour of the stone is bluish-grey. It more closely resembles the De Laak granite, already described, than any other Cornish granite we have seen. It is even in texture, and is not porphyritic. The felspar is white, the crystalline boundaries not being at all well defined. Both black and white micas occur, the former being more abundant than the latter. Quartz is tolerably plentiful in small grains.

A very large portion of the arch-stones of Putney Bridge was supplied from these quarries.

Penryn Quarries.—The colour of this stone is grey, and differs from the Carnsew in being much coarser. The orthoclase felspar is white, some of it being irregular, but well-defined twinned crystals, about 1 in. in length, are seen close together, making the stone porphyritic. White and black micas are both present, the former being much more abundant than in the Carnsew; large silvery white flakes occur. The black mica is occasionally congregated together in small patches. Clear quartz is present in little grains, the average size being about 4 or 5 mm.

* "On Granite near Penryn," *London and Edinburgh Phil. Mag.*, May, 1833.

5. Penzance District.

Generally speaking, the granite of this district has a considerable amount of schorl in addition to the three essential minerals. It is often porphyritic. The outcrops of the mass to the west of Penzance contain good examples of schorlaceous granite and schorl rock (schorl and quartz). Near Trevalgan, St. Ives, large felspar crystals are present with schorl and quartz, mica being absent. At Tregender, near Ludgvan, the granite is composed of all four minerals, mica being especially abundant.

Lamorna Quarries.—These are situated on the north-east side of Lamorna Cove, about five miles from Penzance Harbour. At present, however, the great difficulty in loading vessels with the stone prevents its more extensive use. Such is the nature of the coast round Lamorna Cove that ships have had to put out to sea two or three times whilst loading, or run the risk of being wrecked. This, of course, adds considerably to the expense of the material.

The general colour of the rock is light greenish-grey. Felspars are light-green and white, those helping to form the base being scattered about irregularly. The dirty white felspars which cause the stone to become porphyritic are unusually large, some being 2½ in. to 3 in. in length. Both black and brown micas occur as very small flakes, and large black crystals of schorl are exceedingly plentiful. The transparent quartz is in little grains, being fairly distributed, but not too abundant.

We are informed that there is hardly any covering of earth on the granite at Lamorna, and that in many places its bare top is to be seen.

Sheffield Quarry.—This quarry takes its name from the village of Sheffield close by. It is about two miles and a half from the westernmost point of Penzance.

The boss of granite whereon this quarry is situated is rather peculiar. When it was first opened a point of granite was exposed above the surface, and working from that central point, the declination of the surface of the rock was about the same on all sides. The crust of ordinary earth varied in depth from 2 ft. to 8 ft., under which the granite appeared to be kaolinised for about 1 ft. before the ordinary granite was reached.

The stone has a rather fine base composed of small crystals of light green felspar, which occurs in little granules; dirty white felspar exists in small pieces enclosing minute grains of quartz. Like Lamorna, the large white orthoclase felspars, which make the stone porphyritic, are very large, being frequently twinned on the Carlsbad type. Sometimes these large felspars are crystallised in a peculiar manner, presenting the appearance of a cross with boundaries well defined. Moreover, the large crystals generally, in this quarry do not occur with the longer axes approximately in one direction, consequently it is often difficult to split the rock up. Although this renders the quarrying of the stone somewhat troublesome, it is an advantage rather than otherwise as far as the strength of the material is concerned. The crystals interlock with one another, and the stone has therefore a tendency to cleave along the planes which coincide with the clinopinakoids.* Black mica occurs in small quantities, whilst although the quartz is not over-abundant, here and there it is, for Cornish granite, in rather large crystals. Small pieces of black schorl are common.

The stone is principally used for dock-work in blocks varying from one to ten tons, and also for dressed fronts of buildings, rough walling, pavings, and kerbings. It is carried by waggon for shipment to various ports, both at home and abroad. At present the material is being supplied for Her Majesty's dock at Malta.

New Mill or Cranken Quarry.—This quarry is situated about four miles north of Penzance. About 8 ft. of earth crust and 6 in. of kaolinised granite were dug out before solid stone was reached. It is different in appearance from either Lamorna or Sheffield, the prevailing felspar being of a light yellow colour, and rarely light green. The porphyritic crystals are not so well defined, and the felspar at quartz are more equally divided. In places this granite contains little patches of dark matter, having a very fine microscopic base, in which black needle-like crystals are distinct.

* The planes of composition.

minant, whilst the large orthoclase spars that are in the base are usually much clearer and have more definite boundaries than in the others of the rock. Little schorl crystals are abundant at the expense of the mica, which is black, and more rarely dark brown. The schorl occurs in small granules, making the rock compact. Very large blocks have been raised.

The two quarries, Sheffield and New Mill, now present nearly the whole working of granite at Penzance.

* *Kithill Quarries*.—The agent for these is the Tamar quarries, which are in the hands of the same company, writes to us to claim having issued any circulars "giving account of prospective work" alluding to granite used in a previous article.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

1,141, Improvements in Chimney-tops. J. Skon. These chimney-tops are made with arms or ribs issuing from or connected with the trunk of the chimney converging upwards in such manner that the upper outlets for the smoke may be near to each other, and in parallel vertical planes. In effect this, the arms diverge so that the appearance at the top is like a triangular arrangement of ribs, the lower ends being open, and the upper orifices placed vertically opposite and near each other. The advantage claimed is that the wind will force the smoke downwards.

1,142, Lavatory Basin. P. Winn.

One of the improvements covered by this patent is specially applicable to fixed basins, while others are intended for those basins which are turned up for the purpose of emptying them. The basins are shown in the figure of an ellipse, but one of the sides is flatter, or of a longer radius,—like a shallow dish,—the flat side being turned towards the user. To form the user of the basin has more room at the under side than in basins of the ordinary shape, and the area of the basin is not increased. Supply cocks are placed out of the way of the hands when washing, and are fitted with handles so arranged as to flush the water over the basin for the purpose of cleansing it. For turn-up basins, the cocks are fitted with a screw up to a stop, which is provided.

1,143, Ventilators. J. Bedford.

One of the ventilators, the subject of this patent, are made by a square shoulder formed at the lower end of the cylindrical shaft. For fixing, a square is trimmed and fitted with a metal framework to receive the base of the ventilator, which is secured by nails or screws. Two of the sides of the square base are cut off at an angle to correspond with the internal slope of the roof. At the top of the wood or metal lining of the square is a wooden board, which serves partly as a head, and partly as a support for the bottom edge of the ventilator to rest upon, and also as a support or finish for the plastering to be carried on to the required position upon the outside of the roof of the ventilator a flashing or border of lead is soldered in order that the flashing may be drawn down to the required position without the use of fire soldering tools upon the roof.

1,144, Improvements in Water-closets. John K. This invention is chiefly applicable to closets with Bramah discharge valves. One or two discharge valves are provided; in the latter case a water effect. An overflow passage made with a bend is formed in the material of the basin, or on the basin and the inside of the casing. A passage is formed in the top of this overflow passage for the purpose of allowing it to be cleaned. The passage is attached to a pocket or jacketed space or rim, and either in the basin or between the basin and casing, or in the casing itself, the water overflowing of these spaces, and when the filling either of the basin, or when the water is let go, the water for the after-service to all the basin, flows from either of these through small holes made for the purpose, hole from the rim or pocket into the overflow passage, allows water to pass into the trap bend of the passage for the purpose of always keeping it full and every time the closet is used.

NEW APPLICATIONS FOR PATENTS.

80.—9,824, A. Muir, Mitreing Boards, Joints, Architraves, &c.—9,829, J. Tucker, Window Fastener. 9,840, G. Harrison, Fireproof &c.

31.—9,859, H. Dean, Intercepting Gullies, Drain Traps.—9,860, H. Dean, Drain and Catching Traps.—9,881, H. Johnson and T. J. Fastener for Windows, Doors, &c.—9,885, J. G. Retaining Catches for Doors.—9,886, H. Nails.—9,900, J. Alexander, Cistern Ball-cocks.

August 3.—9,935, J. Annandale, Fire-grates, Kitchen-ranges, and Stoves.—9,948, F. H. and L. Leodell, Coupling for Pipes.
August 4.—9,976, J. Goodwin, Sustaining Sliding Doors and Windows.—9,987, T. Whitaker, Pile-driving Machines.—10,004, F. Reeves and A. Slater, Indicating Apparatus for Hotels, &c.—10,012, H. Lake, Machinery for Decorative or Ornamental Woodwork.

August 5.—10,040, E. Goddard, Window Frames, Casements, Sash-bars, &c.—10,055, A. Andrews, Window Fasteners.—10,056, E. Wright, Springless Lock.

PROVISIONAL SPECIFICATIONS ACCEPTED.

7,882, C. Coutts, Corrugated Water Supply Pipes.—8,178, E. Wilson, Screw Fasteners for Windows.—8,141, P. Barker, Water-closets.—8,152, H. Keene, Lead Glazing.—8,876, H. Hennes, Self-acting Fasteners for Doors and Windows.—8,889, W. Dryden, Fasteners for Window Sashes.—9,542, H. Cunningham, Wood Screw Machinery.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

9,881, F. Shorten, Stucco.—10,863, R. Dates, Water-proof Preventer Cistern for Water-closets.—11,580, F. Gowing, Sanitary Traps and Pipe Connections.—11,759, O. J. Inver, Water Meters.—11,790, J. Lowthwaite, Paving Blocks.—12,405, J. Allen, Bricks and Tiles.—12,801, S. Bamford, Stench Traps.—13,741, D. Baker, Ventilating Flues.—11,146, C. Wharton, Automatic Window-sash Fastener.—11,159, W. Scott, Paperhangings.—11,853, W. Scott-Moncrieffe, Syphon Cisterns for Flushing Water-closets.—12,704, H. Marie, Set Squares.—8,818, M. Rothschild, Mortising Machines.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 3.

By DEERHAM, TEWSON, & Co.
Southend, Cliff Parade—Oakleigh House, freehold 21,900
Essex, Stebbing—Gentleman's Farm, containing 130a. 2r. 23p., freehold 1,300
By W. T. HUNT, jun.

Strand—14, White Horse-yard, freehold 610
By R. TRAVIS & Co.

Barking, Bifron-place—Twenty freehold cottages Gunnersbury—41, Arlington Park Gardens, 91 years, ground-rent 54. 9s 610
By Messrs. GRANT.

Richmond—2 to 8, Rosedale-cottages, freehold 750
By DANIEL SMITH, SON, & OAKLEY
Wandsworth Common—The residence "Bruntswood," and 161 acres, freehold 17,500
Putney—Abbots House, and 3a. 0r. 27p., freehold 7,000

AUGUST 5.

By W. A. BLACKMORE.
Holloway—11, 12, and 15, Ashburnton-grove, 53 years, ground-rent 11s. 12s. 6d. 620
By NEWSON & HARRISON.

Holloway—13 and 15, Victoria-road, 47 years, ground-rent 10s., with reversion to three houses 650
No. 43, 83, John's-villa, freehold 680
Islington—340, Liverpool-road, 49 years, ground-rent 6s. 600

Stratford—41, 43, and 45, Weston-street, freehold, Forest Gate—24, Lorton-road, freehold 760
Finsbury Park—23, Pimlico-road, 81 years, ground-rent 41. 5s. 340

AUGUST 6.

By GEORGE NEWMAN.
Camberwell, Chabam-street—The Grosvenor Mineral Water Works, freehold 1,370
By MARSH, MILNER, & LANGTON.

Nunhead—Ground-rent of 7s., reversion in 63 years 210
Peckham—Ground-rent of 9s., reversion in 63 years 330
Camberwell—Ground-rent of 14s. 14s., reversion in 3 years 2,330

Ground-rents of 32s., reversion in 37 years 850
Peckham—Ground-rents of 15s. 13s. 6d., reversion in 99 years 460
Canning Town—Ground-rents of 24s., reversion in 83 years 645

Rotherhithe—Ground-rents of 9s. 6s., reversion in 16 years 220
By E. ROBINS & HINS.

Strand Green—Freehold land, about 21 acres 7,250
Regent's Park—14, Albert-street, freehold 1,000
Peckham, Paddington-road—A plot of freehold land 50

By G. E. SMALLERICK.
Cranleigh—Hillside Farm, 51a. 3r. 16p., freehold 2,000
The Park, containing 16a. 3r. 12p., freehold 1,000
Ellist's, comprising 15a. 2r. 38p., freehold 650
Stedman's, containing 9a. 3r. 11p., freehold 370

Architectural Association Saturday Visits.

The Architectural Association, on Saturday last, visited the Royal Holloway College at Egham. The party were met by Mr. Walter Ledgey, on behalf of Mr. W. H. Crowland, the architect, and Messrs. Thompson, sons of the contractor. The buildings have so recently been fully described and illustrated that it is unnecessary to describe them, but a very enjoyable and instructive visit was made. The next visit will be made on Saturday, the 21st inst., to Oxford.

Miscellaneous.

The Proposed Jubilee Exhibition in Manchester.

A meeting of the guarantors of the Manchester Jubilee Exhibition was held in the Mayor's Parlour, on the 5th inst., to receive the report of the committee appointed to inquire into the advisability of holding an exhibition and to elect an executive council to carry out the undertaking. The Mayor (Alderman Goldschmidt) presided. The Town Clerk (Sir Joseph Heron) stated that the guarantee fund now amounted to 105,000. The Mayor having made a few remarks, called for the report of the Provisional Committee appointed to carry out the enterprise, providing that the necessary amount (100,000) was guaranteed. Sir Joseph Heron read the report, which stated that the Executive Committee had considered the question of the site. The scheme approved by the town's meeting, held on the 19th July last, stated that "the best position available for the Exhibition would appear to be land in the neighbourhood of Old Trafford, where several lines of railway converge, which would afford ample means of transport and communication." Accordingly the committee had visited the neighbourhood of Old Trafford, and were of opinion that the site lying between Talbot-road and the Botanical Gardens, containing about 6 acres, together with the Gardens themselves, containing about 16 acres, would form a suitable site for the proposed Exhibition (total, 22 acres). Sir Humphrey F. de Trafford, who was himself a guarantor to the fund to the extent of 1,000l., had very handsomely placed the above plot at the disposal of the committee, free of charge, subject to arrangements being made with the tenants. The necessity for immediate action was such that the Provisional Committee decided to take active measures in relation to the designs for the exhibition building, and for this purpose they determined to appoint Mr. James Margatroyd, architect, Manchester, as their assessor, and they instructed him to forward particulars to the following four architects, selected by the committee after careful consideration and much discussion:—Messrs. Maxwell & Tuke, Messrs. Pennington & Bridgen, Messrs. Salomons & Ely, and Messrs. Darbyshire & Smith. The designs, when furnished by the architects, would be submitted to the Guarantors' Council. Sir Joseph Lee moved the adoption of the report, and reviewed the proceedings of the committee since the town's meeting. He said that it was proposed, if possible, to raise the guarantee fund to 200,000l., and there seemed to be very little doubt that that sum would be raised. The report was adopted.

New Drainage Works of the Houses of Parliament.—These works, and the ventilating works connected therewith, on the Shone hydro-pneumatic system, as recommended by the late committee of the House of Commons, have just been commenced, and will be carried forward with all possible speed. The engineer for the works is Mr. Isaac Shone, C.E., and the Resident Engineer is Mr. John Phillips, C.E. The Commissioners of her Majesty's Works and Public Buildings have let the works in three contracts, viz.,—for the general works, to Messrs. John Mowlem & Co., of Westminster; for the pneumatic and hydraulic ejectors, to Messrs. Hughes & Lancaster, of Chester and Liverpool; and the gas-engine air-compressors, to the British Gas Engineering Company, London. The total amount of the three contracts is under 10,000l.

Glasgow Architectural Association.

On Saturday afternoon a party of the members visited Kilmwinning Abbey, and when assembled there, after a short description had been read by Mr. W. J. Anderson, engaged for a couple of hours in sketching and measuring the old remains. Passing on to Kilmwinning, the company had tea previously to visiting the interesting old church there, with its quaint woodwork in roof and gallery fronts and canopies. Here suitable subjects for sketching were found and taken advantage of till darkness set in.

Local Board Surveyorships.

—Mr. Charles Cobham, of Sunderland, has been appointed Surveyor to the Local Board of Grays Thurrock, Essex, which met for the first time only a few weeks ago.

Sales of Building Land.

—The Pheasant-field Freehold Building Estate was sold by Mr. R. J. Collier, at the Mart, on the 11th inst., for 16,000l. It comprises about sixteen acres.

The "James Watt" Dock at Greenock. This dock, which has been constructed on the old Garvel Park Estate at the east end of Greenock, was formally opened on the 5th inst. The first sod of the dock was cut on the 1st of August, 1878, and the foundation stone was laid on August 6th, 1881. Its construction has thus occupied eight years. The works comprise two tidal harbours, one wet dock, and one graving dock, with an extensive quayside area. The dimensions of these various docks are as follow:—James Watt wet dock,—width of entrance, 75 ft.; depth of water on sill at high water, 32 ft.; length, 2,000 ft.; width, 300 ft. to 350 ft.; length of jetty, 600 ft.; length of quays, 3,600 ft. Great harbour (tidal).—Length, 3,250 ft.; width, 600 ft.; area, 45 acres; depth at high water when completed, 38 ft. Garvel basin (tidal).—Width of entrance, 35 ft.; length at high-water when completed, 25 ft.; length of quays, 2,480 ft. Garvel graving dock.—Length, 635 ft.; width, 80 ft.; width of entrance, 60 ft.; and depth on sill at high water, 20 ft. The total water space provided by these docks and tidal harbours is ninety acres; the total quay area about 100 acres; and the total length of quays is over three miles. The James Watt Dock, which is considered the greatest and most costly of these extensive harbours, is one of the finest harbours for steamers of the largest class in the United Kingdom. It has cost over 250,000*l.*, and the outlay on the entire scheme, which has been designed by Mr. Kinnipie, C.E., is fully half a million of money. An extensive range of warehouses and sheds, capable of storing 20,000 tons of general merchandise, has been constructed at a cost of about 40,000*l.* Lines of railways (Caledonian and Glasgow and South-Western) run along the sides of the Watt Dock, and lines of railways have also been laid through the centre of the warehouses and sheds; and hydraulic cranes of great power commanding these rails have been erected, so that goods can be loaded into or discharged from railway wagons under cover. On the jetty at the Watt Dock two 30-ton steam coaling cranes have been provided, each crane being capable of loading about 150 tons of coal per hour. According to the *Scotsman*, the James Watt Wet Dock has this enormous and almost essential advantage, that it is the only dock on the Clyde in which vessels of huge tonnage can be constantly kept afloat. At all other docks or harbours the large class of steamers ground during a part of each tide.

Institution of Mechanical Engineers.—The summer meeting of this institution will be held in London on Tuesday and Wednesday next, August 17th and 18th, at 25, Great George-street, Westminster, by kind permission of the Council of the Institution of Civil Engineers. The chair will be taken by the President, Mr. Jeremiah Head, at ten o'clock on Tuesday morning, and at half-past nine o'clock on Wednesday morning. The following papers have been offered for reading and discussion (not necessarily in the order here given), after the address by the President:—"Experiments on the Steam-Jacketing and Compounding of Locomotives in Russia," by Mr. Alexander Brodin, of Kieff; "On the Working of Compound Locomotives in India," by Mr. Charles Sandiford, of Lahore; "Description of a Portable Hydraulic Drilling Machine," by Mr. Marc Berrier-Fontaine, of Toulon; "Description of the Blackpool Electric Tramway," by Mr. M. Holroyd Smith, of Halifax; and "On Triple-Expansion Marine Engines," by Mr. Robert Wylie, of Hartlepool.

The Proposed New Public Park, Dundee.—A meeting of the Police Commission was held on the 9th inst. Bailie Gentle presiding, when, on the motion of the chairman, it was resolved to extend the Magdalen Green by acquiring the property already conditionally agreed to be purchased from Mr. Scott, of Balguy, and such Crown rights as might be necessary, and by extending the esplanade westwards to a line in continuation of Windsor-street. The extension will add about sixteen acres to the area of the Magdalen Green, the estimated cost of forming the embankment, making the roadway, and erecting a bridge over the railway being about 15,000*l.* A contribution towards the cost of the undertaking is expected from the Caledonian Railway Company. At the same meeting it was resolved to expend 300*l.* in extending the stables of the Commissioners in Allan-street.

Engineers' Visit to Scotland.—On the 30th ult., a party of members of the Liverpool Engineering Society visited the Forth and Tay Bridges, at the invitation of the engineers and contractors of the respective undertakings. On arrival at Queen's Ferry South, the party was met by Mr. Cooper, the resident engineer of the Forth Bridge, who drew attention to the novel features of the special appliances for erecting this gigantic structure. Having examined the various details connected with the south shore end of the work, the party embarked in the steam-launch kindly placed at their disposal for the occasion, and proceeded to the north shore. Here the "skew backs" which are now in position were examined with much interest. The mode of erecting the vertical members of the piers, and the skilful arrangement for raising temporary staging by hydraulic pressure, were explained by Mr. Cooper. The party were much struck with the progress made in all parts of the work since their visit last year, the whole of the foundation being now completed. The precautions taken against accident were also noted with satisfaction, riveters and others engaged on the elevated part of the work exposed to heavy winds, &c., being protected by a wire caging, which also prevents tools and materials falling on the men below. The facility with which the riveting *in situ* is effected by means of the specially-designed apparatus was thoroughly appreciated. A visit was paid to the Exhibition by the party on their return to Edinburgh. Proceeding to Dundee the party made an inspection of the Tay Bridge on the 2nd inst., under the guidance of Mr. Seabright, one of the assistant engineers. Here, again, a steam launch conveyed members to the various points of interest. One of the large bowstring girders in course of construction was seen, and the method of floating it into position in mid-stream was explained. The opportunity afforded of comparing the design and execution of the old and new bridges was by no means the least instructive feature of the excursion.

Action by an Architect.—An action was brought by Mr. Joseph Crouch, architect, Birmingham, against Messrs. D. S. Beasley & Co., engineers, Bracebridge Works, Bracebridge-street, to recover 37*l.* for professional services rendered. Mr. Lindell (instructed by Mr. Pepper, Birmingham) appeared for the plaintiff, and Mr. Vachell (instructed by Mr. Turner, Birmingham) for the defendants. Plaintiff said he first prepared plans for the defendants for the repair of some buildings in Dartmouth-street, for which he charged 3*l.* 3*s.* In January, 1885, he prepared plans and drew out specifications for some buildings in Bracebridge-street. The cost of these buildings was about 1,500*l.*, and his commission was at the rate of 2½ per cent. The usual architect's commission was at the rate of 5 per cent. He did some work which did not properly come under the head of an architect's duties, but he made no extra charge. They experienced some difficulty with the foundation, which led to the laying down of a large bed of concrete. The building was completed in July, 1885. He sent in his account shortly afterwards, but defendants refused to pay it. The defence was that all the buildings were not erected, and defendant declined to pay except on those put up. The jury in the end found for the full amount claimed, and his Lordship certified for costs on the higher scale. *Birmingham Gazette.*

Pauper Lunatic Asylum, Plymouth.—The *Western Morning News* of the 10th inst. gives an account of the result of the competition for the Pauper Lunatic Asylum at Plymouth, for which architects of Plymouth and for a radius of twenty miles round, were invited to compete. Mr. Howell, F.R.I.B.A., was invited to assist the committee in adjudicating on the plans, and reported in favor of "Tamar," by Mr. L. J. Hodge, of Plymouth, for the first premium, the cost of the design being estimated at 35,000*l.* The design signed "Pauperis semper habetis" by Mr. Charles King, of Plymouth, was placed second, the estimate of cost being 39,000*l.* The third place was given to the plans signed "Consideration," by Messrs. Hine & Odgers, of Plymouth, who estimated that their plans could be carried out for 25,900*l.*, or about 10,000*l.* less than Mr. Hodge's, and nearly 14,000*l.* below the estimate of Mr. King. The committee decided to adopt the plans of Messrs. Hine & Odgers.

Holy Trinity Church, Guildford.—A meeting has lately been held to consider the question whether Holy Trinity Church, Guildford, should be enlarged, or whether a new church or chapel-of-ease should be built on another site. The Rector (the Rev. A. S. Valpy) said that, as to the question of rebuilding the church on the old site, his lamented predecessor consulted the eminent architects, Messrs. Carpenter & Ingelow, on the subject. The great initial disadvantage of that scheme was that they had a cramped site, which would never allow of the church to advantage, besides which it would keep the existing worshippers out of the church for a long period. Mr. A. W. Blomfield, whom he had consulted, was of opinion that it would be a great mistake to pull it down, as it was substantially built, and the enlargement would make as good a church as any new one. He (the Rector) had sent the plans to the Bishop of the diocese, and the Bishop had expressed the extremity of the present boundary, to take down the existing tower, put it out to the northern boundary, utilise the space where the tower and porches are, make the vestibule where the present steps are, and retain the main north and south walls and the vestry, using the latter as a baptistery. The saving by this scheme would be between 4,000*l.* and 5,000*l.*, which was a matter of some consideration. The estimate for this enlargement was 6,800*l.*, and the increased accommodation would be for 700 on the ground-floor besides the gallery, and with the extra seats in the aisles they would have the means of seating nearly 1,000 people, or 300 or 400 more than at present. After some discussion, in the course of which a letter was read from the Bishop of Winchester, expressing his approval of Mr. Blomfield's plans, the following resolution was unanimously adopted:—"That this meeting approves the plans and proposals of Mr. Blomfield for enlarging Holy Trinity Church, and suggests that such be carried out, in so far as funds will permit; and that an appeal for that purpose be drawn up and issued."

Electric Lighting.—The Admiralty seems to be going in extensively for electric lighting. They have just given an order to a well-known Electric Manufacturing Company for over 7,000 switches, besides fusible plugs, brackets, and other articles.

PRICES CURRENT OF MATERIALS.

TIMBER.		£	s.	d.	¢
Greenheart, B.G.	.....ton	6	5	0	7
Teak, E.I.	.....load	9	0	0	11
Sesquiu, U.S.	.....foot cube	0	2	4	0
Ash, Canada	.....load	3	0	0	4
Birch	.....	2	10	0	0
Elm	.....	3	10	0	4
Fir, Dantsic, &c.	.....	1	10	0	4
Oak	.....	2	10	0	0
Canada	.....	3	0	0	0
Pine, Canada red	.....	2	0	0	10
" yellow	.....	2	5	0	4
Lath, Dantsic	.....fathom	3	0	0	0
St. Petersburg	.....	4	0	0	10
Wainscot, Riga	.....log	2	15	0	4
" Odessa, crown	.....	3	5	0	7
Deals, Finland, 2nd and 1st, std. 100	.....	7	0	0	0
" 4th and 3rd	.....	6	0	0	0
Riga	.....	5	19	0	7
St. Petersburg, 1st yellow	.....	8	0	0	14
" 2nd	.....	7	0	0	8
" white	.....	7	0	0	10
Swedish	.....	8	0	0	15
White Sea	.....	7	0	0	17
Canada Pine, 1st	.....	17	0	0	30
" 2nd	.....	12	0	0	17
" 3rd, &c.	.....	6	0	0	10
" Spruce 1st	.....	8	0	0	11
" 3rd and 2nd	.....	5	0	0	10
New Brunswick, &c.	.....	5	0	0	7
Battens, all kinds	.....	4	0	0	12
Flooring Boards, sq. 1 in., Prepared, 1st	.....	0	9	0	0
Second	.....	0	7	0	0
Other qualities	.....	0	6	0	0
Cedar, Cuba	.....foot	0	8	0	0
Australian	.....	0	2	0	0
Mahogany, Cuba	.....	0	4	0	0
St. Domingo, cargo average	.....	0	4	0	0
Mexican	.....	0	3	0	0
Tobacco	.....	0	4	0	0
Honduras	.....	0	3	0	0
Maple, Bird's-eye	.....	0	8	0	0
Rose, Rio	.....	7	0	0	10
Bahia	.....	8	0	0	10
Box, Turkey	.....	5	0	0	17
Satin, St. Domingo	.....foot	0	7	0	0
Porto Rico	.....	0	8	0	1
Walnut, Italian	.....	0	4	0	0

<p>DFORD.—For alterations to premises in Mill-street, rd, for Mr. T. Hague Carrier. Mr. F. T. Mercer, ed, Bedford. Quantities by the architect :— . H. Long (accepted) £295 0 0</p>	<p>Cowell..... 355 0 0 Hook & Tebbitt 353 0 0 Linzell 339 0 0 Kerridge & Shaw, Cambridge* 285 0 0</p>
--	---

LONDON.—For additions and alterations, No. 38, Regent-street, Piccadilly, for Mr. Hall. Mr. J. T. Cooper, architect:—

W. & E. Curtiss	£560	0	0
Wetherill, Lee, & Martin	552	0	0
Bush	495	0	0

No. 90, Cannon-street, E.C. [A

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

ILLUSTRATIONS.

The Grosvenor Museum and Schools of Science and Art, Chester.—Mr. Thomas M. Lockwood, Architect	270-271
Church of the Holy Trinity, South Shore, Blackpool.—Mr. R. Knill Freeman, Architect	274-275
Cheltenham Grammar School Competition.—Design submitted by Messrs. W. H. Sugden and Fairbank & Wall, Architects	278
Panel Pictures in the Indian and Colonial Exhibition.—Executed by Messrs. Doulton's "Impasto" Process	279
Maesmawr Hall, Montgomeryshire.—Drawn by Mr. T. Edward Pryce	282
Penarth, Newtown, Montgomeryshire.—Drawn by Mr. T. Edward Pryce	283

CONTENTS.

A History of Stained Glass	289	Penarth	283	Provincial News	289
Preservation of Wood.—By George E. Tweddle, F.C.S., F.R.M.S.	260	Grosvenor Museum, Chester (with Plan)	238	Church-Building News	289
Notes	262	"Impasto" by Messrs. Doulton & Co.	283	Dissenting Church-Building News	289
Notes in Kent: With the Architectural Association Excursion (Illustrated)	263	The Edinburgh Exhibition	286	The Student's Column: Stone Quarries.—VIII.	290
The Chester Meeting of the Royal Archaeological Institute	265	Architectural Association: Visit to Oxford	286	Books: Murray's Treatise on Marine Engines and Steam Vessels (Crosby Lockwood); Kild's Ephronia (Wien: Carl Gerold)	290
Manchester Jubilee Exhibition Building	268	Cornish Bench-Ride (Illustrated)	286	Recent Patents	291
The Church of the Holy Trinity, South Shore, Blackpool	268	Essex Archaeological Society	288	Recent Sales of Property	291
Design submitted for Cheltenham Grammar School	268	The West Door of St. Mary's Church, East Bergholt, Suffolk	289	Miscellaneous	292
Maesmawr Hall	268	"Light Railways"	289	Price Current of Building Materials	293
		A Warning	289		
		Sir John Seade's Museum	289		

A History of Stained Glass.



THIS subject has been taken up by comparatively few writers, and all those who have dealt with it have had or have developed a degree of enthusiasm in regard to it which is easy, in one sense, to understand, but which readers who are not penetrated by any special sympathy with things Mediæval may find it difficult sometimes to fully adopt. The subject is, for one thing, peculiarly difficult to adequately illustrate. Few persons, in contemplating a fine window of the great period of Mediæval art, really regard the work from the point of view of pictorial design and expression, as they would regard a painting, for instance, of the great period of Renaissance art. It is the glowing and splendid effect of rich colour as seen by transmitted light, the magnificently decorative character of the work in connexion with the architecture which enshrines it and of which it seems almost to form a part, which enchains the sense of the spectator, and leaves him little room for the same kind of critical estimate of the figure design, which he might indulge in looking at the colder tones of an easel painting or a fresco. At the same time, it is this special quality of colour effect which it is impossible to reproduce in any illustration, least of all in any illustration such as can be multiplied for publication. Water-colour may reproduce a certain amount of the effect of the original, when deftly handled with that special object, and omitting every other pictorial consideration, of which we have seen one or two exceptionally successful examples in a recent exhibition at the Gallery of the Fine Art Society, in some of the drawings which were executed under the supervision, or at least at the instigation of, Mr. Ruskin. But when it comes to publication, even such partial success as this is out of the question. Chromolithography, the only available method for giving any multiplied copies of the colour design, may be said to be worse than useless. It will not, except now and then, by a happy chance, give even the right tone of colour of the original; and where it does so, it gives it with a hard dead texture, which is the furthest thing in the world from the scintillating glow of fine glass. The best authors and illustrators on the subject have therefore, as far as we have observed, entirely abandoned the attempt to illustrate the art in this manner in any published works. They confine themselves to illus-

trations in black and white, giving the design, the comparative contrasts of dark and light, and the leading-up construction,—the latter not an unimportant point in the character and history of stained-glass design. It is better to do this, and to waive all pretext of conveying the colour effect, than to ostensibly attempt it with a process which is only illusory. But then there comes this inevitable drawback to the enthusiasm which is demanded of us, that the subjects are presented to us shorn of the one effect which gives them their real glory in actual existence, and we are left at liberty to judge coldly of the stiffness and puerilities of drawing, design, and expression, which we might forget in contemplating their genuine decorative effect *in situ*. A design by Raffælle retains its essential beauty and expression even when given in an outline engraving. It is possible that to the enthusiastic student of Mediæval stained glass the same is true of these designs when reduced to black and white. But one must certainly be an enthusiast to think so, in many cases at all events. Take one example in the work before us,* that of the "Angel Playing a Harp, from the traceries of Blakeney Church, Norfolk" (plate xxxi., b.). Mr. Westlake expresses, we presume, his own genuine opinion when he remarks on the previous page, "Some of the tracery pieces at Blakeney are still filled with angels of the most excellent design and workmanship; they appear to be the work of some Westminster atelier." &c. Now, what does Mr. Westlake mean by this? He draws the figure himself, and he knows what passes for excellent figure design among artists. Here is a stumpy figure five heads high (we have measured it, so there is no doubt about it), with features rudely expressive of a commonplace self-satisfaction (nothing higher, certainly), in a short tunic, from under which project legs with feet drawn anyhow, one of them more like a bear's paw than a foot, with apparently rough trousers on, but these are intended as the nether wings of a seraph ("with twain he covered his face, and with twain he covered his feet, and with twain he did fly"), as one is enabled to conclude by comparing the bits of fledglings on the shoulders which represent the middle pair of wings. Although modern science keeps the anatomical difficulties of wings on anthropomorphic angels too much before us to allow us the same enjoyment in the idea which our forefathers had, still there is something poetic in the idea of the Biblical six-winged seraph, who is capable (always putting anatomy on one side) of being de-

veloped into a piece of very grand decorative design, eminently suitable for stained-glass treatment. But imagine any one not under the domination of Mediæval enthusiasm contemplating this idea of the six-winged seraph as a possible motive for design, and there having put before him as an illustration this bear-paw figure with feathered trousers and stumpy proportions; would he not probably say "this is the attempt of a child, and of a very unimaginative child"? And this, forsooth, is to be called "excellent execution and design"! This is saying the thing which is not.

In fact, the students of Mediæval stained glass acquire, as it seems to us, a set of entirely conventional perceptions in regard to design and drawing. They are so enamoured of their subject that any head or figure which approaches to decent drawing, though it would have no chance of admission at the Royal Academy, becomes in their phraseology "beautiful," "excellent," and even "splendid." Now there is no occasion for this exaggeration, which is inconsistent with a proper standpoint of criticism, and moreover gives great occasion to the adversary to blaspheme; and the subject is quite full of legitimate interest and beauty, without these illegitimate flights of laudation.

Mr. Westlake's third volume deals with the stained glass of the fifteenth century, with numerous illustrations, chiefly taken from English work, and is prefaced by a general introductory chapter, considering, first the general treatment of English figure windows and their details; secondly, subject windows and tracery; thirdly, heraldry; fourthly, foliage ornamentation, quarry work, and grisaille; and, lastly, the character of the material. The change of character of design in the windows with the architectural change to the Perpendicular style is, Mr. Westlake observes, rather behind the architectural change in date; which is what one would expect. The architectural details and their development were partly influenced by constructional questions which would not affect the windows, and the design of the latter, as far as such details as canopy work, foliage, &c., are concerned, followed the architecture at a little distance behind; and, as the author observes, in the later glass of the century the number of pinnacles which surmount the canopies give the heads of the lights a pretty and animated appearance. This is very well illustrated in the canopy-head from the west window of the Church of St. Martin-le-Grand, York, given in plate xx., a fine example of the use of architectural detail as window decoration, though there is rather more of perspective treatment in the details than is quite in

* A History of Design in Painted Glass. By N. H. J. Westlake, F.R.S. Vol. III. James Parker, London and Oxford, 1886.
† Isaiah vi., 2.

keeping with the notion of stained-glass design. The question of the employment of imitation of architectural detail as a portion of stained glass is one on which something may be said on both sides. Some have objected to it altogether; but, to our thinking, the employment of forms more or less common to the architecture around is one way of harmonising the design of the glass with that of the whole structure, and giving unity of effect; but the architectural details, when so used, should be modified,—treated as suggestions rather than as imitations. The Medieval artists did this to a great extent by a kind of natural instinct, though not always quite as much as would have been desirable. The introduction of architectural detail into stained glass in Renaissance designs, especially in modern German glass, has usually been very badly and coarsely done, with all kinds of unsuitable perspective effects. Rightly regarded, the modification of architectural details for stained-glass treatment ought to afford a good deal of suggestion for conventional decorative design of a kind suitable to the material.

Mr. Westlake rather questions Winston's characterisation of Perpendicular stained-glass as marked by "delicacy, sometimes even bordering on timidity, and general breadth of effect," giving examples of heads, one especially (the head of Jesse at Margaretting), which is bold and powerful enough. We cannot quite see, for our part, how "delicacy bordering on timidity," is reconcilable with "general breadth of effect," which latter does not seem to us to be the characteristic quality of Perpendicular glass, which is certainly weaker in general effect, though often much more finished in detail than earlier glass. In regard to floral ornament, there is a rapid descent from the bold character of earlier work to an elegant and finished but comparatively weak type of design; the transition is well indicated in some cuts from background diapers on p. 12. Mr. Westlake observes that in the later period, of which he is now treating, there is in foliage design "much less leading-up and greater simplicity of colour and design, the foliage being frequently simply painted and stained on the white glass"; not the way, certainly, to produce a powerful effect, or such as stained glass is best capable of. In fact, it was with the glass decorative detail as with that of the architecture, prettiness and facility of execution took the place of power and vigour.

The celebrated Fairford Windows come into the history of this period of the subject, and Mr. Westlake refers to the old controversy, much of which was carried on in our columns in 1868, in order to record again, and in a more definite manner, his protest against the Albert Dürer theory. He gives drawings of two of the windows to show their difference of manner and what, in a picture, might be called "touch," among themselves, and on another page the frontispiece from the "Nuremberg Chronicle," by Wohlgemuth, to show the difference between the style of the Fairford Windows and the German style of the early period of the career of Dürer; he also notes again the A on the sword in one of the windows, as a form never known to be used in his monogram by Dürer, who always used the straight-barred A. That the figures are by hands different from those by which most undoubted English windows were executed can hardly be questioned; on the other hand, Mr. Westlake points to the very English character of the canopies as evidence in favour of their English origin. Could they have been English made and designed windows, with figures copied from drawings by a foreign artist? The Albert Dürer theory is, to say the least, not proven, though there is an undoubtedly German look about some of the heads, several of which are separately illustrated to a larger scale (p. 60). It was supported at the time, most strongly, by some critics whose claims to be considered authorities on such a subject have at all events not survived them.

A chapter on Jesse windows forms part of this volume, in the course of which the author makes a suggestion as to the authorship of the

notable window of the Margaretting church,—announces "the discovery of a new link." It is probably by John Prudde, of Westminster, and executed about 1460." The reason for this is in the remarkable resemblance of design in certain figures with some of those in the Beauchamp Chapel at Warwick, known to have been executed by Prudde. A comparison between the illustrations given from the two sources will leave little doubt that Mr. Westlake has made a happy hit, and that there is at least a high probability that he is right.

The consideration of the subject windows of the century commences with that of the great east window of York Cathedral, the choir windows of which generally are among the largest and most important windows of this class. The author suggests that the east window may have been put in in memory of Archbishop Scrope, whose "judicial murder" took place in June, 1405, while the contract for the window was given in December of the same year. It was executed by John Thornton, "glazier" who was "to portray the said window with his own hand," and also to provide glass, lead, and workmen who were paid by the Chapter. For this service he had 4s. a week and 5l. at the end of the year for three years, with 10l. at the end of the third year, though Mr. Westlake doubts if he got this latter sum (apparently a bonus on completing the contract), thinking it probable that it took more than that time to complete the work. A drawing of the greater part of the window is subjoined, but the scale is too small to give anything more than a general idea of it. The head of St. Edward, from the base of the window, given to a large scale, is a very fine example of the work of the period. In regard to the north choir transept window, rather later in date, Mr. Westlake notes, "the colours used in the composition of the subjects are not numerous, nor are they so rich as in the Decorated and Early Perpendicular windows; both the ruby and blue backgrounds are lighter, and the latter very pearly in tone, whilst the yellow glass is of a full golden colour, and the stain is light and lemon-toned; pieces of spoilt ruby, varying from purple to scarlet tones, are admirably combined or contrasted with masses of toned white; it is essentially a whitish window, even the tracing lines and shadows being most delicate. The whole style of the work affords an interesting study, as exhibiting an advance, generally, to a more conventional Perpendicular character than is shown in the east window, whilst it is less advanced than the St. Martin window."

In several of the heads given in various illustrations a very bad effect is produced (worse, of course, in a drawing than in the actual work) by the lead-lines cutting right across the face, a point on which we have not observed that any comment is made. Considering the care which was evidently in general taken to frame a face within the lead-lines, we should imagine these instances were not originally designed so, but were the result of an attempt to make the best of breakages which had occurred either before or after the original leading up of the window. They are not precedents to be imitated, at all events.

Chapters on French, Flemish, and Italian stained glass of the period are added; that on France including among its illustrations two remarkably bold and powerful figure compartments from Le Mans Cathedral, the figures of St. Bartholomew and St. John, with very bold and grand foliage backgrounds; that of St. John is especially fine (plate lxxx). They form a curious contrast to what Winston, as noted above, calls the "timidity" of the English style of the period.

The whole volume, with its profuse illustrations, is of great interest, and invaluable to the student of the subject, as an indication of the direction in which to turn for the best opportunities for study.

Modern Methods of Illustrating Books.

This is the title of the new volume of Mr. Elliot Stock's "Book Lover's Library." It is written by Mr. H. Trauman Wood, the Secretary of the Society of Arts, and will be issued very shortly.

PRESERVATION OF WOOD.

BY GEORGE R. TWEEDIE, F.C.S., F.R.M.S.

THE importance of the problem to be discussed in this article has been recognised probably from the earliest ages, though when wood was more abundant and its employment relatively more limited, the immediate pressure of the difficulty was not perhaps felt so greatly as it is in these times. Wood may be briefly described as made up of longitudinal fibrous tubes arranged around the central pith. The function of the tubes, which vary in diameter from 1-2000th to 1-200th of an inch, is to carry the sap in a growing tree from the root to the branches. These ligneous passages contain the chief portion of the vegetable albumen and water, the modification and removal of which are among the objects aimed at by the wood-preserved. The proportion of vegetable albumen varies considerably according to the age and variety of the wood, soft woods containing it most abundantly, whilst dense hard ones contain very much less. Dry rot is the result of the attacks of certain fungi, notably *Merulius lacrymans*, *Polyporus hybridus*, *P. destructor*, and *Thelapora puteana*. The first is perhaps the most mischievous and frequently met with, and affects coniferous woods especially, whilst the second is frequently the cause of the deterioration of oak. The development, life history, and action of *Merulius lacrymans* has been recently carefully investigated by Professors Hartig and Poleck independently. Hartig points out that the fungus is "exceedingly sensitive to cold, and hence is never found in living trees, but only in human dwellings." The spores are so minute that about four million only occupy a cubic inch. In large quantities they form a light-brown powder. The germinating filaments are readily formed in nutrient solutions, but do not undergo great development unless in contact with wood, when they branch freely and penetrate readily from cell to cell and vessel to vessel. The perforation of the cell-wall takes place by chemical means; ferments being formed which disintegrate the part of the cell-wall with which they come in contact. Crystals of oxalate of calcium are often formed. Development outside the wood takes place only on moist surfaces.

The destructive action of this fungus depends chiefly upon its power of feeding upon the cellulose, the nitrogenous constituents of the sap, and the mineral constituents of the wood. Poleck found the proportion of mineral matter in the developed fungus to be very considerable, varying from 6.33 to 9.66 per cent., and this has all to be derived from the wood in which it has been resident.

A very important point in connexion with this fungus is that when the mycelial filaments have once been thoroughly deprived of water they have no power of resuscitation.

Wood exposed in warm, damp, ill-ventilated situations is most liable to be attacked by the dry-rot fungi.

Common or wet rot is not radically different from dry rot; both are caused by the total destruction of the longitudinal fibres of the wood by the action of fungi, many of which cause the timber to be more absorbent of moisture than it otherwise would be, and even themselves act as carriers of the water from the surface to the interior.

The liability of wood to rot depends, as is well known, largely upon variety, place of growth, time of felling, age, and mode of employment. A series of experiments, the results of which are given in Young's "Annals of Agriculture," may be quoted suitably here. Inch and a half planks of trees, from thirty to forty-five years' growth, were exposed to the weather for ten years and then examined, with the following results:—Cedar, perfectly sound; larch, heart perfectly sound, but sap decayed; spruce-fir, sound; silver fir, in decay; Scotch fir, much decayed; chestnut, perfectly sound; beech, sound; walnut, in decay; sycamore, much decayed; beech, quite rotten.

* Journal of the Royal Microscopical Society, February, 1886.

It must be borne in mind that in all cases, even timber is more liable to decay than when it is split, owing to the greater exposure of the silica. Young timber, too, rots far more readily than that of mature age. Certain higher forms of life than those already mentioned are also destructive to wood in certain situations. Thus timber exposed to the action of sea-water is able to be attacked by the *Teredo navalis*, popularly known as the ship-worm, or wood-borer, which, by means of its powerful auger-like head shell, bores into the timber, making circular passages, generally in a downward direction. Usually the *teredo*, when quite young, establishes itself in submerged timber some feet below low-water mark, and on by its own exertions, and those of its very numerous companions, the timber is honey-combed in every direction.

Limnoria terebrans, another enemy of wooden submarine structures, attacks the surface, principally to a depth of about 1 in.; on a surface of wood, 1 ft. square, upwards of 4,000 perforations due to the exertions of its minute crustacean have been observed.

Finally, in special circumstances, the attacks of various insects, such as ants, have to be provided against.

These preliminary remarks will clear the way for an intelligent consideration of the means adopted or proposed for extending the longevity of this important and indispensable building material. The first class of protective processes are those which involve the seasoning or drying of wood.

The general object and effect of timber seasoning is to remove at any rate the greater part of the water, so leaving the putrescible part of the sap in a form less inviting to the attack of fungi and insects, and also to reduce the tendency to warping and splitting owing to the expansion, contraction, or actual loss of retained water due to alterations of temperature and exposure to air.

Exposure in stacks and sheds to the open air, if sufficient time can be allowed, is probably the safest if the most tedious. From ten to fifteen per cent. of water is still left in well-seasoned timber, and as much as twenty per cent. has been found in fir and pine even after two or three years' stacking. Still this amount is too small to cause the wood to warp, and except in very trying situations it will not, as a rule, develop any tendency to rot, though, of course, unless the wood be protected by the construction of air-passages round it and application of good adherent paint or other surface protection, even though well dried, it may succumb to the attacks of fungous growths or insects.

The natural process of seasoning is most effectual and speedy if the tree has been felled when most free from sap, and if modern users of wood were able to allow sufficient time for the carrying out of this operation, which does infinitely less violence to the internal structure of the wood than any artificial mode of drying, might be possible to make the material, if properly used, last as long as the oft-quoted Egyptian mummy. In Cresy's "Encyclopædia of Civil Engineering" are the following pertinent remarks which should be carefully considered by modern builders:—"The well-seasoned timber employed by the carpenters of the Middle Ages, in the old halls particularly, is as well as in our churches and chapter-houses, needed neither paint nor dressing of any kind to preserve them, and in many instances they are found sound after four or five centuries. The feather-boardings of our English barns, which in many instances is of undressed elm timber, was its durability to a hard external surface, which it acquires by time and which resists almost the edge of a sharp tool or the point of a nail, apparently a coating of silica quite impervious to moisture; this silica may be derived from the decomposition of the wheat-straw with which these barns are often batched."

In addition to air-curing, the immersion of wood in water is another old system which has especially favoured for raincoatings, &c. Tanning water seems to be the most effectual, the soluble matters of the wood being largely removed, and if the subsequent drying of the

wood be carefully and slowly carried out, its durability is enormously increased. Even when dry-rot has actually commenced its ravages, prolonged submergence of the timber will sometimes cure it.

Of the artificial modes of drying, there are many, and for the most part they are of more than doubtful utility. They include drying by artificial heat in close or open chambers, charring, steaming, boiling, subjection to currents of hot air, or to the action of various gases, products of combustion, &c.

In Newmann's method, the wood was placed in a large wooden box, steam was admitted, and the condensed vapour, sap, and albumen drawn off: when the condensed liquor was colourless the wood was withdrawn. Superheated steam has been suggested as likely to give better results.

Davidson & Symington's process involved the exposure of the wood to a rapid current of warm air (temperature about 112° F.), and this was said to give good results. In 1837, M. de Macquenien invented a process in which also the wood was subjected to a current of heated air, which was impelled by a blower entering the chamber at the bottom, and leaving it at the top. An obvious improvement was a reversal of the points of entrance and exit, since, owing to its lightness, heated air tends at once to rise to the top of the chamber and escape, so that it would not be left so long in contact with the wood as would allow it to withdraw the greatest amount of water.

In a process tried many years ago at Woolwich, the best-remembered results of which are the fatal effects of the explosion which followed, the green logs were heated in pulverised charcoal, and subsequently exposed to the products of the destructive distillation of pitch-pine sawdust.

In the American "Journal of Science" for 1820 the use of air-slacked lime is recommended as an hygroscopic agent, the timber being buried in it. In 1874 the drying of timber by exposure in a closed chamber to a current of carbonic acid gas was patented; whilst another patentee suggests that green wood should be cooked in its own juice, by being heated in closed vessels, under pressure, and in such a way that the sap is kept in and the water only removed.

M. Charpentier's apparatus involved the use of an hermetically-sealed chamber, in which the wood was exposed to the action of air heated by passing over metallic plates, and introduced through four longitudinal tubes disposed on the floor of the furnace, from which it was discharged into the drying-chamber.

An attempt to obviate the tendency of artificially desiccated wood to split involved the gradual cooling of the material by use of cold air under pressure.

In 1871, the preservation of wood by drying with the aid of the products of the combustion of refuse wood was patented; the water, it was claimed, being first evaporated, and the tarry and acid products from the wood then absorbed.

With regard to this latter matter, it will be obvious that the greater porosity of artificially-dried wood makes the necessity of superficial protection even more urgent than is the case with the naturally seasoned material; but, on the other hand, this very condition enables absorbent preservative liquids to be far more effectively applied, and indeed desiccation of some sort, of the wood should always precede, if possible, the application of such preparations, as otherwise the contained water will obstruct, and in the case of those of an oily nature, actually repel their entrance into the pores of the wood.

A brief reference may here be made to the nature of the various coatings that have been suggested as useful for the prevention of the attacks of insects, cryptogamic growths, &c., only dealing with those special expedients which have been recommended or patented for the purpose of extending the longevity of wooden structures under exceptional or ordinary circumstances. As regards ordinary paints, washes, tar, &c., their protective character is pretty well understood, as well

as their comparative uselessness in trying situations, exposed to rapid alternations of heat and cold, dryness and moisture.

For posts, fences, tubs, and other structures set in the earth, the following composition, which forms an enamel-like impervious coating as hard as stone, has been found to be effective:—Forty parts of chalk are added to fifty parts of resin and four parts linseed oil, melted together in an iron pot; one part of native oxide of copper is then added, and one part of sulphuric acid cautiously stirred in. The mixture is applied hot with a strong brush.

A patented composition for a similar purpose contains galipot, resin, and turpentine mixed with powdered antimony and sulphate of copper.

In 1866 the use of asphaltum dissolved in linseed or other vegetable oil, and applied cold with turpentine, or hot without, was also the subject of a patent.

A so-called "mineralising" composition for wooden paving blocks was patented in 1868, and contains resin, boiled oil, wood, tar, naphthalene, and plumbago.

A French inventor, about sixteen years ago, took the trouble to patent a composition made up of potter's earth, with fish and ground-nut oil, soot, vegetable or animal black, and hair, but it is not easy to conceive what special advantages the mixture could possess.

Messrs. Douglas & Watson recommended, in 1870, the application first of a resin soap containing alkali, and then, before the first coat dries, a solution of alum. In this way an insoluble film was formed of a kind of basic soap, containing alumina and alkali, but its durability could be but moderate, and its advantages over good white lead paint difficult to appreciate. In another patent an insoluble soap is obtained by employment of sulphate of iron, alumina, or copper; this is then dissolved in a suitable hydrocarbon and brushed over the wood. Resin dissolved in carbon disulphide; resin, copal, and other gums dissolved in hot paraffin wax; a compound made by melting caoutchouc with soot; melted "ozocerite," a mineral wax; pitch dissolved in carbon disulphide, petroleum spirit, or other hydrocarbon; a mixture containing resin, sand, pitch, naphtha, &c.; paraffin and gutta-percha melted together; a mixture of petroleum, resin, galipot, caoutchouc, and vegetable oil; another of naphtha, resin, turpentine, and linseed oil; boiled tar and sawdust; and many others, are compositions which have been patented comparatively recently, very few of which possess any conspicuous merits.

The use of metallic sheets or foil to enclose exposed woodwork; the coating of the surface with galena or sulphide of lead; with Spence's Metal (a compound containing iron and copper sulphides melted with sulphur); with thin sheets of indiarubber, have all at various times been patented.

The casing of the ends of posts, piles, telegraph-poles, &c., which are in contact with earth or water, in earthenware, sheet iron, or zinc sockets, the space between the casing and the wood being generally filled in with pitch or asphalt, has been the subject of several patents. Copper sheathing, though largely used for submarine woodwork, is of little use against the attacks of the *limnoria*, which get between it and the wood, and the destructive work goes on undisturbed.

The use of asphalt applied in the following manner should be efficient for all exposed woodwork; a coating of pitch or tar is first applied, and then the asphalt, using hot irons to smooth and incorporate the surface. This mode of application was patented by Finlay in 1872.

Wrought-iron nails, with heads about 1 in. square, driven into the piles close together, was recommended by Mr. S. Clegg as an effectual preservative of submerged woodwork. The iron corrodes and forms a solid impenetrable rust over the surface of the timber.

Another plan applicable to piles and similar woodwork, which was said to give good results, consisted in the formation around each pile of a wooden casing, leaving about 1 in. clear all round, which was rammed full of

cement concrete. This effectually stops the ravages of teredo, limnoria, &c.

In regard to patented compositions for the protection specially of submarine woodwork, their name is legion and their complexity amazing, the general aim seeming to be the introduction of as many substances as possible that would be likely to disagree with the digestions of the attackers of the structure. A large number contain barium salts as their poisonous basis, incorporated with various oils and varnishes. A mixture of arseniate of copper, oxide of iron, chalk, strychnine, concentrated extract of tobacco, borax, coal tar, linseed oil, or turpentine, was patented in 1868. Another contains oxide of zinc in a solution of india-rubber and aloes.

Tarr & Wonsen's patent composition consisted of forty gallons of wood tar and thirty gallons of naphtha; dry ochre was then thoroughly incorporated together with 40 lb. of white arsenic and 160 lb. of oxide of copper. For fresh water coal tar was substituted for wood tar.

A composition containing gas tar, marl, acetate of lead, alum, and sulphate of ammonia is also the subject of a patent.

In 1881 Messrs. Brown & Mitchell patented a compound made up of the refuse from arsenic furnaces (containing zinc, tin, &c.) ground up with ochre and oils and then incorporated with tar and pitch. This was stated to be especially effectual in preventing the growth of weeds and the adhesion of barnacles.

In the same year (1881) Mr. Denny, of Singapore, brought out a preparation made from the "powder obtained by suspending zinc in a semi-saturated solution of sulphate of copper; the resulting powder after drying and grinding is mixed with the juice of a tree known as *Elococcus vernica*, which is sold by the Chinese as vah-ni-shi, or white varnish.

Of other expedients that have at various times been suggested for general woodwork, the following are some of the principal:—The use of sublimated zinc dust or powder as the base of a protective paint; the use of washes containing Portland cement, lime, and sand; a paint containing whiting, baryta, linseed oil, and zinc oxide; the employment of compounds containing *zyloidine*, or the product resulting from the action of a mixture of nitric and sulphuric acids from woody fibre, mixed with various gums and oils.

A curious, but not very practical, patent involved the use of a sulphide of silicon, which was to be applied to the surface of damp wood, decomposition ensuing, with evolution of sulphuretted hydrogen, insoluble hydrate of silica, or silicic acid being deposited on the surface of the wood, and forming a protective film. Tank waste from alkali works, which is rich in the unpleasant sulphides of calcium, has often been recommended for the prevention, and even the cure, of dry rot. The spaces between floor-joists should be filled up with it, and it can also be applied to the ends of beams resting on the walls.

A certain class of preservative paints, which are also fireproof, are nearly all composed of asbestos, mica, borax, soluble phosphates and tungstates, and similar materials, suspended in or mixed with a solution of silicate of potash or soda (soluble glass). In all such compounds, however, adhesion is very imperfect, exposure to weather causing blistering and flaking off; consequently the surface of woodwork so treated requires frequent renewal. Polacci's compound for preserving and rendering wood incombustible contained sulphate of zinc, potash, alum, black oxide of manganese, lime, and common salt mixed with water, and a little sulphuric acid. Another patentee recommends the application first of silicate of potash and then of lime; in this way a fairly adherent coating of silicate of lime is formed.

Mixtures of the silicates of lime and magnesia; of asbestos, chalk, and soluble silicates; of powdered glass, ground porcelain, powdered stone, lime, and silicate of soda; of gelatinous hydrate of alumina, with an alkaline silicate, have all been patented as useful for fireproofing and preserving wood.*

* To be concluded in our next.

NOTES.

THE new Government have already announced their intention of introducing a Railway Bill in their legislative programme. The materials for a good measure, and one satisfactory to all parties, are available, as Mr. Stanhope went thoroughly into the question as President of the Board of Trade under the last Conservative Administration; and, while the proposed Bill will be on the lines of the one prepared by that gentleman when in office, some of the features of Mr. Mundella's Bill will doubtless be also adopted. The latter measure has been so recently and so fully discussed, that its good and bad points will be fresh in the minds of members,—though several of its most prominent supporters and opponents are not in the newly-constituted House. In the face of the still decreasing dividends declared by the railway companies, it is certain that nothing manifestly unfair to them would, if proposed, receive support, but there is no doubt that a measure adjusting some of the anomalies and difficulties which have so long called for legislation would speedily pass into law.

IT is not surprising that in these days of canal-cutting enterprise, the old idea should have been revived of cutting a canal from the sea to the Birkenhead Docks, across the low flat country lying between the outfalls of the Dee and the Mersey, and thus getting a passage which will enable ships to avoid the bar of the Mersey. Mr. H. E. Baggallay, C.E., has prepared a plan of the scheme, which we imagine to be a perfectly feasible one, and which was, in fact, brought prominently forward half a century ago, when Birkenhead, as a town, may be said to have been founded. Great things were expected from it for the new port on the left bank of the Mersey; it was prophesied that before many years Liverpool would be referred to as a town "near Birkenhead"; and the lines of new streets were laid out on the Birkenhead side in preparation for a town on a grand scale; the curb-stones for the projected streets, which never came into existence, being long after visible, radiating in straight lines through fields and common land. These outlying portions of the present town have now assumed a suburban character, and are, in fact, practically suburbs to Liverpool rather than to Birkenhead; but there is no saying what revivifying effect the proposed canal might still work if carried out. The ground seems almost made for the purpose of such an experiment.

SIR DANIEL GOOCH'S explanation, at the 102nd half-yearly meeting of the Great Western Railway Company, as to the non-opening of the Severn Tunnel, cannot be regarded as wholly satisfactory. It is now a considerable time since we were told that "the first passenger train passed through the tunnel, which may now be regarded as an accomplished fact." ["The whole of the tunnel under the river," it was then stated, "is as dry as possible; but on the Monmouth side, where a spring was met with, there is a slight leakage, which will be stopped in a few days by caulking and cement work."] In the Report for June 30th, 1885, the directors anticipated the establishment of traffic through the tunnel in the spring of the present year. Now, however, it seems that this has not been attempted, "as Sir John Hawkshaw considered that the final completion of the works might be thereby retarded." In addition to this, we are now further told of the construction of a "new permanent pumping-shaft at Sudbrook": of the erection of "two of the permanent pumps," and of the completion of "permanent engines and pumps at 6 miles 36 chains." All this pumping from a work described to be "as dry as possible," is not what the shareholders were led to anticipate; and it will take something more in the way of statistical information than the Chairman has yet vouchsafed to show that the construction of a costly tunnel of 7,664 yards long, of which the brickwork is in

some parts 3 ft. thick, and which needs so much permanent pumping, in order to shorten the distance between Cardiff and London by thirteen miles, is a very well-considered expenditure of capital. Nor is it clear what the hope expressed by the Chairman as to obtaining "enhanced traffic from the North and West of England" can have to do with this dip under the Severn.

IN regard to the competition for new Municipal Buildings for Edinburgh, as the Corporation have adopted the now too-prevalent custom of requiring architects to make a deposit of money (3*l.* 3*s.* in this case) before they can ascertain in detail what the requirements of the competition will be, we give some particulars which have been promulgated in the *Scotsman*, which may serve as a guide to some young aspirants as to whether it is worth while to risk their guineas or not:—

"The conditions of competition specify that each design must be illustrated by geometrical drawings of the plan of each floor and of the roofs; that elevation of each external facade, the sections, one including the cost of construction, showing the location of the internal court or courts; a block plan, showing the proposed buildings with reference to the adjacent streets and houses, and detail drawings of the principal features of the design. Further, each competitor is to submit a probable estimate of the cost of the entire structure according to his design, and that the element of cost must form an important consideration in judging of the merits of the design." It is laid down that the main staircases, corridors, and internal spaces must be of ample, though not excessive, dimensions, and that courts, rooms, staircases, and corridors must have lofty ceilings, and be well lighted and ventilated. All external facades and those to the cost of the stone, the floors of fireproof construction, the roofs to have their constructive portions in iron, while the stairs are to be of stone. Ample lavatory accommodation, thoroughly ventilated, and on the most approved sanitary principles, has to be provided; as also a pair of passenger elevators, and a hoist for lifting coal from the level of Cockburn street up to the highest floor. All canvassing of the Magistrates and Council, or of their assessors, in favour of any particular design, is not to be admissible. After the prize award has been made public, the Magistrates and Council take power publicly to exhibit all the designs.

We hope the plans and particulars will be got out in such a manner as to justify the deposit. In some similar cases they certainly have not been.

THE new form of Charter of the Institute of Architects is in the hands of members, and we will give some special consideration to it in detail in our next.

THERE is no department in the local government of our towns and cities which shows such variations and irregularities as that of scavenging; and any light that can be thrown on the subject from present or past experience should be of considerable value. This is well exemplified in the case of two populous seaports in South Wales, viz., Cardiff and Swansea, both rapidly increasing towns under very much the same industrial conditions, and, to a certain extent, rivals of each other. Yet between these two places there is a most remarkable difference in the cost of keeping them clean. Cardiff has not only the largest population, but one which increases at quite an alarming rate, the inhabitants of 1881 numbering 85,378, while now they are estimated at 97,034. The following short table shows that while the population grows at an unusual pace, the expenses of scavenging have grown still quicker:

Year.	Occupied Houses.	Cost of Scavenging.	Cost per House.	Cost per Head.
		s. d.	s. d.	s. d.
1875	7,000	£3,127	8 11	—
1878	{ After the extension of (the borough.)	5,103	—	—
1881	12,113	6,607	10 10	1 6
1883	—	8,420	—	—
1885	16,939	11,494	13 7	2 5

Since 1881 the population has increased 13 per cent., the number of inhabited houses by 33 per cent., and the cost of keeping the town clean by 60 per cent., while the wages paid in 1875 to the men employed in the scavenging amounted to 767*l.*, rising in 1878, to 1,519*l.*; in 1881 to 3,892*l.*; and in 1885 to 6,528*l.* During the past ten years the rateable value of Cardiff has increased 150 per cent., the

salaries of corporate officers 210 per cent., and the cost of scavenging 370 per cent. It need scarcely be said that the Cardiff scavenging is not done by contract, as it used to be done ten or eleven years ago, but by a Health Committee. Swansea, which has forty miles of streets and over 12,000 houses, does its scavenging by contract, the contract amounting to 4,622*l.*, or at the rate of 7*s.* 8*d.* per house. As the streets of Swansea are kept up as clean as those of Cardiff, it is scarcely to be wondered at that the ratepayers of the latter town should be inquiring why they have to pay nearly double the price.

NO visitor to New York could fail to be struck with the dense and complicated network of telegraph-wires, which, until very recently, stretched along the Broadway and principal thoroughfares, a network that was as disfiguring as it was dangerous. This nuisance, however, has just been removed, not only from that city, but from Chicago, Washington, St. Louis, and other big towns, by a legislative decree providing for the compulsory abolition of overhead wires. In future, not only the telegraph, but also the telephone and electric light wires, are to be conducted underground, either in conduits or tunnels beneath the pavement, and by this means a very remarkable improvement will be effected in the latter of street architecture, while some very tangible dangers are removed from the passers-by. Even in this country, where we are not accustomed to such violent alternations of wind-orce as take place in America, deaths have occasionally happened from falls of the wires during heavy snowstorms, while even in the country, where such contingencies are not likely to occur, considerable loss of property frequently is occasioned by the blowing down of posts during a gale. All these mishaps would be rendered impossible by an underground communication.

THE curious battlements crowning the *Cà d'Oro* at Venice, and the absence of a cornice, have been frequently remarked upon, and it has been suggested that the present termination of the building is not original. Signor Boni, to whom we are indebted for several interesting discoveries in his native city, has ascertained that the battlements undoubtedly formed part of the original design, and has recovered the design of the cornice which formerly extended the width of the building next the Grand Canal. The front cornice has disappeared with the exception of some of the brackets supporting the arcades, but the position of the arcading is clearly indicated, and a portion of the cornice still exists on the return next the narrow street or *calle* adjoining the palace to the eastward, from which it has been easy to reconstitute the design of the entire cornice. The original agreement for the building of the *Cà d'Oro* has been recently discovered by Signor Bartolomeo Cecchetti, the Superintendent of the State Archives, among the papers of the Procurators of St. Mark. The architect was John Bon (the designer of the famous Porta di Carta and an ancestor of Signor Boni), and it appears that the work was carried out by the proprietor Count Contarini himself, who stipulated that certain old materials should be utilised in the building. This explains the presence of some antique marbles and fragments of Byzantine sculpture in the front of the palace, which have exercised the ingenuity of some archaeologists who have endeavoured to assign a greater antiquity to the building than its general design suggests. The date of the *Cà d'Oro* is clearly fixed, by the documents recently discovered, as belonging to the early years of the fifteenth century. In the building agreement the architect, John Bon, with his son, Bartholomew and his two assistants, Zane and Rosso, undertake to work for one year, from the 4th of August, 1424, for the sum of 140 gold ducats, or about 70*l.* English money. The *Cà d'Oro* was richly gilded and coloured externally, traces of this decoration being still visible in places, and there seems to be very little doubt that it owes its popular name to this fact, notwithstanding various ingenious suggestions to

the contrary, which seek to derive the name from the family of Doro.

A MOVEMENT is on foot for the restoration of one of the oldest and most interesting churches in the Principality, viz., that of Llantwit Major, near Cowbridge, in Glamorgan-shire, a village which is almost unique for its ancient associations and existing remains. Llantwit was not only a monastery, but a very famous university or school of divinity, founded by St. Illtud in the fifth century, and said to have included among its *alumni*, Gildas, the historian, St. David, and even Taliesin, the oldest of the Welsh bards; while the number of less eminent students was so great as to have necessitated 400 houses and seven lecture-halls. The church is of different dates: what is called the new church, which is of the thirteenth century, being, curiously enough, older than the other part, which is a couple of hundred years later. At the west end of the latter are the ruins of a Lady Chapel, 40 ft. in length; but the chief interest lies in its tombs, one of which has a row of lozenge-shaped compartments, with an arabesque ornament on one side, and a series of interlaced rings on the other. In the churchyard is an upright stone, believed to be Runic, and the shaft of a cross to the memory of St. Illutus, or Illtud. The antiquities of this quaint village are not confined to the church, for close by is a very singular little Town Hall of Norman date, with a flight of steps by the side and an inscribed bell in the gable, while for some distance around there are traces of ruined buildings, probably those of the University. Upwards of 700*l.* has been already subscribed towards the restoration, and, considering the historic celebrity of the village, there is no doubt that sufficient money will be found for the purpose.

THE Bath Town Council have had a little difference about the payment to their architect, Mr. Davis, of the commission payable on acceptance of tenders for the new baths. One of the Council did not think an architect should be paid "in this way," and instanced a case where the same gentleman had been asked to make sketches for a new bridge, and "did not bring in his bill for a considerable time." There is in the world, we believe, a general feeling in favour of people who "do not send in their bills for a considerable time": the Bath Town Council are not singular in that respect. Another member proceeded to explain that "the Society of British Architects," by which we presume he meant "the Institute of British Architects," had laid down rules for the guidance of architects in regard to the method of charging their commissions, and proceeded to specify these. Thereupon arose a protest on the part of the Mayor and others present that such "rules" were not binding on them. Who ever said they were? That is a misconception which is constantly cropping up. The Institute never laid down any "rules" for architects' charges; they specified certain charges as fair and right, thereby giving the architect who made such charges the weight of their representative opinion to back him. But the Institute make no pretence that such charges are binding on any one, as Judges and Lawyers and Town Councillors are always pretending they do. This sort of insinuation is constantly being made, and there is no ground whatever for it. Eventually the Council concluded (and correctly) that it is not usual to pay an architect more than half his commission when the tenders are accepted and before any work has been commenced, and dealt accordingly.

IT appears from a recent letter in the *Times*, that the artistic correspondent of that journal, who can see no difference between ancient and new mosaics, has gained the suffrages and sympathies of that particular surveyor who, at a meeting of the Institute of Architects for considering the decorative treatment of domes, distinguished himself by the suggestion that St. Paul's dome would be best treated by a coat of whitewash. *Arcades ambo!* It would be interesting to know on

whom it devolves, in the *Times* office, to decide upon the fitness of correspondents to instruct its readers in art and architecture, and how the decision is arrived at.

NOTES IN KENT, WITH THE ARCHITECTURAL ASSOCIATION EXCURSION.*

ON Wednesday (the 11th) the first place on the programme was Penshurst, the way to which lay through Hadlow, where there is a lofty prospect-tower, perhaps 200 ft. high, built earlier in the century by the then owner of the house, and coated from top to bottom in cement. It might serve as a good advertisement for the cement-makers, since there is not a flaw visible, but as an architectural feature it can only excite wonder and derision. Penshurst is too full of interest to be properly treated in notes such as these. It is a large and straggling collection of buildings of varying dates, picturesque and stately from every point of view, surrounded with splendid old gardens, which stretch away with steps and terraces, out yew hedges, long alleys, and straight grass walks, till they meet the ancient trees of the park. Beyond one part of the enclosing wall lies the church, which from the village is approached under a picturesque half-timber cottage. The house itself, however, claims chief attention. The hall, dating from about 1341, is one of the largest and loftiest in any private house, and speaks of the great opulence and power which the builder must have possessed. It was built by Sir John de Pulteney, who purchased the manor from the De Penchesters, who are the earliest recorded possessors. Sir John's son alienated the estates to one Guy Lovain, whose son, Sir Nicholas, left a widow. She for her third husband married Sir John Devereux, who added a large wing towards the close of the fourteenth century, having obtained a licence to build and embattle here in 1392. After his death the estates passed through many hands, till they came to their most illustrious possessors, the Sidney's. Edward VI. in 1552 granted Penshurst to his tutor, Sir William Sidney, who had distinguished himself at Flodden Field. Sir William did not long enjoy the estates, as he died in the following year, and was succeeded by his son Sir Henry, to whom we owe nearly all the later buildings. These are all of brick, while the older buildings are of stone, and the two materials, under the kindly hand of time, combine to form the most beautiful masses of colour. The buildings of the Sidney's may be recognised not only by their material, but by the heraldic arms and cognisances with which that family adorned all that they built. Penshurst has always been a lovely place. Even when the brick buildings were new the air of antiquity remained, and Ben Jonson sang their praises, along with those of the orchard and the garden, and, above all, of the noble Sidney who lived there:—

"Now, Penshurst, they that will proportion thee
With other edifices, when they see
Those proud ambitious heaps, and nothing else,
May say, their lords have built, but thy lord dwells."

Sir Henry married Lady Mary Dudley, sister of Queen Elizabeth's favourite, the Earl of Leicester, and the alliance is recorded in the buildings by the use of the bear and ragged staff as an ornamentation on the screen in the hall. Sir Henry's eldest son was the celebrated Sir Philip Sidney, who succeeded to the estates only a few months before his early death. The architectural history of the place may be said to close with Sir Henry's death, for after that no building of importance seems to have been done till quite modern times.

Ever was to have been visited next, but the occupier objected, and therefore Somerhill, the seat of Sir Julian Goldsmid, just outside Tunbridge, was substituted. Somerhill is interesting chiefly as being one of John Thorpe's works. A plan of it, entitled, "Lo. Clarickard," is in his book at the Soane Museum. It was built by Richard Burgh, Lord Clarickard, and some of the spouts bear the initials R. C. and the dates 1611 and 1613. There is not much detail left, but the general appearance is stately, the old stable-yard is picturesque, and the new stable buildings, designed by Mr. T. H. Watson, are particularly happy, and add very much to the whole effect. Tunbridge Castle was visited on the way back to Malling, but of this it may be said, as of Allington and Leybourne, that it is

* See page 226, ante.

food for the archaeologist rather than for the architect.

Thursday morning saw the excursion on the way to Boughton Monchelsea. Boughton was a fine place once. North of the house lay the kitchen garden, within a fair stone wall. Opposite the front was a broad green sward, with geometrical flower-beds and prim plantations on either side, and a tiled path running down the middle to a bowling-green, bounded on the further side by a trimmed hedge, under which a path led to another collection of parterres, a little way down the hill. Southwards from the front of the house, a broad green walk led to a detached summer-house, such as still exists at Severn End in Worcestershire. The house was bounded on the south by a court, beyond which lay a green-court, and on the west by the wood-yard. Most of this is altered now. The bowling-green has disappeared, and so has the summer-house; across the space where the bright parterres used to be, the carriage-drive now sweeps, and the prim plantations have turned into a fine irregular mass of trees. But the wide view is the same, and if ever the builder of the house went to the brow of the hill to enjoy the prospect, which is much to be doubted, for the admiration of scenery as scenery is a growth of the last century and a half; but if ever he did linger on the prospect, it must, in its main features, have been such as may be seen to-day. The disposition of the nearer fields, no doubt, was different; but where the eye ceases to take in details it would hardly find much change. The same green hop-fields, stretched away to the distant hills, varied by the smoother meadows and rougher woodland. Red roofs peeped out amid the trees, and the same towers and spires rose from the encircling trees, just as they do to-day.

The house itself has changed with the changing times, and though the exterior retains much of its original appearance, the interior has been completely altered by different owners, and now is chiefly modern. There is a good Queen Anne staircase, and there are one or two scraps of sixteenth-century glass, some of which bear the date 1567, with the arms of the then possessor, Robert Rudston.

It would serve little purpose to give the history of the manor previous to the building of the house. The possessor at that time was Robert Rudston, son of Jas. Rudston, who was Lord Mayor of London in 1528. Robert Rudston died most of the building in the years 1555 and 1576, and his son Belknap Rudston settled the estate on his kinsman, Sir Francis Barnham, from whom, by marriage, it has descended to the present owner, Mr. Rider. The church has been almost entirely rebuilt, but there is a good old lych-gate left.

East Sutton has one of the most interesting churches visited on the excursion, and it has the rare merit of being unaltered. The north chapel, of Decorated work, is the best part of the structure, and its two elaborate windows, one of which is beautifully treated on the inside as well, found their way into many sketch-books. The manor of East Sutton came into possession of the Filmer family by purchase early in the reign of James I., and as it has been in their possession ever since, the church contains many of their monuments, as well as some to the Argyll family, their predecessors. One or two of them are particularly good.

In the chancel is a large brass of unusually late date, to Sir Edward Filmer (who died in 1629), his wife, and eighteen children, the whole family being duly depicted on it. This Sir Edward was the purchaser of the manor. He had previously resided at the adjacent house of Little Charlton, said to have been built by his father, Sir Robert Filmer, in Elizabeth's reign, but the date on the house of Little Charlton is 1612. Whether it is the original date, or a copy, or an invention, it is not easy to determine, for the house has been restored and enlarged. However this may be, Little Charlton was the first home of the Filmers in this parish, but when Sir Edward bought East Sutton from Sir John Argyll, whose sister he had married, he left Charlton and took up his residence at the manor-house by the church. Both the houses still remain. That by the church has been enlarged and altered till little of the original work remains. Little Charlton has also been enlarged, but one wing of the old house remains and is figured in Nash's mansions, and there are several features still remaining inside.

Leeds village was the next place visited. Some of its houses are very quaint and picturesque, and date from the fifteenth century, vieing in age with much of the castle itself. The church is a fine one, as churches in this district go, and the earliest parts of it date back as far as the Norman period, showing that there must have been a community here long before the earliest existing parts of the castle were built, unless we except the foundations, which are attributed to Odo, Bishop of Bayeux, and a half-brother to William the Conqueror. The greatest historical interest of this neighbourhood attaches, of course, to Leeds Castle itself, and it is a curious sight to see an ancient fortress on tiny islands, with walls rising sheer from the waters of the lakelet, inhabited as a modern residence, with all the signs of a well-kept and frequented place about it. It is true that the most distinctly Medieval part has a ruinous air; the grim gateway has been converted into a porter's lodge, but the remains of the machicolations have been left and serve to point the comfortable moral that the world has grown more peaceful since they were devised for the purpose of casting unpleasant objects on unwelcome visitors. The castle must in its day have been a place of strength. It



stood on three islands, of which two are now left. On the first was the barbacan and flour-mill; on the second, the gateway, the court-yard, and part of the castle; and on the third, far removed from the land, and only accessible across the other two, stood the bulk of the castle itself. The barbacan and mill are now indistinguishable ruins, and the waterway that divided them from the land has been filled up. The gatehouse, too, has a ruined air about it, but still serves as a gatehouse and porter's lodge. The court-yard is a broad mass of turf shadowed by trees, and intersected by the carriage-drive. That part of the castle which stood on the second island was rebuilt sixty years ago. It is the third island that retains the chief part of the old work. This, however, has lost its purely Medieval character, since it was rebuilt in Henry VIII's time, and its appearance is rather that of a manor-house than a fortress. The portion that was rebuilt sixty years ago was the work of the possessor in Elizabeth's reign; the structure that now takes its place was made to harmonise with the earlier work of Henry VIII's time, and the general effect is decidedly good and stately, though the detail is devoid of interest.

The history of the castle is full of stirring incident, for it was in the possession of the Crown, and dominated the whole of this part of Kent. William of Wykeham was at one time Chief Warden and Surveyor of the King's Castle of Leeds, but there is no work left which can be ascribed to him. In 1512, Sir Henry Guldeford was appointed by Henry VIII.

Constable of Leeds and Keeper of the Park, and he thoroughly restored the castle at the king's charges. It is chiefly his work which gives the castle its present character. So far back as the year 1320, at an earlier time than most of the existing work, and when, possibly, the castle was not so elaborately defended, it was under the governorship of "the rich Lord Badlesmere," but he, "being puffed up through ambition and his great wealth," forgot his allegiance, and joined with the Earl of Lancaster and other barons who were discontented with Edward II. The castle was under the care of the Castellans, Thomas Colepeper, when the queen endeavoured to gain it by a ruse, feigning a pilgrimage to Canterbury, and sending to the castle to demand lodging for herself and retinue. The stout Castellans refused to admit any one without letters from his lord, and the vexed queen retired discomfited. The king, enraged at the indignity offered to her, laid siege to the castle through the Earls of Pembroke and Richmond, and the discontented lords not coming to the rescue, the castle finally capitulated. The brave Castellans were hanged; Lady Badlesmere and her children were sent to the Tower of London, and the rich lord himself was pursued and finally taken prisoner, and thereafter hanged and drawn at Canterbury, where his head grimly garnished one of the gates.

Some three quarters of a mile to the south of the castle used to stand the Priory, or Abbey, as it was more recently called. It was granted at the Dissolution to Sir Anthony St. Leger, and after passing through various hands came into those of William Covert, a scion of the great family of Covert, seated at Slaught Place, in Sussex. He put a new front to the house that had been made out of the old buildings about the year 1598, and, judging from a plate in Harris's history, it must have been a fine piece of work; but the remains of the abbey now are but scant, and offer no subjects for the architectural pencil.

It is not far from the castle to Hollingbourne, where lie buried many of the Colepepers. The church itself is not of much interest, but some of the monuments are, and the mortuary chapel, on the north side is, perhaps, unique in treatment. It dates from the beginning of the seventeenth century. The walls have a wood-panelled dado, above which they are cased with black marble in squares, every alternate square having a raised shield, the plain squares receiving the inscription. Only a few inscriptions have been cut, however, and the chapel is an example of the vanity of human wishes, provision being made for perhaps 100 burials, and only half a score taking place. The effect of the black marble is triste, and detracts from the beauty of the design, which is very suggestive. There is a handsome altar-cloth, worked by two daughters of Lord Colepeper while he was in exile with Charles II. In the village is a good-sized Elizabethan house, once a fine place, but now suffering from many alterations, one of which has at some time removed one entire wing.

Wrotham Place, visited on the last day, is an Elizabethan house considerably altered, but containing many beautiful articles *de vertu*, which were very kindly exhibited the visitors by their host. The church does not contain much of interest. Of far greater interest is Ightham Church, which contains several fine Jacobean monuments to the Selbys of the Mote, and an exquisitely-accounted figure of Sir Thomas Cawne, also of the Mote, who died temp. Edward III., and left by his will 20l. for the making of a window above his tomb, which accordingly was done, and remains to this day. The village of Ightham contains some picturesque cottages, but the great attraction is the Mote, which lies about two miles away, down in a valley surrounded by woods. The history of the place is not thoroughly known, and the history of an old building is always important, as showing by whom it was built, and often accounting for features and ornaments which would otherwise be difficult to explain. The presence of the above-mentioned Sir Thomas Cawne is not easily accounted for, since the De Hants seem to have been in possession from before 1370 till Henry VIII's time, after which the estates belonged to a Sir Richard Clement. From this family they passed through some Allens to the Selbys, whose arms appear in several places. Thus much can be ascertained; but the builders of the various parts

not be identified. The oldest part seems to be the hall, which is a lofty apartment of the Decorated period. The roof is of wood with moulded principals, a curious feature being the use of a finely-moulded stone arch about e-third down the length of the hall. The actual reason for the use of stone instead of wood is difficult to fathom. In the time of Henry VIII. there was a large new fireplace built in the hall, as well as a new window, and a private chapel was built at the opposite corner of the courtyard, thus superseding the older one near the hall, of which the crypt still remains. The chapel is of great interest, since much of the original woodwork remains. In a room leading off the stairs to the chapel is a very handsome Jacobean chimney-piece. Outside, neither in the courtyard or looking on to the east which completely and closely surrounds the house, everything is picturesque. There is one window, with stone mullioned windows; and half-timber work, with wood oriel windows and delicately-carved barge-boards; there are red brick chimneys, with beautiful smoky tops, and moss-grown tiled roofs and green climbing vines; there is work for the pencil, the pen, the brush; for the architect, the artist, and the amateur: and they all know it. Few houses have been so often sketched as Ightham, and few are worthier of such an honour; still if there be any to whom sketching is an unknown pastime, it is a pleasure merely to wander round the passages and to bask in the sunshine before the great gateway while gazing down into the waters of the moat, and watching the fish as they placidly pilot themselves through the weeds.

CHESTER MEETING OF THE ROYAL ARCHAEOLOGICAL INSTITUTE.

FOLLOWING the proceedings of the opening meeting, which were reported in our last,* there was a perambulation of the city walls, under the guidance of Mr. W. Thompson Watkin (author of "Roman Cheshire") and of Mr. G. W. Shrubsole, F.G.S. Ascending the steps at the Eastgate, the visitors proceeded northwards. Mr. Watkin observing at the outset that the existing walls are undoubtedly more or less on the line of the Roman walls, though they were, in his opinion, decidedly much later than the period of the Roman occupation,—of the Edwardian period, in fact. Some projecting stones at the base of the outer face of the wall near the Kaleyards Gate, which some local antiquaries used to regard as Roman, had been proved, by excavation, to be of the Edwardian period. When this portion of the wall was reached, the visitors descended for a few moments for its illumination, Sir James Picton remarking that exhibited no signs of Roman work; the characteristic wide mortar joints of Roman work are wholly absent. The wall seemed to have a tendency to lean outwards at this point,—the upper part still overhangs to a perceptible degree,—and the projecting stones at the foot of the wall were probably merely put there to prevent the wall slipping further. The Rev. Prebendary Seath, well known for his acquaintance with Roman remains, said it was very clear that the masonry of this part of the wall was not of the Roman period. Mr. Watkin added that since the walls were built they had been constantly repaired, and there were records of the proceedings of the "murengers" or wall-guardians. Pointing to the perishable and friable red sandstone of which the masonry of the walls is composed, Mr. Watkin remarked that it was scarcely likely that the Romans, who always built so solidly and chose good materials, would use so soft and friable a stone as the red sandstone now to be seen in the walls; but, even if they had used the red sandstone, what likelihood was there that it could, after the lapse of 1400 years, have remained to the present day, seeing that the stone of the cathedral, some of it only erected 100 years ago, was thoroughly worn away and decayed prior to the restoration of the cathedral? Mr. Shrubsole remarked that, at the suggestion of the late Dean Howson, an excavation was made along the front part of the wall at this point. The excavation was carried to a depth of 10 ft. or 12 ft., but not a fragment of Roman work of any kind was found. The excavation, however, led to the discovery of a

plinth, described by competent architects who had seen it as of the Edwardian period. The stones of that plinth were without mortar, and certainly without Roman mortar joints, such as were seen in other and undoubted Roman work found in Chester. The projecting row of stones was not bonded into the wall behind, but formed a mere outer skin, with no concrete or grouting in any part of it. The conclusion to be drawn was, as had been suggested by another member of the party, that these projecting stones were merely deposited at the foot of the wall in order, by their weight and bulk, to prevent the wall slipping down or toppling over. The late Dean Howson had come to the conclusion that there was no trace of Roman work in that part of the wall. Professor C. T. Newton said that if that part of the wall were Roman, those who were engaged in the excavation ought to have found some fragments of Samian ware at its foot. Mr. Shrubsole said none were found, whereupon Prof. Newton said that seemed to be conclusive evidence that the wall was not Roman, for the Romans were in the habit of throwing all their broken pottery and rubbish over the town walls. Mr. Watkin, in answer to a question, said that possibly some of the stones to be found in the existing wall were Roman, but they were not in the positions in which they were left by the Romans. Passing northwards along the wall, the visitors came to what is now called the Phoenix Tower, at the north-east angle of the walls; on the top of this tower King Charles I. is stated to have stood and witnessed the defeat of his army on Rowton Moor. Turning along the northern side of the wall, the visitors proceeded westward, crossing the North-gate and passing the low tower called "Morgan's Mount," and the next one, called "Pemberton's Parlour," which bears an inscribed tablet recording the names of the "murengers" or wall-guardians, and some of the work which they did. The inscription is dated 1701. It was stated that there is no longer a body of murengers, but we believe that the Corporation undertakes the work of keeping-up and maintaining the walls, of which the city may well be proud, for although there appear to be good grounds for abandoning the local tradition that the walls as now existing are Roman, Chester will remain unique as the largest city in the United Kingdom completely surrounded by walls dating from Mediaeval times. The question being asked whether there was a fosse outside the wall, a reply was given in the affirmative, and it was stated that for the canal which now skirts the north wall, the line of the fosse was partly utilised, the fact being that the contractor for the construction of the canal was agreeably surprised and peculiarly benefited by the discovery that a great deal of the cutting through the rock which he had anticipated and estimated for had been done centuries ago. Near the two towers last named, and before the present north-western corner of the walls and the picturesque Water Tower were reached, Mr. Watkin pointed out what he believed to be the point where the western wall of the Roman castrum had originally terminated, for in a field now enclosed within the walls Roman interments had been found, and, as was well known, Roman interments were always extra-mural. The Rev. Precentor Venables, remarking on this, said that the same thing had occurred at Lincoln, where, as the population of the city extended, the wall was carried further down the slope, in a manner almost identical with what had evidently been done at Chester, and parallel with the first wall. Arrived at the Water Tower, the visitors descended into an enclosure to examine a Roman hypocaust found beneath an old building in Bridge-street. The pillars are stated to be arranged on the same plan and at the same distances apart as they were when discovered. They were when found covered with large tiles (some of which are preserved), which carried a thick coating of concrete. The pillars, or *pylæ*, of the hypocaust, it should be observed, are of stone, and not of tiles superposed to give the requisite height. They are monolithic, but diminished in the centre so as to allow as much space as possible for the passage of the hot air. In answer to Professor Newton, Mr. Shrubsole said that the tessellæ were laid upon concrete, fine at the top and coarser underneath. Professor Newton said that was according to the Vitruvian formula. Ascending to the

wall again, the visitors proceeded southwards, having the large open space used as a race-course on their right hand, between the city wall and the river Dee. The low-lying nature of the ground here was pointed out, and it was stated that at one time the whole of this low ground was under water, which came up close to the foot of the west wall, as it does now on the south and south-east. In corroboration of this statement it was pointed out that, not long ago, in digging some foundations for the new gasworks, a pig of lead was found 23 ft. below the level of the surface, and bearing an inscription of the time of Vespasian; it was dug up under such conditions as to leave no doubt that it must have fallen overboard or been thrown into the water from a vessel passing over the site. Additional evidence of the nearer approach of the waters to the walls at one time was shown by the position of the Watergate, at the foot of Watergate-street,* and by other traces, such as the appellation of "The Yacht" to an old inn just within the walls, of the close contiguity of the water at one time. At a point of the wall a little further south another lot of projecting stones were seen at the foot of the outer face of the wall towards the Roodee. Here a discussion ensued similar to that which arose over the projecting stones found near the Kaleyards Gate, the conclusion arrived at being the same, viz., that this masonry was not Roman, but that the stones had been deposited where they are now seen as a rough-and-ready engineering expedient to prevent the fall of the wall proper. Going southwards, towards Grosvenor-street, the party was about to continue the perambulation of the walls southward, past the Castle and prison, over the Bridge Gate, and then eastward *via* the "Wishing Steps" to the East Gate, when a smart shower brought this plan to a premature close, and the visitors hurriedly took refuge in the admirable Grosvenor Museum, of which we are able to give a view and plans this week. Here Mr. Shrubsole, Mr. Watkin, and Professor McKenny Hughes explained some of the most interesting exhibits of an archaeological character. Mr. Shrubsole, who is the Hon. Curator of the Museum, has, we may here mention, published an excellent illustrated catalogue of the Roman altars and inscribed stones in the Grosvenor Museum, so that it is unnecessary for us to dwell at length on this part of the afternoon's proceedings. Meanwhile, another party perambulated the walls southwards from the Eastgate, and the intention was that when the two parties met they were to change guides; but, as in most other arrangements of the kind, so far as our experience goes, the result in practice was not a success, however well it may have looked upon paper. Possibly the rain was to blame for this. Another party traversed some of the old streets of the city, examining the most picturesque of the houses and the "Rows." One or two very good crypts were seen, notably one in Watergate-street, now in the occupation of Messrs. Quellyn Roberts & Co., wine merchants. This crypt is very large and in excellent preservation, and its present owners and occupiers are justifiably proud of it. Occasion was taken by one of the leaders of the party to point out that these crypts were very common in Mediaeval times under houses of large size; they were used for storage purposes, and the common notion that they were necessarily of ecclesiastical origin was a mistaken one.

When the rain had abated the visitors proceeded to the Church of St. Mary-on-the-Hill, or St. Mary-super-Montem, anciently called St. Mary de Castro. Here the Rev. H. Grantham, the rector, received the visitors, and described the church, about which we will say more next week.

In the evening, Mr. E. A. Freeman delivered his address as President of the Historical Section, as mentioned in our last, and on the motion of the Rev. Precentor Venables, seconded by Mr. Peacock, F.S.A., a vote of thanks was given to Dr. Freeman for his address.

On Wednesday, as before mentioned, Vallæ Crucis Abbey, Wrexham, and Obirk Castle were visited, but of this excursion and of other proceedings of the day we must defer a more detailed account until next week.

In the evening the Antiquarian Section was

* The Water Gate is situated about midway in the face of the west wall, and some little distance from the water now. It must not be confounded with the Water Tower, which is at the north-west angle of the walls.

† Chester: Phillipson & Golder, Eastgate-row.

* See Builder, p. 249, ante.

opened by the address of the President of the Section, the Bishop of Chester, who in the course of an earnest and able plea for the preservation of old records, especially manorial court-rolls, said,—“No one who has not, as I have done in past years, spent days and weeks over this sort of muniment can at all realise the immense amount of local, historical, and genealogical material which lies hid in the presses that contain the court rolls. Speaking to antiquaries, I need not apologise for a little enthusiasm in genealogical research. The anciently renowned and great historical houses have their pedigrees in the College of Arms, but a great proportion of those anciently renowned and great historical houses have done their work, become extinct in the male line, and left only a thin traceable line even in the noble families of to-day. Other great houses are springing up and having their day, both in England and in the colonies and in America. And the instinct of lineage is a very strong instinct, and however proud a man may be of having made his own way in the world, and being, as it is said, his own ancestor, every man who does so rise as to wish his descendants to look back gratefully to him, will have some slight wish, I think, to realise the fact that he himself has sprung from honest parents, and will pay some attention to the growth and continuity of his own family. I wish that parish registers were cared for as they should be. They are certainly much better cared for than they used to be, and there is no wholesale destruction going on amongst them. But it is otherwise with the Court Rolls—whole series of them may be found in the booksellers' catalogues at waste-paper prices. In these days, when champagne can be made from peat-ashes, to what base uses might old parchment be put? Just think that in a glass of jelly or a basin of soup you may be swallowing the proof of your descent from one of the barons of Magna Charta, or from one who drew his bow at Hastings. His lordship concluded:—“Brother antiquaries, we have not the whole field of knowledge to ourselves; there are critics who call anything that they do not know themselves,—a sufficiently wide material in truth,—“old rag bags,” and there are politicians who think it a real blessing to mankind to destroy anything that is old; do not let them retort upon us that the sole object of antiquarian research is that which is of no use, but is ready to vanish away. There is a correlation of all historical and scientific, theoretic and scientific research, of all modes of research, in fact. But both altogether, and each one, requires sympathy, patience, modesty, and, I may add, a little grain of scepticism, such as is content, in all matters that depend on discovery, with a little less than perfect infallibility.

In the same section, the Rev. G. F. Browne followed with a paper “On Early Sculptured Stones in Cheshire.” Papers by Mr. Henry Taylor and Sir James Picton were read in the Historical Section. To these we may return.

As we briefly mentioned last week, the Architectural Section was opened on Thursday, August 12th, by an address given by the President of the Section, the Right Hon. A. J. B. Beresford Hope, M.P.

Mr. Beresford Hope began by warning his hearers that they must not expect from him any very solid contribution to the great edifice of human learning which it was the object of the Institute gradually and secretly to build up. He said he wished rather to put forward a few suggestions as to the working of the machine, for it seemed to him that, as President of that Section, he occupied somewhat the same position as those useful, though humble, individuals in great manufactories whose business it was to oil the wheels. The subject of architecture, which was to engage the attention of the meeting, was a strangely varied as well as a most important one; for architecture presented itself in so many relations, it had so many different aspects. The first and greatest distinction to be drawn was that between the architecture of the past and the architecture of the future. Then, too, architecture was at the same time such a practical thing, and it was an artistic thing too. In all those aspects the relations of architecture to archaeology came in to assist in the solution of various problems, the solution of which was very difficult indeed. That ought to be an object to be borne in mind when the members of the Institute met together to exchange notes or to mourn over what they deemed to be vandalisms. Now what was the

position of the archaeological architect? Was he always popular, and was he doing good work? Whether he was popular or not, he was doing very useful work, and, perhaps, even if he was unpopular as an architect he was doing useful work as an archaeologist. But there was one great difficulty staring them in the face. The practical character of architecture made it necessary for the architect to concern himself with the building of dwellings in which a man could live without being perpetually in danger of catarrh or blood-poisoning. The architect must also build temples to worship in, but those temples must be so planned and arranged as to conform to the religious instincts and wants of those who were to worship in them. It had also to be borne in mind that while we had only a certain acreage in England, there was a large and growing population. So the new wants of civilisation made things apparently dangerous, which had formerly been overlooked. Woe to them all if they did not do justice to those matters. Opposed as he was to the sacred legacy of the past, in the shape of buildings religious, secular, and domestic, which gave us such a real idea of the life of our ancestors, being needlessly frittered away, he, nevertheless, recognised that the architect had to consider the needs of the future, and the requirements which had grown out of the triumphs of science. There was an awkward, ugly word which had been invented of late years; but it was a blessed word in some respects, because it meant health and long life. That word was “sanitation.” Sanitation stared us in the face everywhere. How were we to go on without sanitation? How was sanitation to be enforced without detriment to the old and the picturesque? Those were questions with which we had to deal in the present day. He was very well assured, speaking seriously, that no greater blow was ever struck at archaeology, no greater difficulty was ever propounded for solution by archaeologists, than when our sanitary lights passed a decree forbidding the continuation of the old dear domestic cesspool. As long as the cesspool existed the old Tudor and Elizabethan houses of the country were comparatively free from molestation. But now, what was the first thing that happened when a man came into possession of an old Tudor house? Did he content himself with admiring the carving? Did he sit down to table in the hall with his hat on his head and dressed in the costume of the period to which the house belonged? He might do all that and much more with the most archaeological accuracy. He did nothing of the sort, however, but called in the sanitary engineer, who tore up floors, pulled down panellings, and generally disturbed and more or less destroyed what was old. In the case of some old moated grange, perhaps, an iron tube would be carried across the moat in order that the moat might not become the rich receptacle of all the treasures of the house. He could imagine Mr. Stevenson, or some other delineator of the grotesque and horrible, telling some such story as this:—“A very good young man, a very enlightened young man, had a visit one morning from a fairy, and the fairy tells him that some grand old mansion (say Haddon Hall) had been, in a fit of capricious generosity on the part of the Duke of Rutland, handed over to him, with sufficient means to keep it up. We can imagine such a young man, full of archaeological enthusiasm, what a state of ecstasy he would be in at being the recipient of such a gift! But a second fairy comes in and says:—“By the way, about that gift. The house is given you on condition that you live in it!” Now he is a man of great taste and a member of the Archaeological Institute. At the same time he is a man who is careful about his health. So what is he to do and how is he to live in the Hall? Shall he live in the old building, with all its picturesque and discomfort, to be killed by catarrh or poisoned by the cess-pool? Or shall he call in an architect to make the place habitable, and at the same time something very different to what it was in Dorothy Vernon's time? For to make such a place fit for the conditions of modern life would be to ruin it by internal changes, and hardly less so by the addition of excrescences which would alter the aspect of the place almost beyond recognition. Whatever he did, it was quite certain that he would be the object of the vituperation of all archaeologists, who would regard him as a Vandal.” He gave them that little

parable of the Squire of Haddon Hall because it exactly served to illustrate one phase of the problem which they had to solve. If any of the members of the Institute were members of a Board of Health, they would be the better able to understand such difficulties as those which he had referred. The case was, however, different when he came to our churches. Some years ago he was an earnest supporter of church restoration, because he was an ecclesiologist before he was an archaeologist, and he still was an ecclesiologist. No doubt the ecclesiologists had made mistakes half a century ago, when they had a trifle less experience than they now possessed. In the old days of church restoration they used to move the monuments about in a most wonderful way. In that way they incurred a good deal of odium, which was not altogether unmerited. But the people who were loudest in condemning them were, taken all round, rather more ignorant than they were themselves. But now a more sober, a more reverential idea of church restoration had grown up. They tried to be reverential in the old days, but it was the reverence which only took one point of view. We were taught now to look at our churches all round,—at wholes. The question of church restoration was now only a question of degree. The man who could argue that churches, so long as churches were churches, must not be restored; was a man who would, in Canning's words, “say anything.” The question should always be, “What is the least that can be done to bring out the uses of the churches, to make them useful and yet to preserve the archaeological features?” He remembered a Collegiate church in the West of England, which was some years ago restored by one of the most eminent ecclesiastical architects of his day, who ruthlessly altered the church, destroyed much interesting work, and revolutionised the church in order to make the church more convenient for current worship. That was a most unjustifiable proceeding, but it was a proceeding such as would not be done again by an architect of eminence. The question of church restoration was, he repeated, a question of degree. Some ecclesiologists were, no doubt, too revolutionary in their changes; though perhaps the archaeologists were not revolutionary enough. The attrition between the two parties would no doubt result in good. Common-sense would come in and make its influence felt. The instinct for the beautiful reverence for the past, and the belief in history; and, on the other hand, practical necessities make themselves felt and help to bring about the happy mean between the two extremes of over-restoration and no-restoration. It should be remembered that archaeology had its limits. The archaeologist was not bound, in the nature of things, to look upon a house as a place where a man must live. The archaeologist, only cared for the preservation of an old house, whether it was fit to live in or not. Then there came in the question of sanitation. He did not know whether any of his hearers had seen a drawing some time ago which appeared in the *Builder*, and which made a great impression upon him.* It was by Mr. H. W. Brewer, an artist who drew as if he were an architect. It was a representation of a make-believe German city of the most picturesque period of the transition between Gothic and the Renaissance; a beautiful minster being shown in the middle of the picture, surrounded by a number of picturesque buildings, the Rathaus or Town-hall included. But there was not a single human being to be seen in the picture, and the streets and steps of the houses were covered with a growth of weeds from long disuse. The story which the picture was supposed to illustrate was that of a city which had been entirely denuded of its inhabitants by some pestilence or epidemic. In the middle of the picture, and underneath some of the buildings, was the trace of what, once a clear and beautiful stream, had been converted into a loathsome sewer,—the main sewer of the town, and, no doubt, the source of the drinking-water of the city. That picture, which was a most pathetic one, teaching a great lesson, did not receive much attention at the time as it deserved. To sum up, architecture was a pursuit in which the variety of considerations with which it had to grapple was so great, so important, and in some respects so incompatible with archaeological deference to the past, that no one man

* “Deserted.” See *Builder*, vol. xlv., p. 24.

or any one school of men, could wholly succeed in reconciling the architecture of the past, the architecture of history, and the architecture of old domestic and ecclesiastical life, with the architecture of our present everyday social wants.

On the motion of the Duke of Westminster, a vote of thanks to Mr. Beresford-Hope for his able and interesting address was carried by acclamation, and the section adjourned.

Subsequently the Cathedral, St. John's Church and the adjacent ruins, and Eaton all were visited, and in the evening the Mayor gave a *conversations* in the Town Hall.

On Friday, Malpas, Nantwich, Acton, and Ambury churches, and Beeston Castle, were visited.

In the evening, in the Architectural Section, R. G. W. Shrubsole, F.G.S., read a paper on "The Age of the City Walls of Chester." He marked that Pennant had stated over a century ago that the form of the city evinced its Roman origin, but that no part of the old walls remained. The latter remark had naturally caused considerable difference of opinion, and then, about fifty years ago, a zeal was shown for the preservation of the local antiquities, for the first time the claim was advanced that a large part of the north wall on the east side of the North-gate was Roman work *in situ*. Since at that time it had figured as such in standard works, although considerable discussion had arisen upon the point, which was a most interesting one, and one that the last quarter of a century had given greater facilities for rightly judging than any previous period. Mr. Shrubsole continued,—During that interval, large portions of the wall have been laid open for necessary repairs. Besides this, many excavations have been purposely made at the base of the wall, at the more interesting points, to ascertain its peculiarities and character. In dealing with the age of the walls it is my intention to limit my remarks to one period involved in the question raised by Pennant. Does any part of the Roman wall still exist in the present walls of Chester? It were profitless, did it be well-nigh impossible, to judge by mere appearance of the age of a structure, on the whole so destitute of distinctive architectural features, which has had to be repaired or remodelled every century or two. Among much that is uncertain, one period we know stands prominently forward for distinctive recognition in the use of stone, tiles, and mortar in its constructive work, which enables us to distinguish it from all others. I allude to the period of the Roman occupation in Britain. The position that I take up on this question is opposed to the modern view, believing that, however pardonable may be the aim for the Roman age of any part of the city walls, it is one not borne out by anything that can be seen there at the present time. It is an element not without value in this case that the great writers on the subject, such as Camden, Ormerod, Ormerod, Tyson, and Henshall, make such claim for the walls. The opinions held by these writers, and even older ones, might be summarised in the words of Ormerod:—"The walls of Chester follow the outline of the old Roman work, and probably stand on the Roman foundation." On the general subject, it may be said that historical evidence is against the probability of any portion of the Roman wall being extant. The facts bearing on the case are that, after the departure of the Romans, the Britons, Danes, and Saxons each in turn assailed the walls and helped on their demolition, leaving them for Ethelfreda to rebuild, and, it is said, enlarge. Again, we find in Norman times an imperative order was issued for the rebuilding of the walls, to be followed by a fine for non-appearance on the part of holders of land, or their history during the next 500 years the extent of dilapidation into which they had fallen from natural decay and intestinal strife. Subsequently, in the Civil War, the walls suffered severely, serious breaches having been made on the face of the wall. In this condition they remained until, as the inscription on "Pemberton's Parlour" tells us, "In the eighth year of the reign of Queen Anne divers wide breaches in the walls were rebuilt and other decays therein were repaired, 2,000 yards of the pavement were now flagged or paved, and the whole repaired, regulated, and adorned at the expense of 1,000*l.* and upwards." From this time a sliding tax on Irish linen imported into Chester provided a sufficiently ample fund to keep the

walls in good repair. Under any circumstances it is impossible to believe that a perishable stone of the nature of our sandstone should have held together as a structure for 1,600 years. It is not even credible that 200 or 300 yards of it should have remained intact. It is far more probable and consonant with observation that there may have not been one, but four walls, in the space of time over which its existence has been spread. Proceeding to examine the parts of the wall for which a Roman origin is set up, Mr. Shrubsole referred to the group of large stones found on the outside of the wall near Blackfriars, midway along the Roodee. One fact alone, he said, disposed of its claim to Roman origin. The base of the stones rested upon a quicksand which was the bed of the old river. To have neglected the solid ground above, and to have built the wall of the Castra on quicksand in a hole 50 ft. below the level, was a mode of proceeding he could not imagine any military engineer capable of, least of all a Roman engineer. In examining the reputed Roman work at the Kaleyards, he accounted for the single course of stones there found by the fact that some centuries ago the city wall stood on the spot where these stones now stand. The foundation of clay proved treacherous, aided by the loose ground of the fosse in front and the outward thrust of the ground of the churchyard, and these causes proving too much for the stability of the wall, it was pushed outwards to such an extent as to be useless, and it was dismantled, the base being left in the place where it was found, and the new wall built inside the old one. The Roman work *par excellence* of some authorities was to be seen on the east side of the Northgate, between it and King Charles's Tower. Owing to certain clearances, the wall was now to be seen under exceptionally favourable circumstances, but, looking to the work as a whole from the base to the top, it must be confessed that for genuine Roman work it presented several anomalies, if not unique features. They were supposed to see here a wall which, from the plinth to the cornice, was believed to have been part of the Castrum which encircled Deva on that side. The base had a very English-like look about it. The irregular size of the stones, large and small intermixed, had not the characteristic appearance of Roman work, and the whole was crowned by a cornice, an unparalleled example so far as the walls of Roman castra in England were concerned, and more nearly allied to the debased Classic cornices to be seen in the front of some of the gabled houses in Bridge-street of the Jacobean age than anything Roman. In 1884 a number of excavations were made in order to examine the inner face of the wall, when it was found that there was a singular absence of everything Roman about it, while all its affinities bespoke its connexion with the work of the last two or three centuries. Other structures in the city, such as Julius Caesar's Tower at the Castle, and the Old Shipgate near the river, had been spoken of as Roman, but after very superficial examination,—seeing that neither of the places alluded to were 500 years old,—they were really out of the discussion, for most certainly neither of the spots were included within the Roman camps. As to the construction of the older portions of the walls, during the past twenty-five years we had on various times seen hundreds of yards of the present wall laid open for necessary repair, but in no instance had we seen the faintest approach to Norman work *in situ*. After referring at some length to the discussion as to the material of which the walls were constructed, Mr. Shrubsole said that all the evidence to hand went to show that the Romans in their several works made free use of local stone, as might be seen in Handbridge, where several hundred yards of rock had been excavated, and the microscopic examination of the stone showed that the stone in the Northgate wall was identical with the local stone. There was, therefore, no warrant for the supposition that the stone had been brought from a distance, and the wall, therefore, could not claim a longer life than was usual with a stone of its kind. The way in which the error as to the extreme age of the walls had arisen was readily explicable. If the opinion rested alone on a passing or superficial examination, such was the extent of the "weathering" of the stone and the seeming antiquity which one or two centuries would confer upon it that it seemed natural to infer its antiquity was great. Looking at all the

aspects of the walls, he was of the same opinion as Pennant, and had come to the conclusion that nothing in the walls dated further back than the reign of James I. and Charles I.

A discussion followed. On Saturday there was an excursion to Delamere Forest to see the remains of the Roman road to Mancunium (Manchester), Tarvin Church being visited *en route*. On Eddisbury Hill some remains of early fortifications were examined. In the evening there were sectional meetings.

In the Architectural Section, Mr. J. Matthews Jones, City Surveyor, Chester, then read a paper on "A Roman Hypocaust lately found in Chester." He said that in June last the work of laying a connecting sewer from the intercepting sewer on the Roodee, to drain Blackfriars and its district, was commenced. Having some years ago discovered an interment (supposed to be Roman) near the line of the new sewer, on the outside of the walls, Mr. Jones said he thought it likely that the further opening of the ground in the neighbourhood would yield other proofs of the Roman occupation of the city. Proceeding onwards from the Roodee, the excavation passed through clay under the city wall's foundation. Near the centre of the roadway, at a depth of 13 ft. below the present surface, the remains of a hypocaust, in a tolerably good state of preservation, were discovered. The western and eastern walls measured 2 ft. 9 in. in thickness at the top, with a slight batter, the eastern wall having a slight batter and set-offs, and having, under a layer of clay, the concrete floor. Several pillars and a specimen of the masonry were cut out, and had been deposited in the Grosvenor Museum, Chester. To the eye of a practical man the masonry of the walls of the hypocaust appeared to approximate in many respects to that of several portions of the city walls. No trace of bonding tiles was found, though the masonry discovered was enclosing so large a number of tile pillars. The plan seemed to be that of a chamber with a semicircular end, facing west. The internal dimensions of this chamber, on the longest line exposed to view, viz., from west to east, measured 19 ft. 8 in. The width could not be ascertained, the trench being only 2 ft. 6 in. wide, and the probing under being attended with danger, owing to the superincumbent mass of filling-up stuff and the wet mud at the bottom. In the direction of the longest line before mentioned there were the remains of twelve pillars, a series of four of which supported, for a distance of 5 ft. 3 in., a concrete floor, in splendid condition, from 6 in. to 7 in. thick. The supporting pillars also rested on concrete, the under portions being of loose material. These pillars were found in a perfect state, the remaining ones being more or less destroyed, though ample portions of them were left to enable one to identify their original position. The upper layer of concrete had, for the distance named, a squared, worked edge, and seemed to have been stopped originally at that point. Large tiles abutted against the same, but little trace of these were found. The number of tiles forming a pillar were ten in number, the base or foot tile being 10½ in. wide, 6 in. long, and 2 in. thick. Then came seven tiles, 8 in. square, superposed to form the shaft; then the under-cap tile, 12 in. square and 1½ in. thick; and then the upper cap tile, 17 in. square and 2 in. thick, and the concrete-floor-supporting tile, extending from pillar to pillar, 2 ft. square. All these were bedded on each other with mortar. It should be mentioned that the pillars found adjoining the wall were composed of stone slabs cut as nearly as possible to correspond with the form and dimensions of the tiles in the other pillars. Broken flue-tiles were also found in the filling-up stuff there, and a flue-tile which stood vertically near the last wall-pillar,—whether on its original position could not be verified, was removed. Bones, tiles, and coins were found during the course of the excavation, and a tile, bearing an inscription, was handed to the Curator of the Grosvenor Museum. It should be noted that the level of the bottom floor of the hypocaust was 40 ft. above Ordnance datum, corresponding with the present level of the street at the Water-gate, not many yards distant. The present Roodee was 21 ft. below the level of the floor, and the present parapet wall some 14 ft. to 16 ft. above the floor. The present city wall was distant about twenty yards from the semicircular end of the hypocaust, and it was to be regretted

that the discovery was not made at an earlier date, as it might have materially affected the conclusions which had been come to as to the extension of the town-wall, as the centre of the hypocaust was shown to be distant only from twelve to fifteen yards from the supposed extended wall. In conclusion, Mr. Jones urged the desirability of further exploration of the locality, and delivered a little homily the purport of which was that the maxim "Honour to whom honour" was not always borne in mind and acted upon in Chester in regard to antiquarian discoveries.

On Monday last Hawarden Castle, Mold, Caergwrle, and Gresford were visited, and in the evening the concluding general meeting was held, as well as a meeting of the Architectural Section, when Sir Llewelyn Turner read a paper on "Carnarvon Castle."

On Tuesday last the visitors proceeded by rail to Flint, Conway, and Carnarvon castles, and so terminated a very successful round of meetings and excursions, which latter were fortunately favoured with, on the whole, very good weather.

We hope to conclude our notes of the meeting in our next.

MANCHESTER JUBILEE EXHIBITION BUILDING.

At a meeting of the Council of Guarantors for this Exhibition, held on the 12th, it was decided to select the designs bearing the motto: "Small cost, large re-sale," which were found to be by Messrs. Maxwell & Tuke; and that the remaining designs be awarded the three premiums as follows:—"Expectation" (Messrs. Salomons & Ely), 50l.; "Vivat Regina" (Mr. A. Darbyshire), 30l.; "Spes" (Messrs. Pennington & Bridgen), 20l.

The estimated cost of carrying out the selected design is 32,653l. We are indebted to the *Manchester Courier* for the following particulars in regard to the selected design:—

The building will be constructed chiefly of iron and glass, to some extent after the style of its famous prototype at Sydenham. From the centre rises a dome, in front of which, over the principal entrances, are two small towers.

The architects state that in preparing the plans of the building they have borne in mind the suggestions of the assessor as to (a) rapidity of construction, (b) safety from fire, and (c) reduction by cost of re-sale. They had practically covered the whole of the land off Talbot-road as well as a portion of Haysleigh, and such portions of the Botanical Gardens as were required to form the approach from Chester-road. The extra area covered, inclusive of "Old Manchester and Salford," was about 40,000 square yards. The plan included a portion of the Botanical Gardens. The trees about "Old Manchester and Salford," the open-air café, and the gallery of approach were carefully delineated from actual measurement.

They had narrowed the new portion of the gallery of approach to avoid the destruction of some of the noblest trees in the garden, which must be sacrificed if the 60 ft. gallery was to be carried its full width to the main building. The new building is divided into five sections. The general plan of the main building consists of a lofty nave and transepts arranged in the form of a Latin cross, with low buildings supporting it on each side. These low buildings or courts are each 30 ft. wide, and this division has been preferred above the usually greater width, as it allows in each court side exhibits and a central gangway. Section 2 (machinery in motion and processes) is divided into three sub-sections, one for motive power, electrical machines and machinery in motion of a hazardous description; one for machinery in motion not hazardous; and the south-west angle (separated from the rest by the nave) for processes not requiring power and not hazardous. The Section 4 occupies the portions comprising "Old Manchester and Salford," and is partly used as a screen so that the whole of the front towards the Botanical Gardens will be faced with ancient buildings representing portions of "Old Manchester and Salford" or historic buildings in the neighbourhood. Section 6 (fine arts) is separated from the rest of the building by fireproof screens. The doorways are deeply recessed to prevent the spread of fire. In Section 7 is a music-room 150 ft. by 100 ft., divided from the rest of the building with fireproof screens. This hall is accessible from the gardens or from the central nave. In

addition to this room the architects provide a band gallery at the end of the north transept, so arranged with movable shutters that the band can be heard either in the building or in the gardens.

The gallery of approach from Chester-road will be filled with statuary, interspersed with shrubs and flowers, so as to form a striking *coup d'œil* upon entering. The entrance from Talbot-road is marked by a carriage porch the whole width of the street. The old 60 ft. gallery, it is added, will in all probability be retained after the exhibition as a permanent exhibition, and for this purpose the designers propose to encase it almost entirely with glass. The purlins would need a little strengthening, but otherwise the building was, in their opinion, strong enough for its purpose. The curved portion of the top would be covered with corrugated iron bent to the sweep. Considering the valuable collection that would be housed within the building, and the enormous charges made for insurance, which in this case would for building and contents, if fully covered, amount at least to 4,000l., they had used nothing inflammable in the building except the windows, the skylights, and the outside cornice and the doors. Always bearing the above consideration in mind, and after a careful study of the strongest materials, and searching calculations as to the first cost, the ease and economy of erection, the value of the materials if broken up and re-sold, and the value of the building if sold for re-erection, they had decided to recommend the use of gas or water pipes as the material of which to construct the framework of the building. The Corporation of Manchester used every year an enormous quantity of gas-tubing of the sizes specified, and as this tubing would be improved by the coat of paint it would receive in the building, the cost of the building by its use would be greatly reduced: (a) by the re-sale value of the materials; and (b) the ease with which the same could be constructed and taken down. According to the plan, the whole of the framework of the building, except the roof of the nave and the dome, would be constructed either of cast or wrought tubes, including the pillars, principals, and purlins. The architects furnish details showing the method of construction. All divisions in the building, where not brick, will be made with J. Ineson's patent wire and plaster studing. The outer casing to the building, where not glass, will also be made of this material, but the exposed surface will be cemented. The question of a fireproof floor being of paramount importance, it is proposed to use cement slabs, 4 in. thick, as set forth in the details and the sample of the material sent along with the plans. With regard to protection from fire, the architects state that they have so divided and separated the buildings that the risk of fire has been reduced to a minimum. The central portion of the building has been divided by four 14 in. brick walls from the sections on either side, so as to prevent a spread of fire. A fire occurring in one of the art-galleries, for instance, could not possibly spread to another gallery or to the main building. They recommend, in addition to these and other precautions, that wide curtains be hung between the brick walls below the door to within 7 ft. of the floor, and that these should be dropped down to the floor after the Exhibition closes at night. On the subject of reduction of loss by re-sale, the architects state that, the framework of the building being made of iron tubes, nothing but the special couplings would be waste or scrap. Looking at the building's capacity for sale or re-erection, the nave would form an excellent workshop, or it could be sold in sections.

Illustrations.

THE CHURCH OF THE HOLY TRINITY, SOUTH SHORE, BLACKPOOL.

THE new church will replace an old brick building with galleries, which at present stands on the site. Owing to the surrounding graves, no extension westward was possible, but the new building will extend much further at the east and than the present one. The plan consists of wide nave (with aisles as ambulatories only) and double transepts.

The chancel is large and of good proportions,

and has, on the north, clergy and choir vestry with organ-loft over them; and a chancel arranged as a chapel on the south. At west end a gallery for school-children is provided, with separate approach. The church will accommodate 1,000. The materials will be Yorkshire parquits with red Rainton stone for the exterior, with North-country slate roofs.

The interior throughout will be finished buff terra cotta.

The tower (some 150 ft. in height) will be prominent object in the flat surrounding country and will, standing on the coast, also serve as a useful landmark.

Mr. R. Knill Freeman, of Bolton, is architect.

DESIGN SUBMITTED FOR CHELTENHAM GRAMMAR SCHOOL.

The plan for this design is arranged on the sides of a quadrangle, so as to make the most of the frontage to High-street. The class-rooms are placed on the side furthest from a public road; the Assembly Hall (30 ft. by 51 ft.) on the left hand side with separate entrance to High-street, if required for public gatherings. This would deaden the sound from a street. On the right hand side of the quadrangle is a gymnasium next to the street, with a room adjoining. The class-rooms are easily accessible from the principal entrance, assembly hall, head master's room, and play-ground. The first floor is arranged a chemical laboratory and lecture-room, art and cast rooms, museum and library; the art-room being well lighted from the north. The caretaker's house, heating chamber, and drying-room are arranged in basement. In this plan is a side entrance for access to premises and play-grounds, also a convenient arrangement for future extension to accommodate 100 more boys. The whole of the main buildings can be erected without disturbing the two schoolrooms in present use. It is proposed to build the walls of best red brick with stone or terra-cotta dressings with light windows glazed into stonework. Estimated cost is £3,800. The design is by Messrs. W. H. Sugden (Keighley), and Fairbairn & Wall (Bradford), architects, and was submitted under motto "Renaissance."

MAESMAWR HALL.

THIS extremely picturesque old house is situated between Newtown and Llanidloes, Montgomeryshire. The oak quarterings are arranged in greater variety than is usually the case in this county, and the effect of the composition, standing as it does at the end of a long avenue of elms, is very charming.

The end gables are treated more plainly than the front, the quarterings throughout being upright and about 7 in. on the face, never more than 9 in. apart, the interspaces filled with "wattle and daub" work, whilst the cornices are much stouter, varying from 9 in. to 12 in. square.

The interior consists of a hall, about 10 square, and the "wainscot parlour," 19 ft. by 14 ft. 9 in., arranged on each side of the chimney, the porch, 16 ft. long by 8 ft. 6 in. wide, connecting the two, and a fine oak staircase of William or Anne's reign on the side of the chimney-stack opposite the porch. Modern drawing-rooms and kitchen offices are in a rear.

There is no record of the date of building, but it was probably constructed towards the end of the sixteenth century.

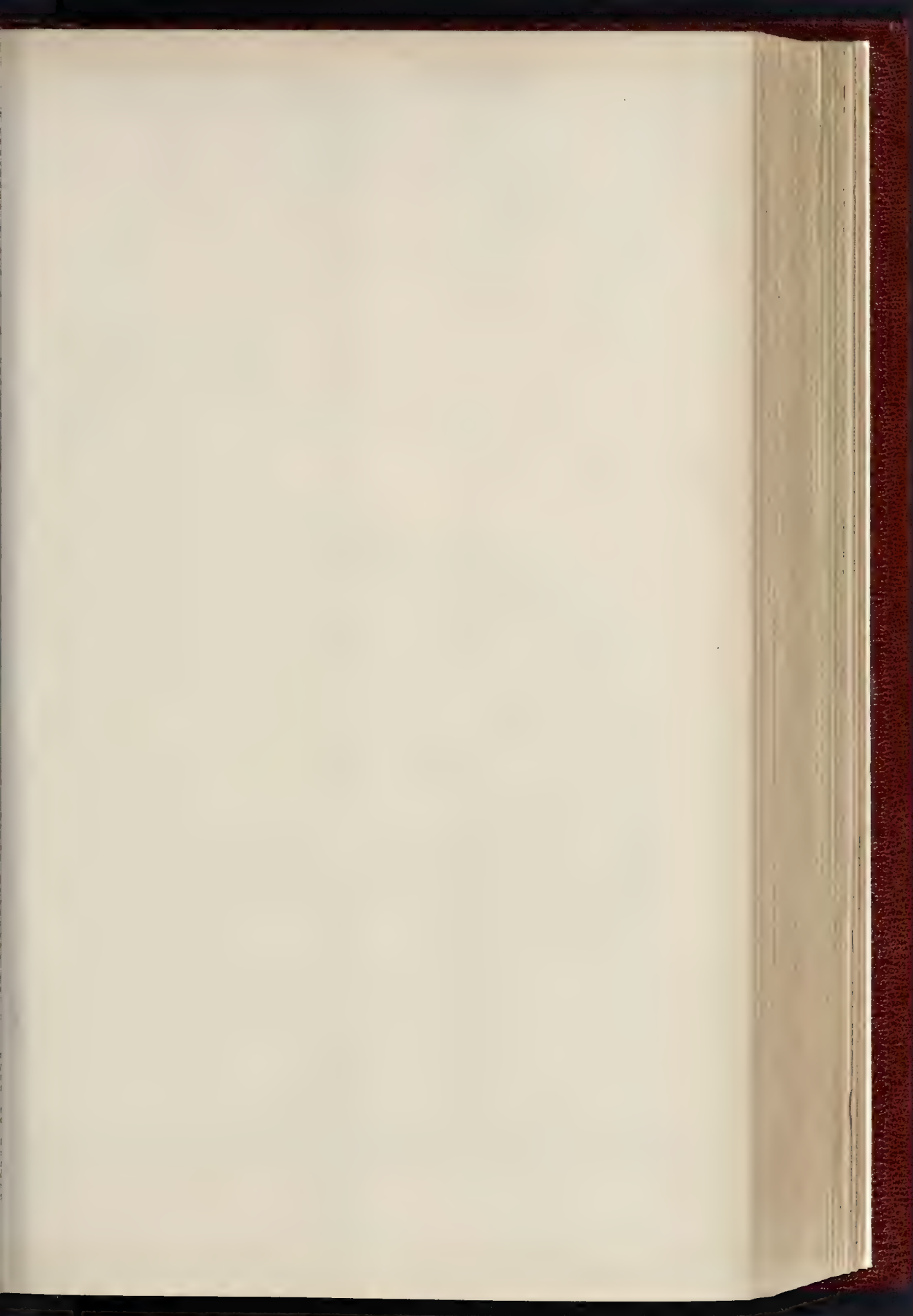
THOS. EDWARD PRYCE.

PENARTH.

A LARGE farmhouse, near Newtown, of earlier and plainer type than most Montgomeryshire houses, and picturesquely situated on a high bank overhanging the Severn, which flows round the rear of the house.

The timbering is very massive, the main posts measuring as much as 12 in. square, the cambered beams nearly 2 ft. on the face. The interior has been much modernised, like most of these old houses, it consisted of a large central hall or common room, with kitchen and offices in the wing on the right, a large parlour and small room in the corresponding wing on the left. Cellars and a millhouse form a half-basement behind.

THOS. EDWARD PRYCE.





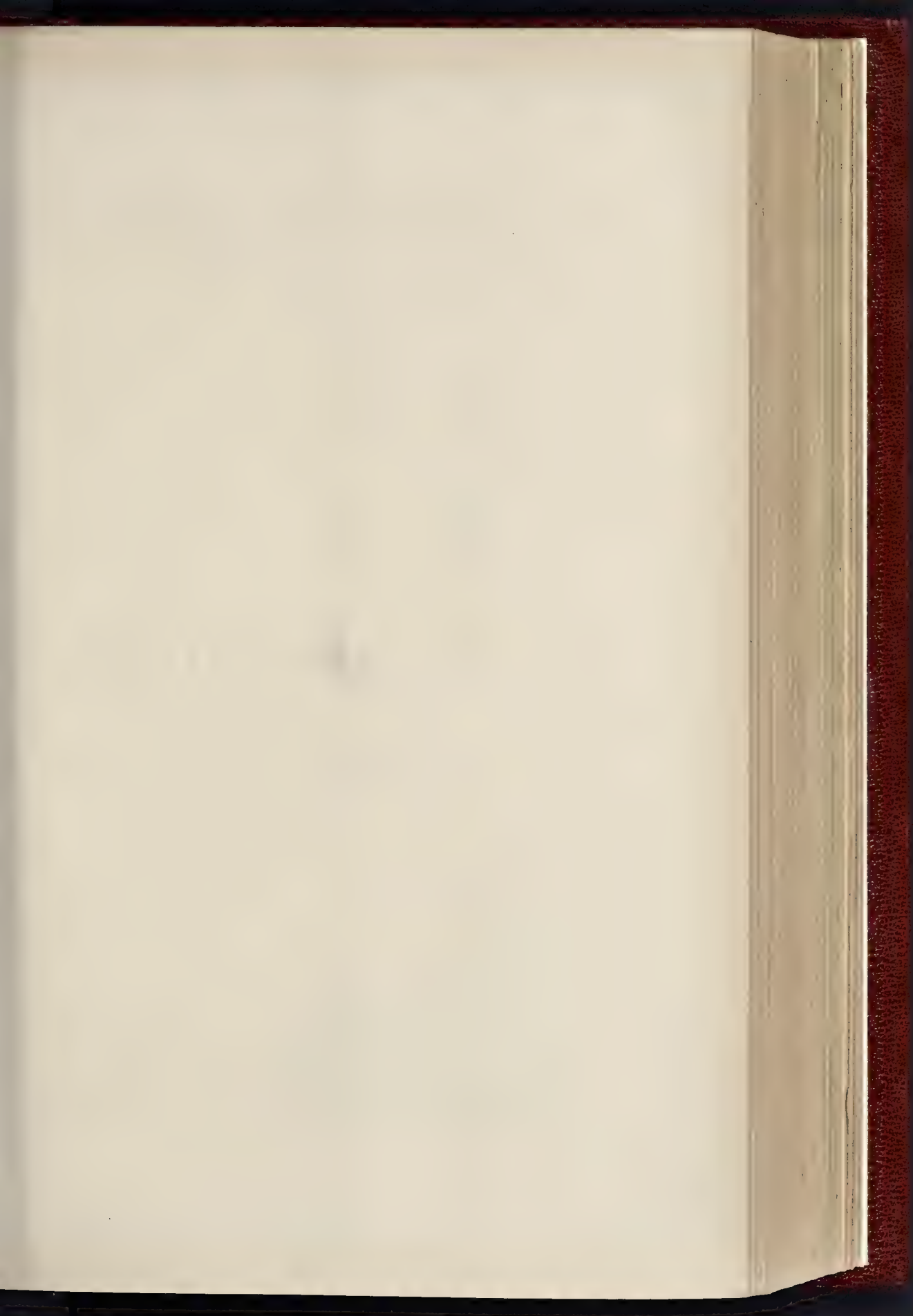
THE GROSVENOR MUSEUM, AND
MR. THOMAS



ENR. PHOTO. SPRA. 11. A. CH. 22. MARSHALL. LANE. ANTON. 17. LIND. IN. 2.

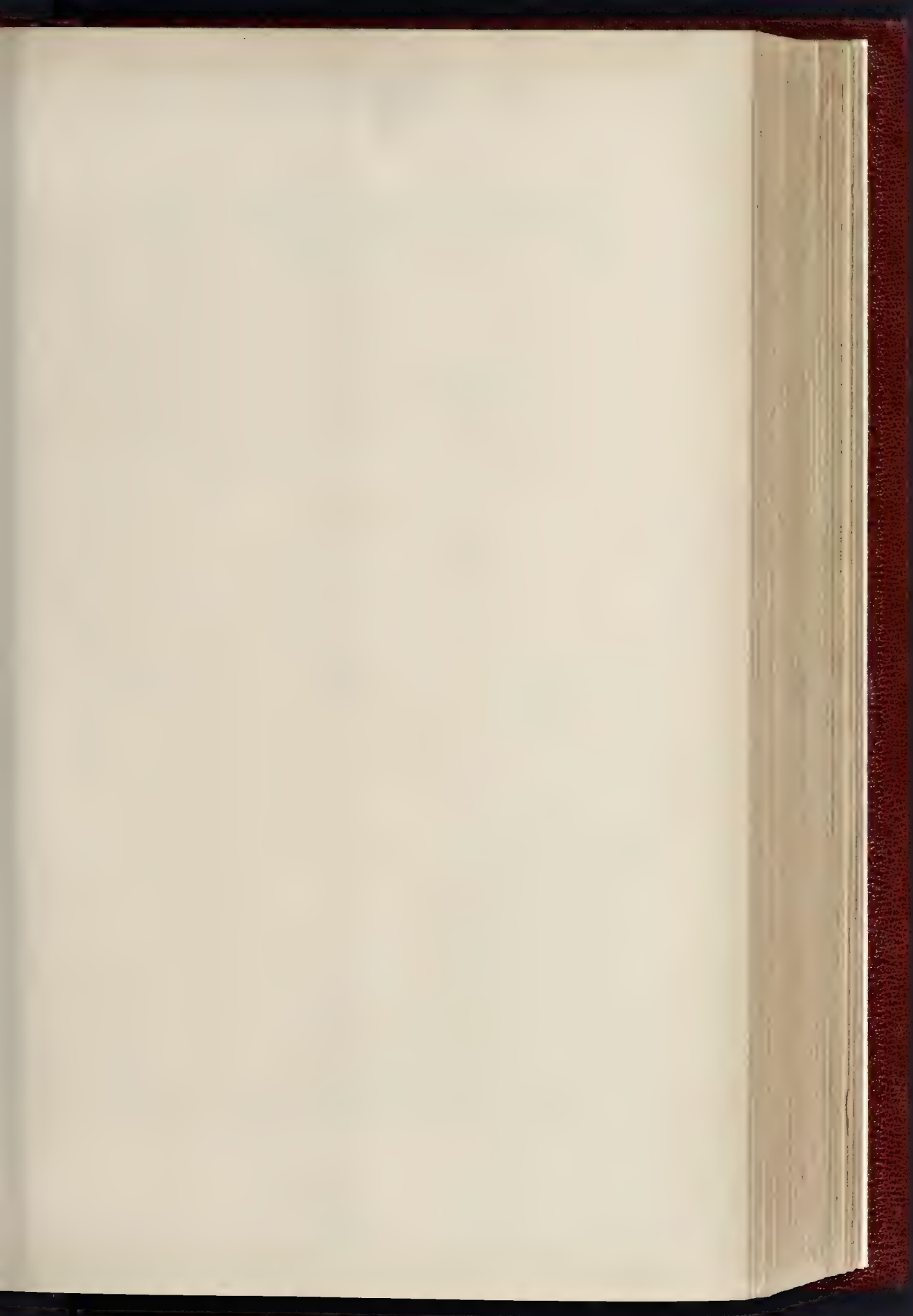
SCIENCE AND ART, CHESTER.

ARCHITECT.

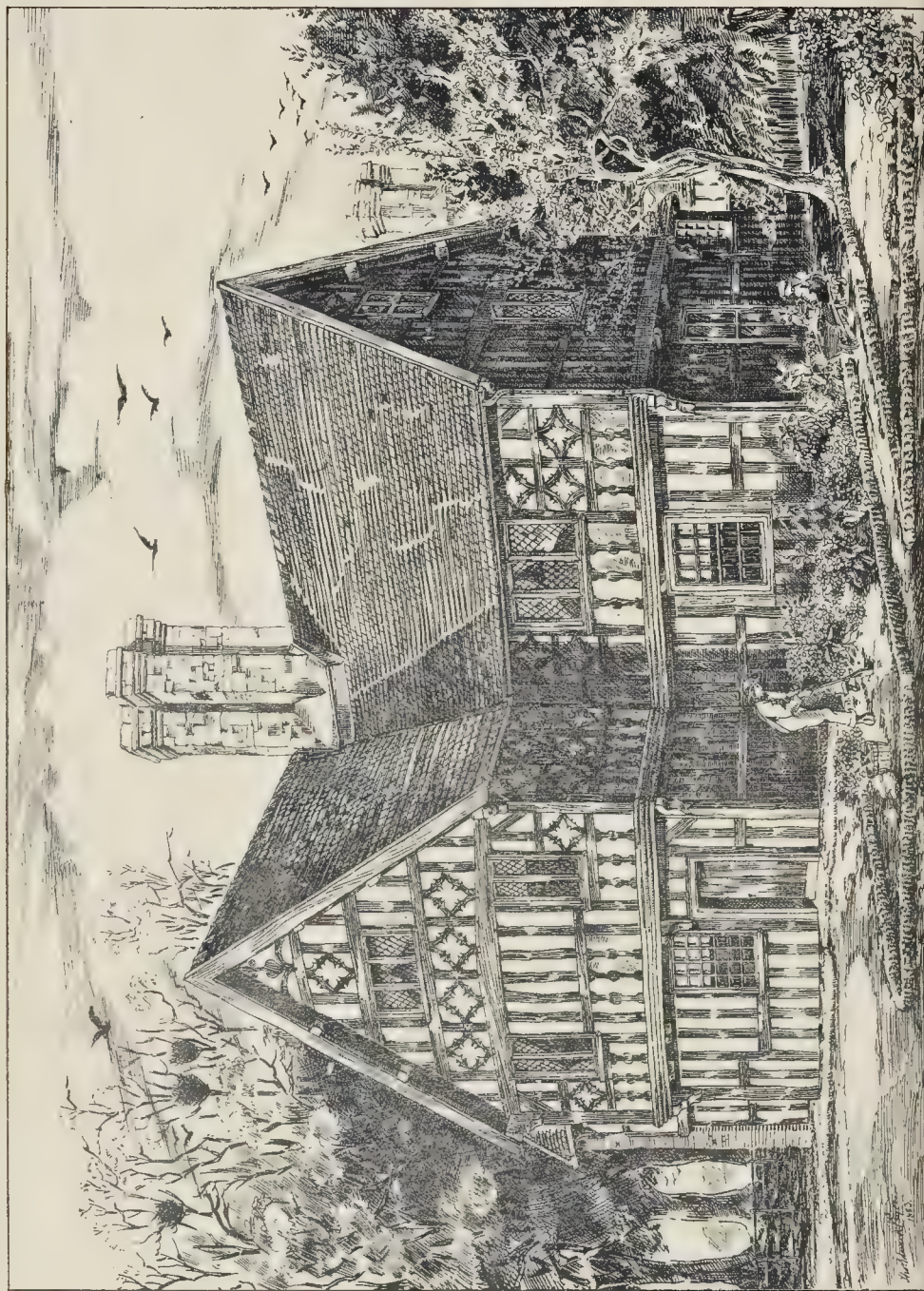


THE BUILDER, AUGUST 21, 1886.



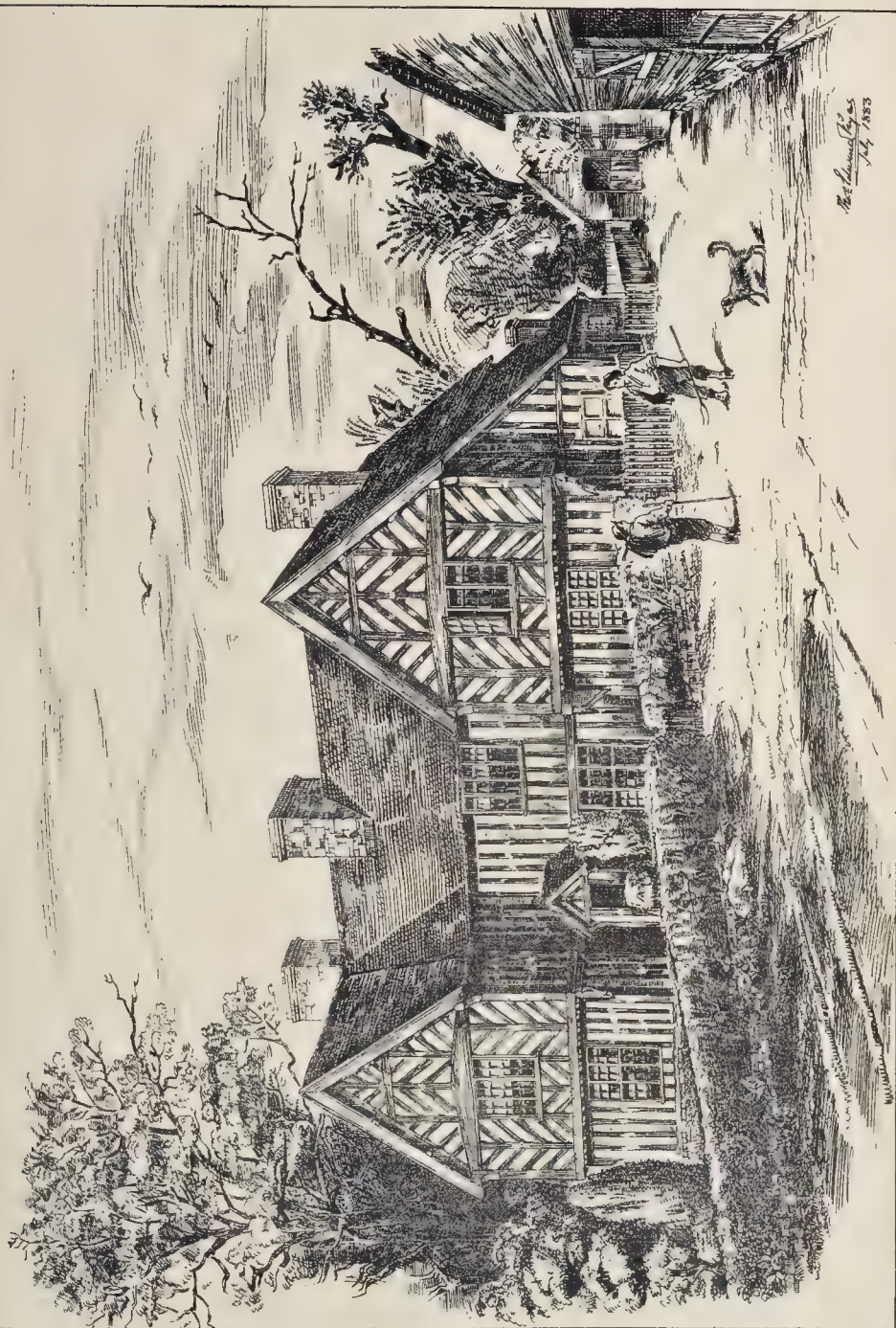


THE BUILDER. AUGUST 21, 1886.



Printed by Wynne & Sons, 10 Queen St. London, W.C.

Whitman & Co. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



Whitman & Co. Lith. 101, 102.

PENARTH, NEWTOWN, MONTGOMERYSHIRE.—DRAWN BY MR. T. EDWARD PRICE.

Printed by Wynne and Sons, 10 Queen St. London, W.C.



INDIA.



AUSTRALIA.

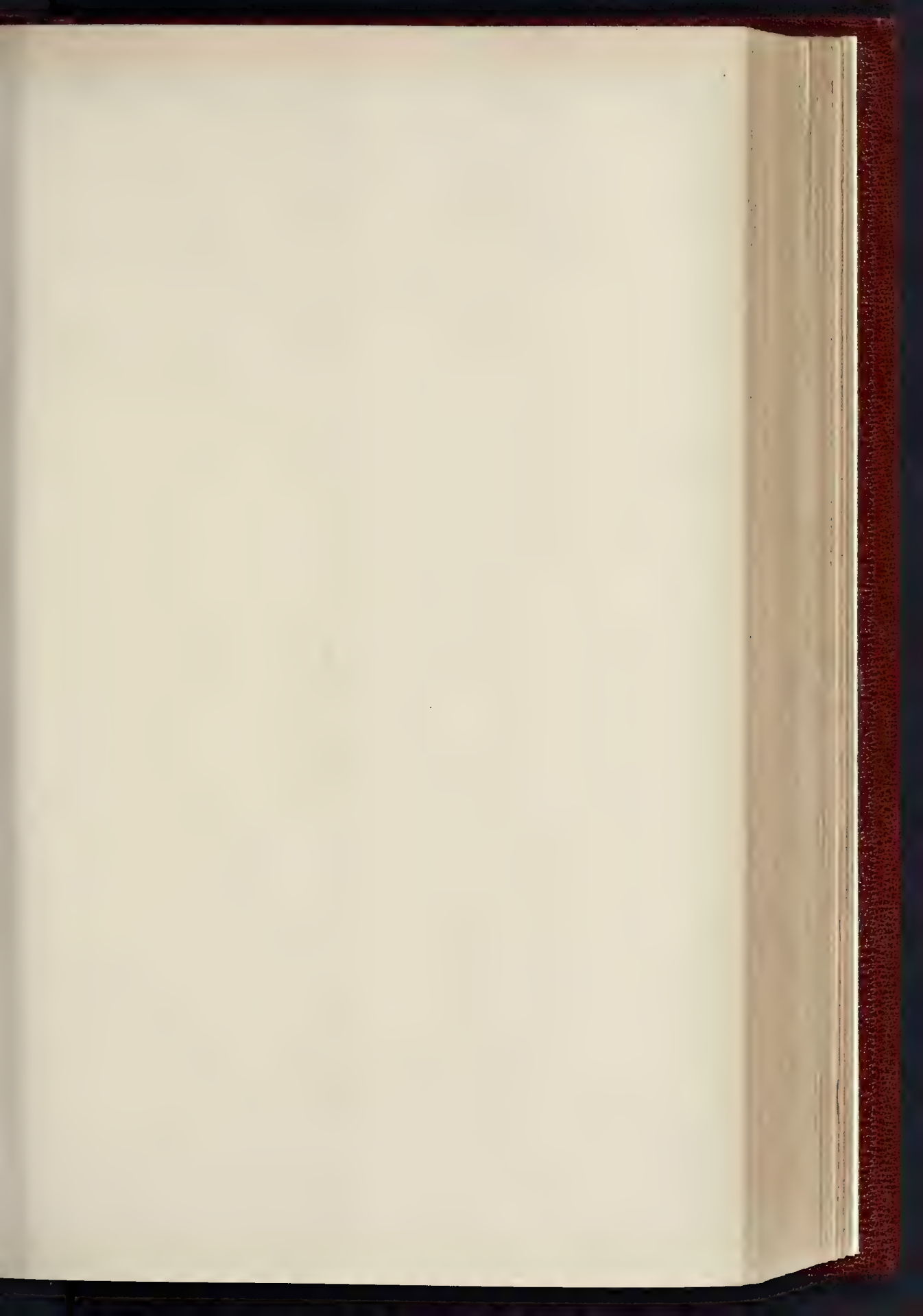


ENGLAND

"INK PHOTO" SPRAGUE & CO. 22 MARTINE LANC, CANNON ST. LONDON, E.C.

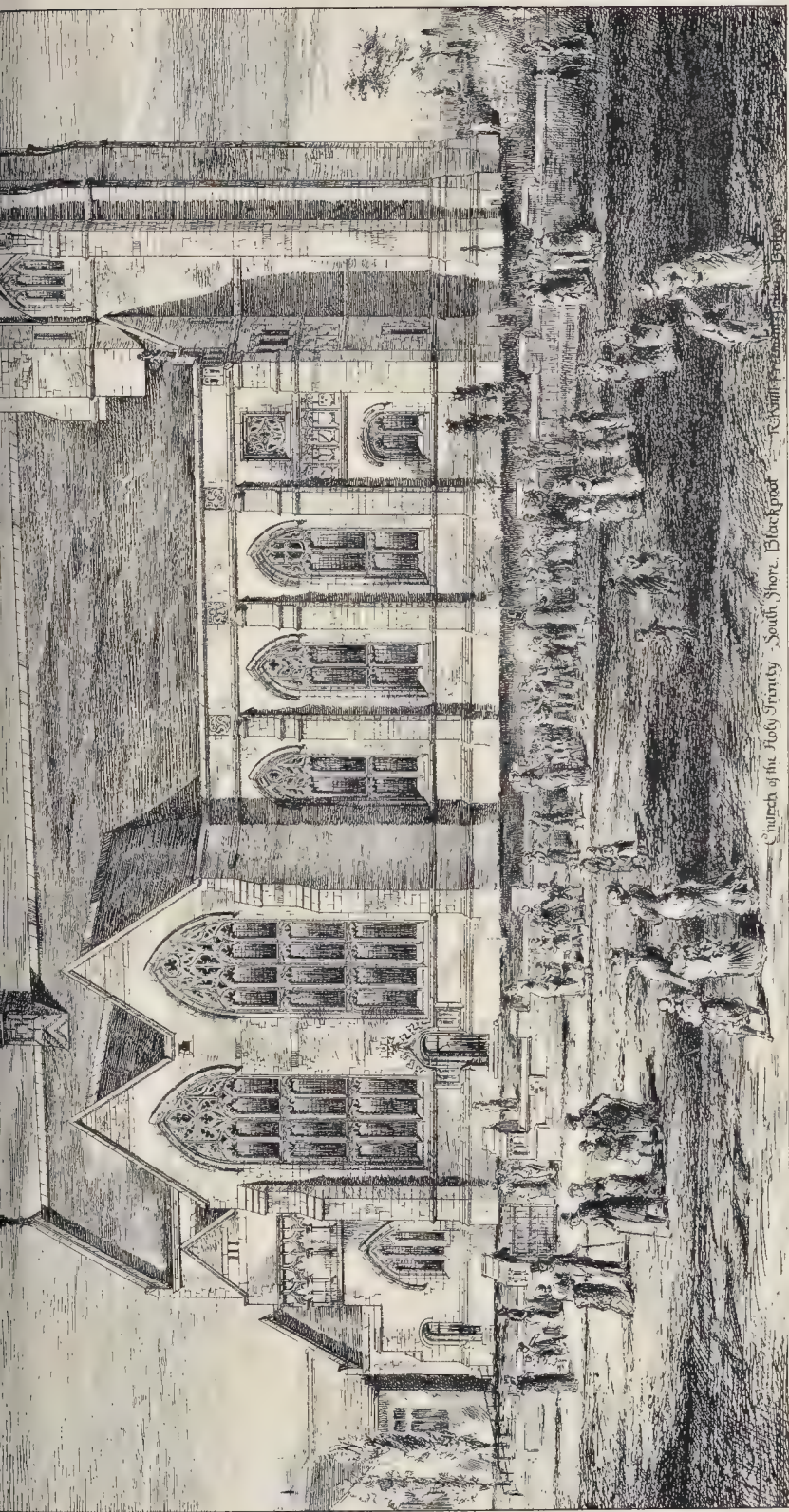
PANEL PICTURES IN THE INDIAN AND COLONIAL EXHIBITION.

EXECUTED BY MESSRS. DOULTON'S "IMPASTO" PROCESS.



THE BUILDER. AUGUST 21, 1886.

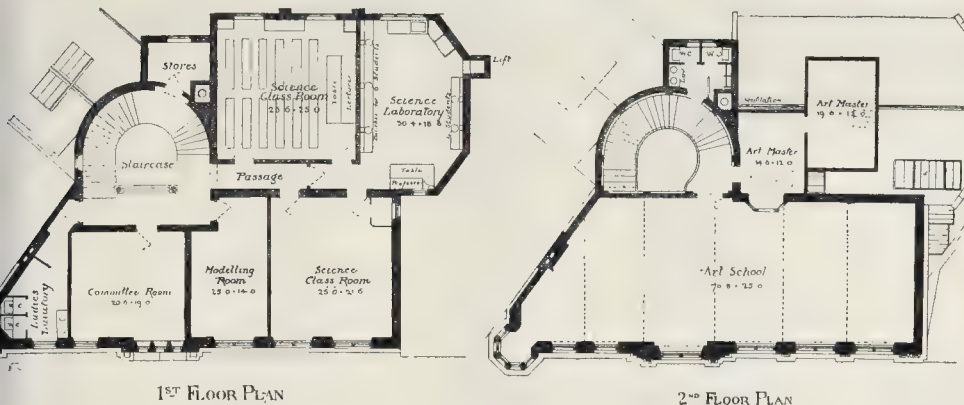




Church of the Holy Trinity, South Shore, Blackpool.

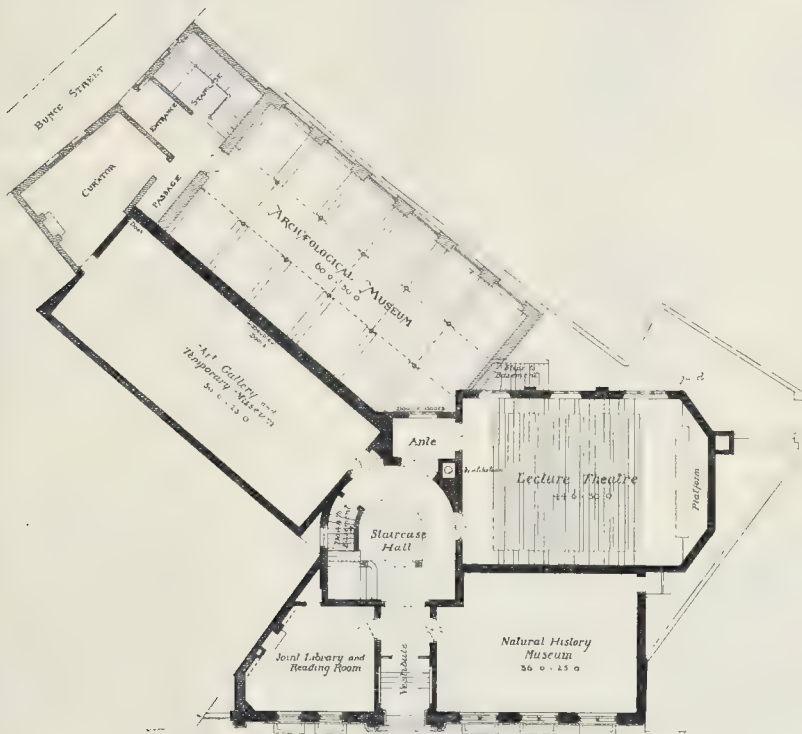
CHURCH OF THE HOLY TRINITY, SOUTH SHORE, BLACKPOOL.

MR R. KNILL-FREEMAN, F.R.I.B.A., ARCHITECT.



1ST FLOOR PLAN

2ND FLOOR PLAN



GROUND PLAN

Grosvenor Museum, Chester.

GROSVENOR MUSEUM, CHESTER.

To illustrate this week the plans and view of the Grosvenor Museum at Chester, opened by the Duke of Westminster on the 9th inst., of which we gave a full account in our issue of last week.

It will be seen that the ground is of irregular shape, and that the plan is of a demanding ingenuity, so that the entrance-hall is a convenient approach to the various departments.

The walls shown in black indicate the portions already built, which comprise the class-rooms for the science and art department, and the lecture-theatre; the walls on the ground plan are hatched to show the portion to be hereafter, comprising, on the ground and floor plans, museums for archaeology and natural history, with the curator's rooms, &c.,

and on the second floor the class-rooms for the more advanced pupils of the school of art department. It is hoped that these will soon be added to the building.

The architect is Mr. Thomas M. Lockwood, of Chester.

"IMPASTO" PANELS BY MESSRS. DOULTON & CO.

At the Indian and Colonial Exhibition the west wall opposite the turnstiles from Exhibition-road into the main entrance-hall is faced with slabs of terra-cotta painted in the "Impasto" process recently introduced by Messrs. Doulton & Co. The paintings are executed in coloured clays, which become incorporated with the body of the ware in the subsequent firing and glazing. The joints in these panels are made to follow the outlines or leading lines of the design, as in

stained glass, and as pieces of large area can be safely used, the total number of joints in a panel of any given size is considerably reduced. Not only therefore is the labour of fixing less than in ordinary tile panels but the unsightly straight jointing is altogether avoided.

The subjects of the panels, of which we give illustrations, are as follows:—Of the three lunettes (each nearly 7 ft. high by 10 ft. wide) above the archways, the left-hand one (as fixed, —the upper one in our plate) is typical of India's native art, and represents an Indian potter working at his wheel, while a native woman is decorating the ware. The centre panel (lowest in our plate) is typical of Great Britain, as represented in her manufacturing industries; the figures are those of an engineer and blacksmith. The remaining lunette represents Australia, as typified by a gold miner and a farmer.

THE EDINBURGH EXHIBITION.*

In no department of artistic culture has greater progress been made in recent years than in the decoration of the home, in the making beautiful those articles with which we come in contact at some point or other of our daily life. That great advance has been made in the application of art to the industries of the cabinet-maker and decorator is manifested by the examples of their handicraft in the Exhibition. In the matter of "art-furniture" Edinburgh makers have, for a considerable period, held a high position, not only as regards the artistic qualities of their productions, but for the substantial thoroughness of the workmanship. They have, of course, been influenced by the changes which have taken place in public taste, but have avoided running to extremes and producing vagaries. A marked departure from the practice which was almost universal in the first half of the century is the substitution of the solid material for veneering, and the attention paid to soundness of construction.

The publication of Mr. Eastlake's "Hints on Household Taste" may be said to have added vigour to this impulse, and to have banished the sarcophagus sideboards and horsehair-upholstered sofas and chairs from the cabinet-making trade. In regard to textile fabrics the progress has been most remarkable. It used to be a matter of very great difficulty to procure a carpet or a set of hangings having the slightest pretensions to artistic beauty, either as regards design, colour, or texture; now the difficulty is to choose from the variety of beautiful fabrics presented to us.

Looking over the catalogue of the Exhibition we find that, in several instances, the manufacturers have secured the aid of a painter, sculptor, or architect, some of them ranking as Academicians. In this way the productions are not mere specimens of manufacture, but examples of artistic handiwork of a high order. Of this class the most striking in the Exhibition is the exhibit of Mr. William Adams, Queensferry-street, Edinburgh (Court 3, No. 924), containing, amongst other articles, a carved oak fireplace, the two side supports consisting of men in armour, and the lintel and overmantel decorated with scenes from Shakespeare; carved oak fireplace, having old Scotch Inglenook, with satyr supports and carved lintel; Chippendale fireplace and overmantel carved in limetree; carved oak settle for entrance-hall, &c. The wealth of boldly designed carving, representing scenes from Shakespeare and Scott in a very spirited and artistic fashion, and the scale upon which they are executed, would make these articles objects of interest and remark in the most sumptuous mansion. Messrs. George Dobie & Son, George-street, Edinburgh, in a pavilion in central court, No. 880, show a boudoir, study, and smoking-room, "illustrating the application of comparatively inexpensive fittings and decorations to such apartments in a middle-class house." The rooms are delightfully comfortable-looking, and the subdued harmony of colour pervading them is in every respect commendable. Few, indeed, are the middle-class houses where such satisfactory surroundings are found. Next to this (No. 881), Messrs. John Taylor & Sons, Princes-street, Edinburgh, have a pavilion fitted up in a more sumptuous manner. A massive oak sideboard, in the old Scottish style, and mantelpieces and chairs to correspond, are good in design and execution. The chairs were made from a design by the late Mr. Drummond, R.S.A. A high-class bedroom suite in satin-wood, consisting of large three-doored wardrobe, washstand, toilet-table, Elizabethan bedstead, fitted with pale blue curtains, &c., are admirable of their kind. The workmanship is of the best, and the material choice. The wardrobe is a particularly handsome article of furniture, and the graceful drapery of the blue brocade hangings is in perfect keeping with the elegant bedstead.

Mr. Scott Morton has made for himself a name as a decorative artist. His Tynecastle embossed canvas, decorative furniture, textile fabrics, mantelpieces, &c., exhibited in Pavilion No. 882, sustain his reputation. The Tynecastle tapestry, which consists of canvas backed by strong paper, is embossed to any pattern, and can be coloured as desired, and is his speciality. Admirable specimens of it are shown. It is

now extensively used, and has been introduced into many mansions, hotels, &c., throughout the country. A specimen, as used in the Hôtel Métropole, and others, for shields in St. Helen's Town-hall, which are exhibited, testify to its effectiveness as a decorative material. There are several figure panels in this material, designed by Mr. G. W. Stevenson, R.S.A., which show that it can be applied to decorative work of a high class. Photographs are exhibited of interiors in various mansion-houses, showing different modes of applying the material; and, besides articles of furniture of elegant design, there is a very beautiful example of silk weaving, designed by Mr. Scott Morton, and executed by Messrs. Varner & Ramon, of London.

A rival to the Tynecastle tapestry appears in the "Coriovellum" of Mr. Thomas Hall, George-street, Edinburgh (No. 908, Court 3). The designs are reproductions of old Cordova and Venetian leathers, the material being treated in a permanent way in colours and gilding, and coated with a hard enamel, rendering it impervious to damp or atmospheric influences, and making the surface washable. This material was shown in the Health Exhibition in 1884, and secured a bronze medal. It must not be supposed that because it is washable and can bear a great amount of wear and tear, that it is a coarse material; on the contrary, the examples exhibited possess highly artistic qualities, which are also exemplified in the Royal Reception Room in the Exhibition-buildings, which we should remark are furnished in an appropriate manner by the Messrs. Clapperton, Princes-street, Edinburgh.

Another new decorative material is that invented by Mr. Girvan, of the firm of Brown & McLaren, Stirling-road, Glasgow, Court 3, No. 911. Upon Lyons satin, patterns are printed in distemper, producing a very brilliant result, but very soft and pleasing in its richness, something like shot silk, varying according to the light thrown upon it. The firm profess to have got over the difficulty hitherto experienced in hanging a large surface with satin, the joints being as perfectly formed as in any well-made wall-paper. Still another wall-decoration is the Lincrosta-Walton of Messrs. Frederick Walton & Co., Sunbury-on-Thames, which is a composition of linseed oil and wood fibre upon which figures in relief are produced. It has the desirable quality of being waterproof. It can also be moulded into forms, such as picture-frames, &c., examples of which are shown.

Messrs. Jeffrey & Co., of Essex-road, Islington, London (No. 919), exhibit some admirable wall-papers, excellent in design, and non-arsenical as to their colouring matter. Their exhibits include papers and embossed leather-papers, designed by Mr. Walter Crane and Mr. Lewis F. Day.

Messrs. W. Woollams & Co., of Marylebone, London (No. 920), have also an excellent display of non-poisonous and artistic papers and leather papers, including "Tergorine," an artificial leather, which is capable of being embossed, painted, and lacquered.

In this court, No. 3, are many other exhibits well worthy of attention, but which want of space prevents us from referring to in detail; we can hardly, however, leave the court without a passing glance at the pair of large painted figures which flank the carved mirrors and picture frames exhibited by Messrs. Ciceri & Co., No. 900, more strange than beautiful.

ARCHITECTURAL ASSOCIATION,

VISIT TO OXFORD, SATURDAY, AUGUST 21ST.

We have been asked to publish the following time-table for the benefit of members who wish to join in this visit:—

- 11 0 a.m.—Arrive.
- 11 15.—Balliol College.
- 12 0 noon.—School in High-street (T. G. Jackson).
- 12 30 p.m.—Trinity College.
- 1 0.—Wadham College—(Lunch at Wadham by invitation of Mr. T. G. Jackson).
- 3 0.—Bodleian Library.—(Meet party arriving by 1 p.m. train).
- 3 15.—All Souls' College.
- 4 0.—New College.
- 4 45.—St. Mary Magdalen.
- 5 0.—Merton College.
- 5 30.—Christchurch.
- 6 45.—Kehle (Butterfield).
- 7 0.—Tea and general look round.
- 9 5.—Return to London.

The schools in High-street and Trinity and Wadham Colleges will be visited under the guidance of Mr. Jackson, and the other buildings under the guidance of Mr. Edwd. G. Bruton.

CORNISH BENCH-ENDS.

The accompanying sketches are a few examples of the rich store of interesting emblematical designs which are to be found carved on the ancient bench-ends of Cornish churches.

The Kilkhampton designs refer almost entirely to the Passion, those of Lanelles (in addition to the figures of bishops) the ladder and thirty pieces of silver, the hand plucking out the hair (in reference probably to the prophecy, "I gave my body to the smiters, and my cheeks to those who plucked out the hair"); next a peculiar kind of Greek cross, the binding cord, scourges, &c.

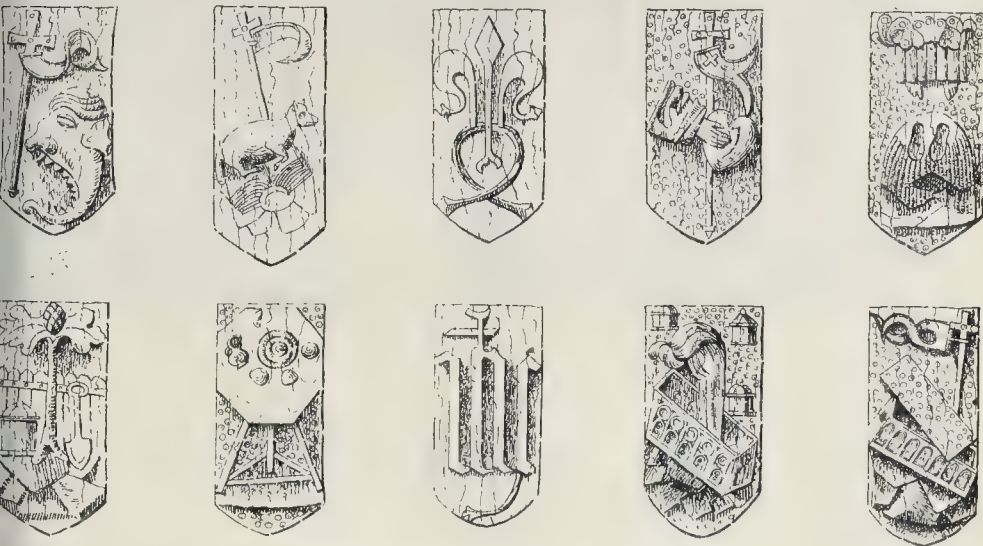
The Lanelles series are most interesting, and the ability of the artist to bring his meaning so forcibly before us without once introducing a figure is remarkable. The first is evidently the Conquest of Hell by the subject of the second, the Lamb of God; then, without following the order in which they are here placed, we must read the subjects in this way:—Our Lord, typified by his banner of victory, bursting the grave, whose covering is rolling aside; then come the Three Maries, their visit shown by the three vases of precious unguents; then follow the four appearances, first to the Blessed Mother, typified by the fleur-de-lis and initial M; then to St. Mary Magdalene in the Garden; then to the two disciples at supper at Emmaus (the table has three little loaves for their number); lastly, to St. Thomas, "Reaching hither thy hand and thrust it into my side"; the Ascension (No. 5) concludes the forty days' life.

These must be very early examples, for they are fifteenth-century work, and it was not till early in that period that the custom of slating churches was introduced. A. G. L.

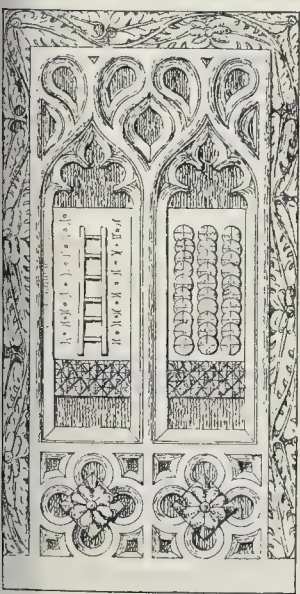
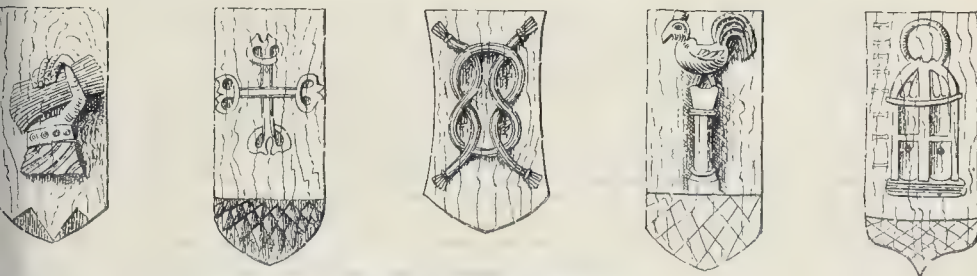
The Briton Assurance Company's Office Buildings in the Strand.—The failure of the Briton Medical and General Life Association, whose affairs are now the subject of investigation in the Law-Courts, has led to the sale of their valuable office buildings in the Strand and Agar-street, which took place last week, at the Auction Mart, under a Chancery order, made by Mr. Justice Kay, Messrs. Debenham, Tewson, & Co. being the auctioneers. The premises were submitted in two lots, the first lot offered consisting of the leasehold property in the Strand, at the corner of Agar-street, covering an area upwards of 2,100 square feet. The premises were stated to be held for a term expiring in 1904, at a rental of 800*l.* a year, and were offered with immediate possession. The particulars stated that a few years ago a large outlay was made by the Association on the premises, and that they were now well adapted either for an insurance company, a club, or other public institution. Mr. Tewson, the auctioneer, in submitting the property, said it situated made it one of the most valuable on the West-end for commercial purposes. It was sold for 4,600*l.* Two houses in Agar-street adjoining were next offered. They are held for a term expiring in 1905, at the annual rental of 90*l.*, and let by under-leases at rents amounting to 390*l.* per annum. They were sold at 2,800*l.*

Proposed Tunnel between Sweden and Denmark.—We learn that Mr. Alexander Rothe, an engineer formerly engaged at the Panama Canal Works, has submitted to the Danish and Swedish Governments plans for a railway tunnel under the Sound, between Copenhagen and Malmö, in Sweden. The tunnel is to have a total length of 7½ miles, miles between Amager and the small island of Saltholm, and 5½ miles between Saltholm and Malmö. The ground to be worked is stated to much resemble that in the English Channel between Dover and Calais, and to offer no difficulty in the execution of the work. The cost of construction is calculated at about 1,200,000*l.* The Swedish Government is said to take a great interest in the scheme, whilst that of Denmark at present is more reserved. Mr. Rothe entertains sanguine hopes of a successful result of the negotiations. The tunnel would be of the greatest importance to the future commercial relations between the Scandinavian peninsula and the rest of Europe, if followed by further tunnelling work; for, after the greater work was completed, tunnels were made under the Great and Little Belts through railway communication with the Continent would be complete.—Iron.

Launcelles.



Kilhampton.



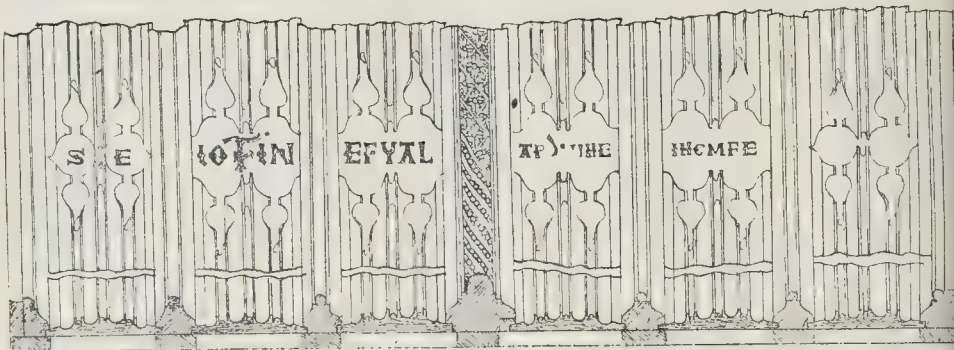
Kilhampton.



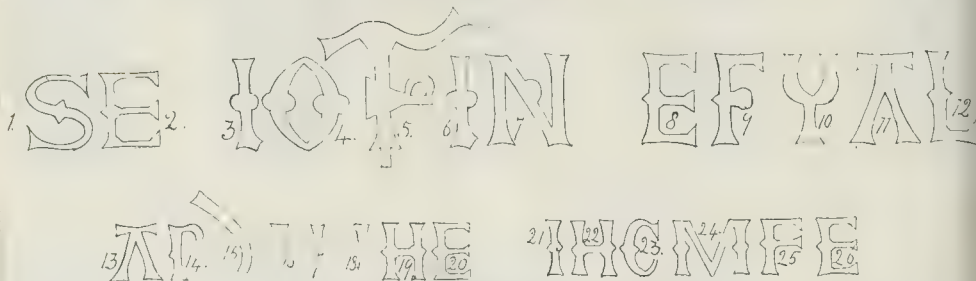
Morwenstow.



Kilhampton.



Panels, St. Mary's Church, East Bergholt.



Inscription on Panels, St. Mary's Church, East Bergholt.

ESSEX ARCHÆOLOGICAL SOCIETY.

The annual meeting of this Society was held on the 12th inst., at Ingatstone, visits being subsequently paid to Margareting, Fryerning, and other places adjacent. Mr. G. Alan Lowndes, the President, occupied the chair at the opening meeting, and Mr. H. W. King, hon. sec., read the annual report, which was satisfactory in character so far as regards the position of the society.

The Chairman, in moving the adoption of the report, referred to the death of Miss Katherine Fry, of Plashet, who had, he said, as stated in the report, taken great interest in the work of the society since its formation. With regard to the position of the society, he thought that at this time they were not wanting money so much as able contributors to assist. He did not know what they would do without their able friend, the hon. sec. Every one who read the *Journal* would see how much they were indebted to him. He wished they could persuade some younger members of the society to take more interest in it. There was a great deal to learn in the county of Essex,—there was not a single parish in which they could not pick up something. That day they would see the monuments to the oldest family in the county, the family of Petre. They would also see one or two specimens of work almost peculiar to the county of Essex. He was alluding to the brick towers of Ingatstone and Fryerning Churches, which, he believed, were the finest in the county. They would also see some timber towers.

Mr. E. Durrant seconded the motion, but thought that a meeting of the society once a year was not sufficient. He believed that if meetings could be held oftener, especially in the large towns, they would be productive of much good.

The resolution was carried.

The Rev. H. T. Armfield proposed, "That the thanks of this meeting be given to the president, vice-presidents, council, and officers for their services during the year, and that they be re-elected, with the addition of the Rev. H. L. Elliot, to supply a vacancy."

The Rev. W. Gibbings seconded the motion, which was carried unanimously.

The Chairman responded, and moved a cordial vote of thanks to Lord Petre and Mr. Coverdale

for their permission to visit Ingatstone Hall, to Major Arkwright for permission to visit Thoby Priory, to the clergy who had opened their churches for the inspection of the society, and especially to the Rector of Ingatstone for the use of the school-room in which that meeting was held.

The motion, on being seconded by Mr. King, was carried.

The Rev. Dr. Hill proposed a vote of thanks to the Mayor of Colchester (Mr. Henry Laver) and Mr. George Joseelyne for auditing the accounts of the society.

Mr. Chancellor seconded the motion. In alluding to remarks which had been made in reference to the laying down of tombstones in churchyards, he said that the matter of churchyards had excited a good deal of attention in many places. His own opinion was that nothing looked much worse than tombstones lying about in all directions. He thought that many tombstones were better preserved by being laid flat. He was about to bring out a work of the whole or nearly the whole of the sculptural monuments of Essex previously to 1700. When he commenced the work he thought that 100 sheets of drawing would cover the whole subject, but he had now got to 140, and seemed to have almost as much to do yet. Some of them were of immense interest. He had found tombs of different members of the same family scattered all over the county, and when he had got them all together he had really compiled a little family history. It was very interesting, too, to study the different attitudes in which the figures were placed on the monuments. They could be traced from the devout position of the Crusaders to the leisurely way in which the statues were placed on the tombs in the times of the Stuarts. Some of the works were very beautiful, and there could be no doubt that at one period, especially from about 1600 to 1650, there must have been a factory almost of these tombs. They appeared to be all designed by one man.

The resolution was carried.

The Honorary Secretary read a memorandum drawn up by a committee appointed by the Council of the Society of Antiquaries as to the importance of the preservation of court rolls and other manorial documents. The memorandum stated that the vast amount of light which the ancient court rolls and other deeds apper-

taining to the numerous manors in this country threw upon the habits and civilisation, and the legal and social condition of its inhabitants rendered them of great historical interest and importance. In questions of genealogy their value was self-evident, but in tracing out the development and gradual growth of those institutions under which this country had so long flourished, the aid that they might afford to the student could hardly be over-estimated. Having mentioned that many of the rolls had been destroyed, and that others were liable to heedless destruction, the memorandum went on to say that the Society of Antiquaries was anxious that steps should be taken for the preservation of those remaining, and was confident that the attention of lords and stewards of manors were called to the historical value of such documents they would readily assist in protecting them from injury, either by depositing them in some public repository, or preserving them with their other muniments.

The Chairman announced that it was proposed to hold next year's annual meeting at Dunmow, where they last met about twenty years ago.

The company then visited Ingatstone Church, where Mr. Chancellor read a paper describing the most interesting features of the building and the monuments. In the construction of the brick tower, which is the finest of its kind in the county, it is said that half a million of bricks were used. Inside the church the memorials to the Petre family were examined.

A move was afterwards made to Ingatstone Hall, where, under the guidance of Mr. Coverdale, jun., the most interesting parts of the building and premises were visited. The hall was formerly the seat of the Petre family until they removed to Thorndon Hall, near Brentwood.

After luncheon at the Spread Eagle Hotel the company left in brakes to visit the church of Margareting, Fryerning, and Blackmore Thoby Priory (the residence of Major Arkwright), and "Jericho," Blackmore (the residence of Col. Disney).

The party afterwards returned to Ingatstone, where they separated.

Queen's School, Kew.—It has been decided to rebuild the Queen's School at Kew, and Mr. Edwin Dolby is the appointed architect.

EAST DOOR OF ST. MARY'S CHURCH, EAST BERGHOLT, SUFFOLK.

RE.—The enclosed tracing of an excellent specimen of oak doors, ornamented with drapery panels, been put into my hands for restoration. After fully removing the paint and dirt in the intervening space between the upper and lower ends of carved drapery, I have been able to trace the lines as shown in the tracing, and which were finally filled in with a black cement. I should have been a great favour if you, or some of your serious correspondents, could furnish me with a tracing to my meaning, so that I can insure their restoration. In five panels, numbering by section from 1 to 26 and from left to right, they fairly perfect up to 13; No. 14 may be B, P, or 15 is probably D; the heads and part of the 16 strokes of 16, 17, and 18 are fairly visible, the strokes may comprise two rather than three letters; 20, 21, and 22 are perfect; 23 may be C, R, S; 24, 25, and 26 are perfect; no letters are visible on the sixth or last panel. The north doors of the same character, only the upper and lower panels are divided with a moulded transome. I enclose tracing of letters, full size.

THOMAS STOFFER, Wood Carver.

—which.

"LIGHT RAILWAYS."

RE.—In reply to "C.E.'s" inquiry in your issue of 14th inst. [p. 252], I beg to say, as contractor, I have carried out upwards of fifty miles of light railways, under Mr. Lewis, of 43, Dame-street, in, who would gladly give any information at for.

THOMAS L. DIXON.

A WARNING.

RE.—During the present month I have had four ladders. First, a hand-truck, stolen from a house in Bournemouth, and found a week after, with name and address, brushes and tools from Belisize Road; a ladder was brought from some other person's works near, and by it the thief gained access through the back window. Third, a sixty-foot ladder from Marylebone-road; evidently, two or three thieves must have been implicated in this. Fourth, some brushes from Regent's Park. Oddly enough, on giving notice to the Police Inspector, and telling him of my losses, he said he had a sixty-foot ladder which he wanted an owner for in the

do not know whether the thieves have selected only for their favour, but I should advise my other builders to be on the alert.

STANLEY G. BIRD.

SIR JOHN SOANE'S MUSEUM.

RE.—In answer to a letter which appeared in last issue [p. 252] from "A Would-be Reader," in which it is stated that this Museum is actually unused, and is closed for nearly ten years in the year, I beg to inform him that the season begins on the 1st of February and closes till the end of August, and that cards for the days and for students can be obtained from the curator at the Museum.

Information is frequently advertised, and it has been seen on the front page of the Builder of the 7th inst.

JAMES W. WILD.

PROVINCIAL NEWS.

Leicester.—The committee charged with the erection of the new Liberal Club-house have had a competition among the liberal architects of Leicester. The plans were referred to Mr. Robson, F.S.A., of London, who selected Mr. E. Burgess, of Leicester, as the best. Mr. Burgess has accordingly been appointed architect to the new building.

Bury (Dorset).—The Earl of Ilchester, Lord Lieutenant of Dorset, has made considerable additions to the fine old mansion at Bury. An entirely new wing has been added at right angles to and on the west of the house, running north and south, and terminating at the southern end with a tower 60 ft. high. A large gateway forms the entrance to a quadrangle, in the side wall of which is a main entrance to the house, formed by a recessed doorway, richly panelled and flanked by shields at the intersections. There is an over the archway, approached by an ornamental turret with an oriel window over the top of the front arch, something similar in design to those at Montacute Priory Gatehouse

and at Ford Abbey, which were both the work of Thomas Chard, who was Prior of Montacute and Abbot of Ford. The fine old tower at Melbury, which is nearly all that remains of the original mansion, was built in the days of Thomas Chard,—the period of the best Perpendicular work. The new work has been designed to harmonise, as far as possible, with this. The whole of the dressings, and the whole of the walls are faced with Ham Hill stone, which has been supplied and fixed complete by Messrs. Charles Trask & Sons. The brickwork and rough walling, as well as the woodwork, &c., have been executed by Lord Ilchester's own workmen, under the direction of Mr. George Buxton, the clerk of works. The architects are Messrs. Devey & Williams. A good deal of work remains to be done to the interior. The Earl of Ilchester has given a splendid entertainment to the workmen who have been employed on the building so far. The men, numbering between forty and fifty, were invited to a supper, which will be long remembered by them as being the most hospitable they had ever seen. Mr. F. Nichols, manager to Messrs. Trask & Sons, was requested to take the chair, Mr. Buxton being vice-chairman. The Earl of Ilchester was from home, but after supper the Countess and Mr. Wells, the estate agent, were present. The healths of the Earl and Countess and their family were proposed and responded to. Mr. Wells proposed in complimentary terms the health of Messrs. Trask & Sons, and the Countess addressed the men, saying how pleased she was at their conduct during the two years the works had been in progress, and how thankful she was that no accident had occurred.

CHURCH-BUILDING NEWS.

Filey.—The interesting old church of Filey was re-opened on August 5th. The building is mainly Early Pointed. In the south transept are sedilia and piscina, marking the site of an altar of importance. New aisle windows, north porch, oak roofs to nave and transepts, east window, oak benches, &c., have been added. The chancel remains to be fitted and re-roofed. The walls have been denuded of all their plaster, and look rough. 4,100l. have been spent. The architect is Mr. Swindon Barber, of Halifax, and the contractor Mr. Thompson, of Peterborough.

Hebburn.—The new Church of St. John, which has been in course of formation and construction during this summer, has now reached in some parts of its masonry a considerable height. The plan consists of a long nave and chancel, with a vestry and heating-chamber, with fuel-house opening out of the north side, and a narthex baptistery and entrance-porch annexed to the west end on the south side. Massive buttresses project at intervals, and alternating with them are double-light windows in the nave, and triple-light windows in the chancel, the heads of which are filled with tracery. In the interior there will be sittings for 352 adults in the nave and narthex, and 120 children; and in the chancel there will be stalls and seats to accommodate 96 persons, forming a total of 568. The architect is Mr. F. R. Wilson, and the contractor Mr. John Monro. Mr. M. Temple Wilson is acting as resident architect.

Lillingstone Dayrell (Bucks).—A new reredos, the gift of Mrs. Roberts, of Tile House, near Buckingham, has just been set up in this church. It consists of an arched pediment, with cornice over, and altar-shelf of red Devonshire marble, the whole being flanked with buttresses. The detail of transitional character, has been made to correspond as far as possible with the early work in the chancel. There is a fine cross in the centre, of Sicilian marble, on a ground of Rosso Antico. This stands under a trefoil-headed arch of selected Derbyshire alabaster. There is much dog-tooth moulding in the cornice and elsewhere. The remaining material of Caen stone; the whole being the work of Mr. Harry Hems, of Exeter. New stalls are also in progress for the church; these as well as the reredos are from the designs of Mr. E. Swinfen Harris, and are being carefully supervised by him. They are the work of Mr. W. Watson, of Stony Stratford.

Porth.—On Thursday afternoon, the 5th inst., the foundation-stone of a new church at Porth, Rhonda Valley, was laid by Miss Davies, Glynrhonda House, in the presence of a large concourse of people. The site of the new

building, which is on the estate of Major Leigh, has been given gratis, and a handsome structure, to accommodate 350 persons, has been designed by Mr. E. M. Bruce Vaughan, architect, Cardiff, and is being erected, at a cost of about 1,100l., by Messrs. Thomas & Morgan, contractors.

Shrewsbury.—The *Shrewsbury Chronicle* understands that specifications for the rebuilding of the choir of Shrewsbury Abbey Church, towards which an anonymous donor recently contributed the munificent sum of 10,000l., are now in the hands of the building trade, is to be at once commenced. The work to be done, the designs of which have been prepared by Mr. J. L. Pearson, R.A., comprises the chancel, crossing, and one bay each of north and south transepts, and north and south vestries. The area proposed to be covered is about 76 ft. by 70 ft. out-to-out of walls. The apices of the main gables will be 78 ft. above the nave floor, and the top of the main walls will be 58 ft. from the same floor. The chancel roof will be arched and groined, and there will be comparatively little timber used in the structure, which will be in the main solid masonry of either Shelvoke, red and white (mottled) stone, or red Harmer Hill stone, both internally and externally. The tenders were to be opened on the 27th ult. It is a proviso in the specification that all coins, antiquities, fossils, and objects of value found in the necessary excavations are not to be considered the property of the contractor or his workmen, but are to be placed in such a place as may be directed.

Timbury.—On the 29th ult. the parish church of Timbury, dedicated to St. Mary, was reopened by the Bishop of Bath and Wells, after being re-seated and the interior thoroughly restored. Although the present structure is of modern date, the church was filled with the old-fashioned pews, and had also a north, west, and south gallery. The pews have been replaced by open pitch-pine seats, and the north and south galleries removed; the west gallery remains, having been re-seated, and a new front of pitch-pine panelled with oak taken from the old floor of the nave; the walls have also been wainscoted with the same. The architect was Mr. Spencer, of Timbury, and the contractor Mr. Pollard, of Bridgwater. The font has been removed from the centre of the nave to near the south door; it has been re-cut and carved with water-lilies round the bowl, while round the top are the words "One Lord, one Faith, one Baptism." Round the base a pavement of encaustic tiles, specially designed for the purpose, has been laid. The windows have been filled with cathedral glass.

DISSENTING CHURCH-BUILDING NEWS.

Brighton.—The enlargement of Queen's-square Baptist Chapel having been completed, the building was re-opened for public worship on the 8th inst. The work of alteration has occupied three months, during which time the chapel congregation met for worship at the Royal Pavilion, where the services were well attended. The style of the building has not been altered as to the exterior; what has been done has been to increase the accommodation to nearly double its former extent. To effect this the wall that used to separate the classroom from the chapel has been removed and the class-room taken in, giving accommodation for a hundred extra persons. The gallery above has been enlarged, and affords accommodation for now an additional two hundred persons. The interior has also been modernised, the chapel now being light, airy, and commodious. The roof has been raised and left open, showing the open tie-beams instead of being ceiled flat, as in the old building. A better system of ventilation has been introduced, and two coloured windows have been placed at the north end, the general effect of the alteration having been to produce a substantial improvement. The cost of these building operations is said to be 1,000l.

Tiverton.—On the 30th ult. the foundation-stone of a new Bible Christian Chapel was laid at Tiverton. The cost of the building will be about 800l. The *Western Times* says that "it is proposed to finish the exterior of the chapel according to the modern type of chapel architecture, while the front of the galleries will be set off by an ornamental palisade with book-rests, &c." Mr. W. Collard and Mr. S. Manning are entrusted with the contract. Mr. S. Deering drew the plans of the new building, and Mr. W. Barrons acts as surveyor.

The Student's Column.

STONE QUARRIES.—VIII.

ENGLISH HORNBLENDIC GRANITES.

THE principal districts in which hornblendic granites occur in England are at Shap Fell, in Westmoreland, and in the igneous mass of Leicestershire.

The Shap Quarries are situated at a considerable elevation above the works where the granite is polished, &c., and the two are connected by a railway, the gradients of which are about 1 in 25.

In recent geological times, glacial action has been at work in the district, and blocks of stone from this mass of rock have been carried away great distances from it. As might be expected, the adjacent moors are strewn with them, but chiefly to the east and south-east. Blocks of shap granite have been found at irregular intervals all the way between the quarries and the east coast, some sixty miles distant at the nearest point. In a south-easterly direction they have been carried further still, and there is one about 14 ft. by 12 ft. half embedded in the ground at Seabam Station two miles from Scarborough,—a distance of more than ninety miles from the quarries.

The stone itself, may be described as a porphyritic hornblendic granite. It varies in colour from light grey, dark grey, golden grey, pink, full red, and deep purple, but for the purposes of commerce there are only two varieties, known as dark and light shap. The base of the rock is fine, the dark kind having small granules of quartz, clear and transparent; the felspars are mostly deep red, but pink and almost white crystals are seen here and there. Mica occurs in minute black flakes, whilst the, comparatively speaking, little hornblende present is just sufficient to cause the rock to be removed from the ordinary granites. Iron pyrites is also present in small quantities. The ground mass of the light kind is slightly coarser than that of the dark, yet it may still be called fine-grained, and it owes its light colour to the fact that the felspars, instead of being dark red, are a light yellowish green, sometimes almost white, and occasionally light pink. Otherwise the two rocks are very similar in appearance. The large orthoclase felspars that cause the rock to become porphyritic are salmon-coloured, and, as compared with those in Cornish granites, are remarkably uniform in size, being usually about an inch in length. They are twinned, and do not appear to lie in any particular position, except for short distances, so that the planes of the crystals, if produced, would intersect one another at various angles. The stone is capable of taking a high polish.

The face of the principal quarry is upwards of 130 ft. in height, and detached blocks, weighing from 1,500 to 2,000 tons, have been blasted; but for practical purposes, blocks of more than 20 tons are seldom required.

We will now give a short account of the method of quarrying, and the machinery used in these quarries. It must be understood, however, that we do not intend to convey to the student the idea that the workings and machinery are necessarily better than in other large quarries in the United Kingdom, or that all the appliances are peculiar to the quarries under consideration. All large quarries use somewhat similar machinery to each other, which is modified according to the magnitude of the workings, and the adoption or otherwise of the latest improvements.

In quarrying Shap granite, holes are drilled having a diameter of from 2 in. to 3 in., and reaching occasionally between 30 ft. and 40 ft. in depth, in which charges of gelatine or gunpowder are placed. The former is best adapted for wet weather. Dynamite is found to be practically useless on account of its shattering propensities. When a large block is brought down on the floor of the quarry, it is usually split with wedges in the first place, as described p. 183, ante. Then steam boring drills are set to work to cut the stone into the size ultimately required. By means of these drills, which will pierce some 130 ft. of granite per day, a great saving is effected, as the largest blocks can be cut to a nicety and great waste obviated. The size of the holes made for this purpose is usually 1 in., and they are placed 5 in. or 6 in. apart. A portable engine supplies these drills with steam, which is conveyed in piping in drains to various points in the quarry. This engine also drives a

granite-crushing machine and its numerous appliances: the crushed material is used for concrete work.

There are two steam cranes, 20 tons and 15 tons respectively, to assist in the manipulation of large blocks of granite, together with a gantree with crane, the latter being placed over the masons' sheds.

The granite intended to be used for engineering purposes, such as in docks, bridges, &c., is worked up in the quarries, and loaded into railway trucks, being taken to the main line by a locomotive.

The cut blocks for architectural and monumental purposes are conveyed to the polishing works, where they are first masoned, and the smoothest possible face put on before being placed in the polishing-mills. In front of the masons' sheds, which are some 100 yards in length, a steam crane travels for the purpose of turning, fitting, and loading the granite. There is also a large gantree for stocking purposes, and for the working of exceptionally heavy blocks.

We now come to the granite turning-lathe, otherwise known as the "steam-mason," which is capable of doing the work of fifteen men, and dealing with columns up to 16 ft. or 18 ft. in length and up to 2 ft. 8 in. in diameter. The corners are roughly scabbled off a squarely cut piece of granite before being put into the lathe. The cutters of the lathe consist of two circular cast steel discs, which are on opposite sides, one acting as a counterpoise to the other, as well as doubling the amount of cut-turn. These cutters have a tapered hole bored in the centre, through which is passed a spindle with boss. This in turn is placed in the rest, when the boss on the spindle is tightly screwed up against the face (or rather, in the tapered hole) of the cutter. The cutter and spindle revolve; the rotary motion being given by the column or block of granite which is turned by steam-power. There are other granite turning-lathes in the works, which are smaller, being adapted for vases, balusters, urns, &c.

Let us now consider the polishing-lathe. When a column comes from the turning-lathe it is placed in an ordinary lathe, and is so fixed as to revolve. Cast-metal planes are then placed upon it, and sand and water applied, which puts on a fairly smooth surface, when emery and water, which imparts a still finer surface. At this stage the plane is covered with thick felt, and the polish is brought out by the application of putty-powder. This process applies to the polishing throughout.

The lathes are of various sizes, being adapted for polishing urns, fountain-basins, and columns, from 2 in. up to 8 ft. in diameter. The Ross of Mull granite columns at Blackfriars Bridge, which are 8 ft. in diameter, is one of the productions of these lathes.

In other parts of the works there are machines for polishing flat and moulded surfaces. When a flat surface of some 60 ft. or 60 ft. super. has to be polished, the various blocks are placed on what is usually called a "wagon." The stones are all packed so as to make a perfectly level surface, over which large flat rings revolve at a rapid rate. An even polish is given all over by the wagon travelling backwards and forwards, like the bed of a planing-machine.

A different principle is adopted in another part of the works, machines called "verticals" being used, but the amount of polishing done is not so large as with the "wagon." Here the granite is stationary. The rings revolve as in the other machines, but a piston-like motion, combined with a swivel-joint, enable the workmen to direct the polishers over any part of the surface.

The machines by which mouldings are polished are known as "sliders." In the first place the mould is cut to drawing, by a mason, then plaster of Paris is run on the mould, and an accurate impression thus obtained. From this pattern a metal casting is made. The granite is then laid on a frame, or on the ground, the casting is attached to a long wrought-iron arm fixed to a pin on a large face plate, and the machinery set in motion. The arm travels to and fro, and, to prevent loss of emery, &c., the moulds are roughly encased in a wooden frame and the joints stopped with plaster of Paris.

Circular door and window heads can be polished in these machines as well as straight mouldings. Where anything very elaborate has to be executed it is done by hand, and, as we

have before had occasion to remark, the price of the material is considerably augmented.

Shap granite has been used in various parts of the country, and nearly all architects are well acquainted with its artistic appearance. The student will find good examples of the stone in the posts round St. Paul's Cathedral and the Temple Bar Memorial.

STR.—In your issue of the 7th inst., under the heading "The Student's Column," remarks are made apparently upon this Company's quarries which do them grave injustice.

The upheaval of granite, known as Kit Hill, is distinct from the rest of the granite in its neighbourhood, and contains no other quarries than those worked by this Company.

The rock has been satisfactorily tested, and has been used, among others, by the Trinity House, to whose engineer it has given perfect satisfaction. It is even and fine in grain, of good colour, and thoroughly reliable in quality, and has been declared by one of the highest authorities on granite to be "well adapted for any description of work, whether tool-dressed or polished." It is quarried in vast blocks, some hundreds of tons in weight. Your contributor has associated these quarries with others in the neighbourhood, which are not on Kit Hill, and has spoken of them all under the name of Kit Hill. This conveys an erroneous impression. Your contributor has not applied to us in any way for information, and we dispute entirely his facts, and the conclusion at which he arrives, may add that we are prepared to place samples and testimonials in your hands, which will amply prove our assertions.

W. J. CHALK, Assoc. M. Inst. C.E.,
Engineer and Manager to the Kit Hill Granite Company (Limited).

10, Delahay-street, S.W., Aug. 18, 1886.

STR.—Referring to your issue of 7th inst., I have not sent out any circular giving any account of prospective work from the Gunnislake Granite Quarries, and did not understand your passing remark to refer to them in this respect, or as to uncertainty of quality and prevalence of joints.

You do not appear to have inspected my properties. The Freehold on the main coach road in the village of Gunnislake, above and close to the Tamar, and is thoroughly developed, having been worked since 1808, and to the depth of 150 ft. in the side of the hill. I enclose test and analysis of the grey granite, and claim that it is the whitest, purest, and strongest known quality.

The Leasehold is adjacent, behind the village; Gunnislake, and has several quarries opened, yielding silver grey granite, similar to that per test and analysis.

Blocks of any sizes can be quarried, and work can always be effected continuously.

I invite inspection of the granites at the different quarries in support of above; or, in case you do not do so, in order that you may judge for yourself. I will send you six samples.

EDWARD STORY.

Books.

A Treatise on Marine Engines and Steam Vessels. By ROBERT MURRAY, Principal Officer to the Board of Trade for the East Coast of Scotland. Eighth Edition, revised by the Author and by GEORGE CARLISLE, Senior Surveyor to the Board of Trade at Liverpool. London: Crosby Lockwood & Co. 1886.

This book is a very early friend of ours, and retains in its present form many of its primitive characteristics. Personally we are obliged to the joint authors for not disturbing too rudely our early reminiscences. There are still some familiar pictures:—"Fig. 1. Side-acting Engine." "Fig. 2. Direct-acting Engine," constructed by Messrs. Seaward, Capel, & Co. together with such venerated names as Boulton & Watt, Fairbairn, Forrester, Penn, and other fragments of ancient history. If we were to judge by this section of the work, might suppose the paddle-wheel to be still most general type of propeller for steam vessels, although we are informed that this is such an appliance as the screw, for having not "Fig. 13. Inverted Direct-acting Steam Engine," after the dozen cuts of paddle engines have been disposed of?

If we turn from the illustrations to the text of the chapter on "varieties of form," which said to treat "of the marine engine of present day, as it is found in vessels of the Royal Navy and merchant service," we find description carried down quite to the present time, there being no fewer than nine lines at the end of the chapter devoted to the the cylinder compound engine. The student also told that "in the great majority of cases the screw is now driven direct, more especially

the largest class of steamships." We should soon expect a writer on modern fire-arms to arm us that bows and arrows are fast becoming obsolete in the armies of Europe. The fact is, this part of the book bears too much evidence of the antiquity of the original, and, in order to fulfil the promise of the fact, should have been entirely rewritten, let the obsolete illustrations should have been either omitted or largely supplemented by sets of modern types of engines.

consideration of the "details of various," which only occupies sixteen pages, and, therefore, not very exhaustive, carries us on the principles of expansion of steam, and that to the use of the indicator. Here, and the same fault, for no mention is made of the Richards indicator, that described being the original and obsolete type, which we did think is rarely seen now excepting in museums. We make bold to say, although her scale, steam pressure, nor revolutions stated, that a set of cards from the various engines, which are reproduced, were taken with a Watt indicator.

as part of the book devoted to steam is more satisfactory, although no mention is here made of corrugated furnaces, most important invention of modern times in connection with steam generation; and the traction described as a "locomotive boiler" (20) really represents a very different type, as two cylindrical furnaces, and is, in fact, well-known gun-boat boiler of the Navy, space occupied by the consideration of the clency of steam vessels," might well have been devoted to questions more germane to the book.

on what has been said it will be gathered the work is by no means perfect. There is, without a good deal of information for the scattered throughout its pages; but the data upon which the work is built is so good that it is next to useless as a means of instruction in marine engineering. The appendices, which occupy nearly half the book, form the most valuable part of the work. They contain details of various steamers, Board regulations, tenders and specifications of navy and mercantile engines, and an Admiralty Committee's report on marine engines. There is also a glossary of terms, and their equivalents in French, German, Italian, and Spanish, which is of value.

Reviews: Eine Studie zur Geschichte der technischen Malerei. Von WILHELM KLEIN. von: Carl Gerold (Zweite umgearbeitete Auflage, mit sechzig Abbildungen im Text).

The first edition of Dr. Klein's "Essay on the History of Greek Vase Painting," issued, seven years ago, it created a great stir among archaeologists—it was a book that lived, if any, the title of "epoch-making." The study of Greek vase-paintings became, as a science. But unhappily the book was dry and laborious reading—it needed for its standing contemporary reference to a series of its (Vorlesungsblätter) issued at Vienna for the use of University lecturers, and possessed of value by only a few specialists. To make matters worse, these plates fell speedily out of use. It thus happened that a book of rare value, that should have been readily intelligible to the educated public, became a closed secret to all but a few of the initiated. It had, however, in Germany an immense success, and was for us in England a new edition has been issued. Students of vase-painting will see that in the new edition there are constant modifications of opinion, but our chief is to call attention to one new feature in the book, which makes it fully intelligible. It is now profusely illustrated. Not only are the nine vases of vases, formerly so difficult of access, and which the meaning of the whole argument, represented by nine very fair woodcut reproductions, but there are upwards of fifty line illustrations, which render the comparatively easy reading. We hope his new edition will reach to wider circles than could possibly be attained to by the first.

Well Hospital Competition.—We should state that the set of plans for the "Thought," and placed second in the competition, are by Mr. Arthur Ardron.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,015, Improvements in Grates. E. Taylor.

An L-shaped grate is made of round or flat bars the round bars being L-shaped and double at one end, so as to form the bottom part double. Two of these round bars are also bent to form the feet. The grate may be fixed in any ordinary fire-grate. In another form, a semicircular plate is used; this plate is perforated at its lower end, and is hung on the top part of the grate by a hook, and thus is suspended in front of the fire-bars. Or, a grid or grate is used to save the breaking up of the fire when cooking, thus economising fuel.

11,133, Ventilation of Street Drains. H. P. Dawson.

Instead of ventilating the street drains by means of manholes or other openings, which allow the stench and foul gases to escape into the street, this invention proposes to carry the gases up the inside of pillars or shafts before permitting them to escape into the atmosphere. For this purpose the tops of the lamp-lamps are galvanized, and the gases led up by pipes from the drains to openings situated under the lantern. The manholes are of course covered with solid lids, and every other opening for ventilation is sealed, excepting the lamp-holes, whence the stench escapes over the heads of the passers-by.

6,663, Door Springs and Checks. J. J. Parnell.

This is a modification of the now well-known hydraulic door-check, by which a door may be opened and closed with facility. The advantages claimed by this patent (that a smoother, more easy, and efficient motion is obtained) are gained by the use of an oscillating instead of a fixed cylinder. The reservoir, filled with oil or other fluid, is widened at one end to allow for this movement. Another point is, that by the very simple device of giving to a certain portion of the crank a flat surface, the absolute closing of the door is ensured, and the tendency to yield either to the right or to the left is avoided, and the ingress and egress of the air prevented. The apparatus is preferably placed so that no part of it will project beyond the inner edge of the door, thus rendering it unnecessary to cut into, and so weaken the door-post.

6,365, Preventing Noise in Closing Doors. G. B. Thornton.

This relates to a special provision for preventing the noise occasioned by the jarring of the catch of the lock coming against the striking-plate. A block or cushion of rubber is inserted in the framing of the door, suitably formed to receive the stroke of the catch before it enters the slot in the plate. The indiarubber yields sufficiently to allow the catch to enter and pass through the slot in the plate and into the cavity of the door-frame without noise. The cushion is either bevelled off to facilitate the passing of the catch over it; or a small roller of indiarubber may be fitted in the plate.

NEW APPLICATIONS FOR PATENTS.

August 6.—10,063, B. and W. Weale, Lever Plunger Flushing Cistern for Water-closets, &c. 10,071, J. Harnett, Chimney-top. —10,092, F. Stevens, Mechanical Electrical Indicator.

August 7.—10,127, E. Schroder and H. Perner, Non-oxidising Coating for Wood. &c.—10,128, J. Daglish, Kilns for Burning Lime, &c.

August 9.—10,139, C. Wharton, Automatic Window-sash Fastener.—10,150, J. De Baers, Preventing Down-draughts in Chimneys. —10,161, G. Redfern, Utilising Heat from Chimneys. —10,167, J. Jeserich, Artificial Asphalte.—10,168, H. Haddan, Door-hinges, &c.

August 10.—10,182, J. and T. Breakell, Decorative Material.—10,189, S. Pratt, Fastening and Alarm for Doors, Shutters, &c.—10,219, F. Smyth, Fittings for Drains, Sowers, Waste-Water Pipes, &c.

August 11.—10,261, J. Broadfoot, Automatic Valves for Ventilating Pipes.—10,262, J. Stapleton, Flushing Tank and Cistern.—10,265, C. Webb, Dry Closet.—10,287, G. Handley and W. Burke, Sawing Stone, Marble, &c.—10,298, F. Lyte, White Pigment.

August 12.—10,323, F. Bosshardt, Splitting, Shaping, or Finishing Building Stones, &c.—10,329, H. Cunningham, Drying Portland Cement, Bricks, Tiles, &c., by Heat.

PROVISIONAL SPECIFICATIONS ACCEPTED.

4,479, G. Inglis, Portable Guard for Persons Painting Windows.—3,391, W. V. Baldwin, Waste-preventing Syphon Cistern for Flushing Closets, &c.—7,438, E. and E. C. Kerry, Bricks.—8,725, J. Bennett, Pigments.—9,075, A. Williams, Dustbin.—9,225, J. Parlour, Workman's Daily Food Carrier.—9,476, H. Lake, Ventilating.—9,544, W. Blakeney, Shop-window Fittings.—8,452, R. Thompson, Fastening for Window Sashes.—8,910, J. Law, Feeding Mechanism for Saw Frames.—9,111, H. Buchan, Valve Apparatus for Water-closets.—9,320, W. Bartholomew, Fittings for Bathe and Lavatories.—9,481, H. Haddan, Ascertaining Leakage in Water-pipes.—9,551, W. Reid, Hydraulic Cement.—9,577, J. Potts, Construction, Bedding, and Laying Drain or Sewerage Pipes.—9,584, A. Sweet, Ventilators or Windguards.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

9,765, J. and J. Heward, Cut Nails.—11,806, W. Timewell, Cement.—12,068, F. Armstrong, Inspection Openings for Drains.—5,921, R. Mean, Sanitary Dustbin.—7,574, H. Matthey, Cement.—7,827, J. Shaw, Cooking Ranges.—8,864, M. Adams, Sewerage and Drainage Works.—8,919, J. Hart, Locks, Latches, &c.—8,975, J. and G. P. Jones, Brick and Quarry Boxes.—12,014, J. Pratt, Gilding Glass.—12,118, G. Garrard, Manufacture of Tiles.—12,251, W. McHaffie, Ventilators and Smoke Cows.—12,252, A. Drummond, Glazing.—12,634, J. Higginbotham and H. Holland, Window-sash Fasteners.—5,235, W. Jenkins, Treble Ladder.—7,878, S. Harrison, Notched Blocks for Building Walls downwards.—9,050, T. Thornton, Door Check.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

JULY 27.

Watford—6, Carey-place, freehold..... £180

AUGUST 5.

By SEDGWICK, SON, & WEALE.
Eastcote—Copyhold house, cottages, and 3a. 1r. Op. 685

By G. B. SMALLPRICE.
Basingstoke—1, Chestnut-villas, freehold..... 230
Church-square—Two freehold cottages..... 230
Church-street—Freehold house and shop..... 235

AUGUST 6.

By SEDGWICK, SON, & WEALE.
Rickmansworth—Fourteen freehold cottages..... 850
Two freehold houses and a cottage..... 850

AUGUST 9.

By MARLER & BENNETT.
Earl's Court—1 and 1a, Portland-cottages, and Portland Lodge, 55 years, ground-rent 25s. 1,600
Westbourne-grove—9, Monmouth-road, 33 years, no ground-rent..... 550

By FURBER, PRICE, & FURBER.
Notting Hill—101, 103, and 105, Golborne-road, 81 years, ground-rent 30s. 2,810
New Southgate, Station-road—St. Thomas's Cottage, 81 years, ground-rent 10s. 680

By J. HUBBARD.
Islington—21 and 42, Canterbury-road, 65 years, ground-rent 7s. 10s. 590
Stoke Newington—126, Green-lane, 59 years, ground-rent 10s. 760

By Mr. WOODS.
Southwark—53 and 55, Summer-street, 814 years, ground-rent 2s. 2s. 61s

AUGUST 10.

By G. SOCKINGS.
Islington—3 and 6, Crowland-terrace, 51 years, ground-rent 9s. 680

By HEARS, SON, & REVEY.
Drury-lane—No. 23, freehold..... 1,660
Stepney—95, Rutland-street, 18 years, ground-rent 3s. 95

Horton—2 and 3, Bristow-street, 24 years, ground-rent 15s. 4s., and Ground-rents of 13s. 4s., term 18 years..... 363
4 to 7, Bristow-street, 25 years, ground-rent 12s. 16s. 670

Lambeth—12, Oakley-street, 25 years, ground-rent 21s. 5s. 670
Hornsey, Middle-lane—St. John's, 83 years, ground-rent 9s. 305

By DEERHAM, TWEED, & CO.
Brighton—19, German-place, freehold..... 890
85, King's-road, and Stabling in rear, freehold 11,800
Strand—No. 429, area 2,100 feet, term 18 years, rent 800s. 4,600
2 and 3, Agar-street, 19 years, ground-rent 90s. 2,700

By JONES, LANG, & CO.
Lewisham—Beacon Lodge, 29 years, ground-rent 20s. 750

AUGUST 11.

By MADDOX & SON.
Aldgate—No. 33, freehold..... 3,010

By R. J. COLLIER.
Willesden—The residence Fiesanfield and 15a. 3r. 2p., freehold..... 16,000

By GREEN & SON.
Kensal Green—1, 2, and 3, Mary's-place, freehold... 1,210
1, William's place, freehold..... 475

By JOSEPH BAKER & CO.
Fulham-road—Nos. 554, 556, and 558, freehold..... 1,275
No. 570, Fulham-road, and Stabling in rear, freehold..... 580
31a, Claybrook-road, freehold..... 201
Two plots of freehold land in Claybrook-road..... 125

By G. FRASER & SONS.
Horton—The Bristport Arms public-house, 7 years, ground-rent 20s. 703
18, Salisbury-street, 7 years, no ground-rent..... 101
11, Felton-street, 31 years, ground-rent 6s. 135

27 to 18 (odd), Harrow-street, 56 years, ground-rent 2s. 5s. 4,720
Ground-rent of 30s. a year, term 55 years..... 631
15 and 17, Northport-street, 49 years, ground-rent 8s. 10s. 653

2 and 6, Minter-street, 44 years, ground-rent 7s. 460
Kingsland—35 to 46 (odd), Downham-road, 34 years, ground-rent 14s. 1,615

Mildmay Park—67, Queen Margaret's-grove, 64 years, ground-rent 6s. 315

AUGUST 12.	
By BRADLEY & CO.	
Cowley, near Uxbridge—Cowley Peachey House and 13a, (r. 2/6), freehold.....	£2,600
The Packet Boat public house.....	2,500
Freehold house and three cottages adjoining.....	910
An enclosure of freehold land, about 5a.....	170
Canterwell—Ground-rent of 8l., reversion in 78 years.....	1,280
Ground-rent of 60l., reversion in 68 years.....	276
Ground-rent of 13l., reversion in 69 years.....	710
By F. MATTHEWS.	
Bermoodsey—5l, Spa-road, freehold.....	165
Pentonville—8, Canning-street North, 24 years, ground-rent 4l.....	250
By C. C. & T. MOORE.	
Stepney—15, East Arbour-street, 25 years, ground-rent 3l.....	250
Canning Town—77 to 83 (odd), Bidder-street, 78 years, ground-rent 15l.....	260
Bow-road—No. 43, ten 16 years, ground-rent 7l.....	180
By HAINS & JARVIS.	
Leytonstone—1 and 2, Grove-terrace, 95 years, ground-rent 8l.....	465
By NEWSON & HARDING.	
Chesham—17, Skelton-street, 27 years, ground-rent 6l.....	840
Holloway—11, 13, and 15, Alexander-road, 72 years, ground-rent 18l.....	3,165
4 to 28 (even), Lansdown-road, 72 years, ground-rent 83l. 2s.....	316
3, Kingsdown-road, 72 years, ground-rent 7l.....	680
Upper Norwood, Hamlet-road—Lansdown Lodge, 55 years, ground-rent 5l.....	590
By F. J. BISLEY.	
Rotherhithe—41, 43, and 45, Silwood-street, 70 years, ground-rent 9l.....	840
22 to 28 (even), Silwood-street, 70 years, ground-rent 2l.....	1,000
9 to 17 (odd), Westlake-road, 70 years, ground-rent 2l. 10s.....	

Miscellaneous.

Bedford Memorial Bridge in Glentilt.—A bridge has just been erected across the Tarriff on the way between Blair Athole and Braemar, immediately above the old ford, where it may be remembered that Mr. Bedford, captain of St. Paul's School, London, lost his life on the 25th of August, 1879. The proposal to erect a bridge was started by the friends of Mr. Bedford, but they were unable to raise sufficient funds to carry out the proposal, and after a lapse of about five years the Scottish Right of Way Society came forward and arranged with the Bedford Memorial Committee to have a bridge erected, promising to add to the subscriptions such amount as would be required for the completion of the undertaking, and a bridge has now been completed. It is a suspension bridge, having a span of 40 ft., and is supported on wire cables that are strained over malleable iron pillars which are firmly fixed on each side of the stream. The footway consists of short straps of wood secured by wires, and is protected by a wire railing on each side. To prevent the great lateral pressure from wind, wire ropes have been fixed to the centre of the bridge and secured to the sides, so that as much rigidity as possible would be given to the structure. Great difficulty was experienced in building a suitable bridge, as all the materials had to be transported on horseback for four miles. The structure which has now been erected is both strong and elegant, and, if properly protected from rust, will stand for many years. The architect was Mr. Douglas Taylor, Hawick.

Newcastle Jubilee Exhibition for 1887. Mr. William Glover, vice-president of the Northern Architectural Association, and the architect for the Jubilee Exhibition at Newcastle, has submitted his plans of the edifice to the Town Improvement Committee, and after explanation and commendation they were passed. The main entrance in the North-court, to be constructed of three 50 ft. spans, will be on the North-road, just beyond the end of the Bull Park wall. The height of the centre span will be 40 ft., and the two side spans will be 35 ft. to the apex. The two side courts will each have a central avenue, 50 ft. wide, and two side avenues, 20 ft. The South Court will be similar, and the whole will thus form a square, enclosing an area of about 24 acres, which will be laid out as a garden and recreation-ground, with a band-stand in the centre. At the four angles there will be refreshment-buffets and dining-rooms, concert and art saloons will be placed south of the South Court. About three acres to the north of the Exhibition-buildings are reserved for mining operations and exposed exhibits, the grounds being connected with the ornamental lake. It is expected that the buildings will be in the hands of the contractors within a month. The date fixed for the opening is Her Majesty's birthday, May 24th, 1887.—*Newcastle Daily Leader.*

Obituary.—The death is announced of Mr. H. H. Fulton, M. Inst. C.E., who was formerly a pupil of his father. The latter, after practising in Great Britain for many years with Messrs. Rennie & Telford, became chief engineer to the States of North Carolina and Georgia, U.S.A. At the death of his father the late Mr. Hamilton H. Fulton became a pupil of the late Sir John Rennie, and was afterwards for years his principal assistant, and aided him in carrying out some of his numerous and most important undertakings, including the improvement of the river Neve navigation, and the river Ouse outfall navigation. Mr. Fulton was elected a member of the Institution of Civil Engineers in the year 1845. In the year 1853 an Act was obtained upon the plans designed by Mr. Fulton, for the construction of the West London and Crystal Palace Railway, a line from the London and South Western (Windsor and Richmond line) to the Crystal Palace Park, a distance of about 5½ miles. The works with branch line to the London and Brighton line at Norwood, and to the Chelsea suspension-bridge, were subsequently carried out from beginning to completion by Mr. Fulton. In the year 1855, the Stokes Bay Railway and Pier Company obtained an Act to extend the London and South Western Railway from Gosport to Stokes Bay, with a pier to enable passengers to land at all times of the tide. The works were designed and carried out by Mr. Fulton, who was also associated as engineer with several other railway and dock works. During the past sixteen years Mr. Fulton has been prominent before the public in connexion with the Manchester Ship Canal project. In the year 1870, he made a preliminary survey and report upon the practicability of improving the rivers Mersey and Irwell so that ocean-going steamers might reach Manchester.

Sale of Building Sites at Southend.—On Saturday last, Messrs. Baker & Sons offered for sale, at the Royal Hotel, Southend, fifty-two plots of freehold building land, forming a portion of the property known as the North Meadow Estate. The several plots offered have frontages averaging 18 ft. each, and depths of 90 ft., the sites being described as eligible for the erection of villa residences. There was a very large attendance. Mr. Baker, in submitting the property, adverted to the increasing popularity of Southend as a sea-side resort, which had within the last few years been greatly improved by the erection of high-class resorts, an esplanade facing the sea, and the construction of an esplanade and parade upwards of a mile in length. The estate he was about to offer was advantageously situated, about the centre of the north side of the town, with a wide and convenient carriage-road direct to the beach and esplanade. He observed that the new line which the London, Tilbury, and Southend Company was now constructing between Barking and Pitsea would materially reduce the distance between London and Southend, while the Great Eastern Company would shortly have access to Southend by the line which that Company was now making between Brentwood and the first-named town. These additional means of access to Southend would doubtless be followed by a great increase in the value of building land at Southend within a very short time. The auctioneer having announced that every plot would be submitted without reserve, the sale proceeded, when the whole of the lots were sold at prices varying from 20l. to 250l. each, two corner plots, having frontages of 35 ft. each, realising 390l. and 331l. respectively. Several of the purchasers took as many as five and six lots each.

Syon House.—A smoke nuisance here from the chimneys of some lower buildings among the offices, from which in certain winds the smoke was directed against the windows of some of the principal rooms on the upper story, has been thus dealt with by Messrs. Verity: a syphon has been fitted to the offending chimneys, continued by a 15-in. galvanised iron tube down the side of the building. Two annular waterspray jets are fixed, one near the syphon, and the other some distance below, which direct the smoke down this shaft, and by the action of the waterspray precipitate all the floating particles of soot, leaving only the lighter portions of the smoke to be disposed off. This courses along the main drain, and what remains is finally extracted by an exhaust head (worked by a fine jet of water placed at the outfall of the sewer a quarter of a mile from the mansion).

Indian Railways and the Famine Difficulty.—Before the introduction of railways, freights in England were 13½d. per ton per mile. Grain is now carried from Agra to Bombay at 442d. per ton per mile, and from Agra to Calcutta at 388d. Mr. Hunter states before the Parliamentary Committee that two bullocks carry two-thirds of a ton 13 miles a day. Taking this estimate, one train carrying 260 tons 13 miles would do the work of 600 bullocks, and one train carrying 200 tons 400 miles in day does the same work as 600 bullocks in month. We have had famines in Bundelkhand when grain at one of the greatest grain centres, Chhatigbur, distanced only 300 miles, has been rotting on the ground. Suppose such to occur again, and that Government undertook, as they are bound to undertake, to feed the starving people, it would require 168,152 bullocks and 83,076 drivers, to place 2,400 tons of grain into Bundelkhand from Chhatigbur, and this with single-line railway would be done with ease. These 2,400 tons would (allowing 1½ lb. for each soul) feed 3,570,666, only a fraction of the millions affected in the famines of 1877-78. During that fearful period no less than four millions died for want of food. Would it be practicable to supply and keep going 83,076 carts in a famine-stricken country? To fill gaps at least another 20,000 would be required, making in all, in round numbers, 100,000 drivers and 200,000 bullocks,—enough to create a famine rather than help it.—*Indian Engineer.*

Wood Wool.—For some time past attention has been directed to a very interesting product, consisting of extremely thin and slender shavings of wood which are comparable to paper cut for packing. It is known by the name of "wood wool." This product was first introduced into France as a packing material. It weighs about 40 or 50 per cent. less than the materials generally used for such a purpose. Its beautiful appearance, its fineness, and its extreme cleanness, at once brought it into favour with shippers. It was afterwards found that the material was well adapted for the manufacture of mattresses, for litter for cattle, for the filtration of liquids, and for stuffing horse-collars, &c., the most suitable species of wood being selected for each of these purposes. Its elasticity causes it to be considered as the best material for bedding after horsehair, and it is even preferable to any other substance when it is derived from resinous wood, since it does not then absorb moisture. In workshop wood wool is tending to replace cotton wool for cleaning machinery, and it has likewise found an application on the rolling stock of railways for lubricating car-axles. While it has the same property which cotton waste has of absorbing oil, it costs ten times less than the material. Its use is said to be rapidly growing in Austria and Germany, and also in France.—*Iron.*

Value of Building Land on Hayling Island.—The value of building land on Hayling Island, Hampshire, a short distance from Portsmouth, appears to be greatly increasing. Last week a sale took place at the Royal Hotel, South Hayling, of a portion of the Easton Estate, immediately facing the sea. The property was offered in forty-five lots, having frontages of from 80 ft. to 90 ft., with depth varying from 150 ft. to 200 ft. There was a large attendance at the sale. Mr. H. B. Trigg, the auctioneer, before inviting biddings adverted to the increasing popularity of Hayling Island as a sea-side resort, and observed that the projected railway across Langston Harbour would greatly enhance the value of the property, and was about to offer by giving it easier access to Portsmouth and Southsea. He added that the value of land on the Island was daily increasing in proof of which he stated that he recently sold a plot for 500l. which was purchased on three years since for 210l. The sale then proceeded, when the bidding became very active and a large number of plots were sold at prices ranging from 75l. to 80l. each, six plots immediately facing the sea, realising 100l. each, about 300l. per acre, the auctioneer remarking that the land was not long ago purchased at 70l. an acre. He announced that a further sale would shortly take place.

Appointment.—Mr. Harry Lloyd, of Cruthorne, has been appointed Surveyor of Sanitary Inspector for the parishes of St. Hurst, Bracknell, Easthamstead, Winkfield, and Binfield. The salary is 110l., and a number of candidates was eighty-three.

LONDON.—For building the new Cutlers' Hall. Mr. T. Taylor Smith, Architect to the Company:—

NAME.	Amount Tender.	If Joiner's Work in Dining-rooms and two Court-rooms is executed in			If Joiner's Work to Principal Staircase and Entrance Hall is executed in		
		Walnut, add	Wainscot, add	Chestnut, add	Walnut, add	Wainscot, add	Chestnut, add
Brass	£10,877	£345	£412	£412	£483	£557	£557
Chappel	10,840	550	620	481	610	740	610
Colls	11,380	360	470	470	630	740	540
Glover	10,890	1,123	1,118	1,084	835	910	915
Higgs & Hill	11,540	646	654	667	648	655	664
Lascelles	12,512	780	808	721	850	918	754
Morley	10,489	1,018	1,010	1,020	829	910	915
Mowlem	11,880	412	570	915	466	811	984
Stevens & Bastow	10,999	472	618	422	636	697	601
Stimpson	11,220	860	560	857	490	740	920

LONDON.—For rebuilding No. 138, Oxford-street, for Messrs. Hyam & Co., Limited, Messrs. Davies & Emanuel, architects. Quantities by Messrs. Karlake & Mortimer:—

	In three months.	In four months.
G. S. & W. Williams & Son	£3,880	£3,850
J. Mowlem & Co.	3,394	3,394
Rider & Sons	3,636	3,396
G. Trollope & Sons	3,442	3,278
J. Grover & Son	3,442	3,242
W. Brase & Son	3,300	3,212
Cobitt & Co.	3,218	3,168
Colls & Sons	3,218	3,118
E. Lawrence & Sons (accepted)	3,131	3,091

LONDON.—For alterations and repairs to No. 8, Half Moon-street, Piccadilly, for Miss Searle. Mr. J. T. Wimpey, architect:—

W. & E. Curtis	£87 0 0
Lee	77 0 0
Bush	725 0 0

NEW BROMPTON (Kent).—For a new road, for the British Land Company, Limited, on their estate at New Brompton. Mr. Henry B. Michell, surveyor:—

J. Jackson, Leyton	£320 0 0
E. Wilson, Walthamstow	555 0 0
J. Bloomfield, Tottenham	465 0 0
J. Filzey, Hove	435 0 0
W. Harris, Camberwell	418 0 0
C. Killingback, Camden Town	384 0 0
J. Trueman, Hackney	339 0 0
Fell & Sons, Bromley, Kent	325 0 0

* Accepted.

QUARRENDON.—For the erection of a new farmhouse and buildings, Quarrendon, near Aylesbury. Mr. Arthur Vernon, F.S.I. architect, Great George-street, Westminster, and High Wycombe:—

Gibson	£1,483 0 0
Grist	1,198 0 0

ROMFORD.—For rebuilding the Woolpack public-house, and for shop adjoining, High-street, Romford, Essex, for Messrs. Ind, Coope, & Co. Mr. John Hudson, architect, Leman-street, E. Quantities by Mr. C. Stanger:—

Holland & Hannen	£4,244 0 0
W. Brase & Son	3,036 0 0
J. & J. Greenwood	3,001 0 0
Brown, Son, & Blomfield	2,987 0 0
J. Beutley	2,912 0 0
Hammond & Son, Romford	2,981 0 0

* Accepted.

SEVENOAKS.—For building new Baptist church, The Vine, Sevenoaks. Mr. John Wiley, architect, Derby:—

Roberts, Norwood	£3,796 0 0
Martin, Eastbourne	3,035 0 0
Dobson, Colchester	2,798 0 0
King, Dover	2,790 0 0
Bowyer, Norwood	2,730 0 0
Denne & Son, Deal	2,668 0 0
Allen & Sons, Kilburn	2,675 0 0
Snow, West Brompton	2,621 0 0
Wiltshire, Sevenoaks (accepted)	2,620 0 0
Staines & Son, London	2,567 0 0
Cornwall & Son, Eastbourne	2,562 15 0
Owen, Sevenoaks	2,500 0 0
Hodges, Sevenoaks	2,460 0 0
Beale, Battersea	2,387 0 0

WALLINGTON.—For the erection of a Baptist church in the Queen's-road, for the trustees. Mr. Henry J. White, architect, Wallington, Surrey:—

E. J. Burnard	£4,117 0 0
Corhead	4,063 0 0
Smith & Son	3,973 0 0
W. H. Castle	3,827 0 0
Allen & Son	3,817 0 0
D. Brown & Co.	3,790 0 0
D. Stewart	3,468 0 0
R. Humphries, Sutton	3,220 0 0

WESTMINSTER.—For the erection of a bakery, offices, and shops, at Horseferry-road, Westminster, for the Civil Service Bread Company (Limited), 107, Cannon-street. Mr. W. F. Mason, engineer, Longlight, Manchester. Quantities by the engineer:—

Wall Bros.	£17,579 0 0
G. Shaw	17,560 0 0
H. L. Holloway	17,742 0 0
J. & J. Greenwood	17,400 0 0
Colls & Sons	16,800 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS. Six lines (about fifty words) or under 4s. 6d. Each additional line (about ten words) 6s. 6d. Terms for Series of Trade Advertisements, also for special Advertisements on front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines (about THIRTY words) or under 2s. 6d. Each additional line (about ten words) 4s. 6d. PREPAYMENT IS ABSOLUTELY NECESSARY.

* Stamp must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to the Publisher.

DOUGLAS FOURDRINIER, Publisher.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY. The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent-garden, W.C., free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 18s. per annum. To all parts of Europe, America, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINIER, Publisher, No. 46, Catherine-street, W.C.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

G. R. T.—R. J. & Son.—M. (there is not the slightest ground for your insinuation, and the charge is referred to as a mere taking any on his steps to recommend themselves to an association. W. G. & C. (thanks to G. R. T. (charge) and P. D. A. R. S. (shall have consideration)—J. B. T. & G. H.—C. T. All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses. Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications. Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED. All communications respecting literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND,

Box Ground, Combe Down,

Corsham Down, And Farleigh Down,

RANDELL, SAUNDERS, & CO., Limited,

Corsham, Wilts. [Adv.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [Adv.]

Doulting Freestone and Ham Hill Stone

of best quality, in blocks, or prepared ready for fixing. An inspection of the Doulting Quarries is respectfully solicited; and Architects at others are CAUTIONED against inferior stone.

Prices, delivered to any part of the United Kingdom, given on application to CHARLES

TEASE & SONS, Norton-sub-Hamdon, Limited,

Somerset.—Agents, Mr. E. WILLIAM,

No. 16, Craven-street, Strand, W.C. [Adv.]

Doulting Free Stone

For prices, &c., address S. & J. STAPLE

HAM HILL STONE, Quarry Owners, Stoke

and Lime Merchants

BLUE LIAS LIME, Stoke - under - Ham

(Ground or Lump), Ilminster. [Adv.]

Asphalte.—The Seyssel and Metallic

Asphalte Company (Mr. H. Glenn), Office, &

Poultry, E.C.—The best and cheapest materials

for damp courses, railway arches, warehouse

floors, flat roofs, stables, cow-sheds, and mil

rooms, granaries, tun-rooms, and terraces. [Adv.]

Asphalte.

Seyssel, Patent Metallic Lava, and

White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [Adv.]

MICHELMORE & REAL

Manufacturers of

CHARLES COLLINGS' PATENT

COLLINGS' PATENT HINGE

LEVER, SCREW, & BARREL BOL

Self-acting "FALL DOWN GATE STOP"

and IMPROVED GATE FITTINGS of every Descript

36A, BOROUGH ROAD

DISCOUNT TO BUILDERS. LONDON, S.E. 1

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.

IRON CISTERN.

F. BRAY & CO.

LONDON, LIVERPOOL, GLASGOW.

VERY PROMPT SUPPLY.

LARGE STOCK READY.

CYLINDERS FOR HOT-WATER CIRCULATION

Particulars on application.

Chief Office: 360, EUSTON ROAD, LONDON.

The Builder.

Vol. LI. No. 273.

SATURDAY, AUGUST 28, 1886.

ILLUSTRATIONS.

Window in the new City of London Schools.—Designed and Executed by Messrs. Heaton, Butler, & Bayne	306-307
Birmingham Law Courts; Second Competition.—Design by Messrs. Bateman & Hunt, Architects	310-311
Some Places Visited on the Cambrian Archaeological Society's Excursion: Oystermouth Castle and Margam Abbey	314
A Warehouse Facade.—Designed by Mr. W. Stirling.....	315
Sketches on the Architectural Association Excursion: North-West Angle of Quadrangle of Ightham Mote House, Kent; Birling Church; and West Front of Malling Abbey.....	315, 319

CONTENTS.

A Sanitary Retrospect	295	Places visited on the Cambrian Archaeological Association	301	Charging for Clerks' Overtime	324
Preservation of Wood. By George R. Twissitt, F.C.S., F.R.M.S.	296	Excursion	301	Episcopal Heraldry.....	324
Notes	298	Sketches on the Architectural Association Excursion	304	Quarry Tile Floors	324
The Chester Meeting of the Royal Archaeological Institute	300	Paradising, Convocation Hall, Oxford	321	The Student's Column: Stone Quarries.—IX.....	324
The Revival of Trade by the Development of India.....	303	Notes at the Liverpool Exhibition	323	Recent Patents	325
Window in the New City of London Schools	304	Cambrian Archaeological Association	322	Recent Sales of Property	328
Birmingham Law Courts: Second Competition.—Design by Messrs. Bateman & Hunt.....	304	Fog Ponds	323	Dennett & Ingle's Fireproof Construction	328
A Warehouse Facade	304	The Architectural Association's Visit to Oxford	323	Miscellaneous	328
		Shadwell Hospital Competition.....	321	Prices Current of Building Materials	327

A Sanitary Retrospect.

THE sanitary management of towns, whether large or small, has not yet in all respects been satisfactorily put in train, although it is fifty years (1836) since the first attempt was made to bring things into something like order by the appointment of a Registrar-General to collate, by the means then first given to him, such information as would enable the originators of the sanitary movement to take some steps towards an alteration of the state of things which then existed. In the previous year (1835) the Municipal Corporations Act was passed, putting all large towns desiring to adopt the Act upon a basis of local self-government, but it did little or nothing in directing the proper sanitary management of towns, and did not recognise the principle that revention is better than cure. It appears to have been overlooked that local government consists of the management of those things which are necessary to the health and general welfare of people as well as of those which are of the nature of convenience, such as the removal of obstructions to the public traffic, the cleansing and lighting of the streets, and the protection of persons and property from violence and theft under the directions of a Watch Committee,—the principal committee contemplated, and specially named in the Act. But on the first report of the Registrar-General being presented to Parliament, in 1839, a Select Committee was appointed to inquire into the health of towns, who reported in 1840 that buildings in towns should be better regulated, and sewers constructed, under the direction of local boards of health. At that time people were buried in churchyards in the middle of towns, and the report showed the evils of that, also the importance of providing open spaces in crowded cities, the superintendence of lodging-houses, the advantages which would result from the establishment of public baths, and the importance of water supply. Mr. Edwin Chadwick reported, in 1842, the results of the inquiry ordered in 1839, describing particularly the sanitary condition of the labouring population, and giving evidence of the beneficial effect of preventive measures in raising the standard of health; and, in 1843, Sir Robert Peel issued a Royal Commission to inquire into the state of large towns and populous districts, and the inquiry was specially directed to the causes of prevalent disease, and to the best means of im-

proving the public health by proper drainage, water supply, and building regulations; the evidence being clear, in fifty towns examined, that an excessive mortality was attributable to defective drainage and other causes capable of removal. The then existing law respecting drainage, namely, the Statute of Sewers, was in respect only of surface-drainage; and in most of the large towns no house-drains could be connected with the sewers without special permission of the Sewer Commissioners. There are people who say that it would have been a good thing if this prohibition had been continued to the present time, but their objection has reference solely to the connexion of water-closets with the sewers; the refuse-water from kitchens, pantries, and sculleries must be carried off either by open or covered drains and sewers, and, as open channels would not be permissible in towns, there remains but one course to pursue. The case is different with respect to waterclosets. There is no absolute necessity for these, and their continued use is a question of expense only; but where the system has been generally adopted it had better be continued, for with whatever objection it may be viewed it has advantages which could not be had in any other way. There was, at the time mentioned, no provision for water being supplied into houses, and only in some cases that mains should be laid in the principal streets, and general uncleanness and deficiency of water were the result, especially in the poorer parts of towns. But it appears that, notwithstanding the reports made, the legislation did not move with any rapidity; and on this head it was remarked in the *Builder* of the 7th June, 1845:—"The Fabian policy of Government with respect to the sanitary condition of towns and the consequent moral improvement of the industrial population challenges remark at this advanced period of the Session, the more so as nothing yet has been even proposed. Her Majesty, in her speech from the throne last February, emphatically said that it would be highly gratifying to her if Parliament could devise the means of promoting the health of her subjects. This gratification the Government appear disposed to withhold, at least for the present. They have already issued their fiat that light and air are still to be paid for, and have contented themselves with simply announcing that a general measure is in embryo, but, when to be brought forth, or if at all, there is no pledge. We are much disposed to fear that autumn will find the health of towns in precisely the same condition that spring did. Bills affecting the rich have been known to pass through their various stages with an almost electric speed; is there any enactment to prevent the same potent spell being applied

to Bills affecting the poor? If not, then there may yet be hope during the present session." In the same year, 1845, the Health of Towns Commissioners presented to Parliament their second report, recommending that the Crown should inspect and supervise the sanitary improvement of towns and populous places; that local authorities should have mere power, and that their districts should be enlarged; that the necessary arrangements for drainage, paving, cleansing, regulating buildings, and water supply, should be under one administrative body; and that there should be compulsory rating for water supply, as well as for sewerage.

The legislation required for accomplishing these purposes was commenced in the following year, 1846, by the passing of the first of a series of Acts for the removal of nuisances, Justices in petty sessions being the adjudicators on the information of Town Councils or other town authorities, and also Boards of Guardians; and by the introduction of these bodies among the authorities for these purposes the first extension of sanitary legislation to rural districts was made. This Act was to remain in force until the end of the session of 1848, and under it the Privy Council might make regulations for the prevention of formidable diseases.

On many special occasions, both before and after the passing of the Municipal Corporations Act of 1835, an Act of Parliament had been obtained by towns for various purposes, chiefly of convenience, but including some provisions for necessary works, and comparing the provisions of these local Acts they were found to embody nearly the same clauses, and in 1847 a general Towns Improvement Clauses Act was passed, together with a Towns Police Clauses Act, consolidating the several provisions which had usually been asked for in the special local Acts, and by thus making provision for many of the requisites of Local Government further legislation was facilitated; and the provisions of the Towns Improvements Clauses Act have been very generally adopted in subsequent legislation for local government. They bear the impress of a practical knowledge of what was asked for and how to carry it out, and this cannot be said of all Acts of Parliament which have been passed for similar purposes: some of them have been inconsistent, one part with another.

The first great and comprehensive measure, the groundwork of the sanitary legislation of this country, was the Public Health Act of 1848. For many years its wisdom was much called in question because of its apparently arbitrary powers; but these were much overrated, for it could not be put in force unless petitioned for by ratepayers, except where the

mortality exceeded 23 in 1,000 per annum, and only so when this was the average rate of mortality of the seven previous years. It did not extend beyond England and Wales, and did not include the metropolis. The powers specified were for enabling the construction and management, by local authorities, of sewerage and house drainage, the regulation of the width of streets and the levels of the lowest floors of dwelling-houses, cleansing streets and courts, the removal of house refuse, the regulation of offensive trades and slaughter-houses, common lodging-houses, and cellar dwellings; paving streets, and the purchase of premises to improve streets; the forming of public recreation grounds; supply of water to houses and to public baths and trades and drinking-fountains; the construction of houses for the dead; burial-grounds, and the purchase of lands for any of the above-named purposes under the provisions of the Lands Clauses Consolidation Acts.

When a town applied for and adopted the Public Health Act it was constituted a Local Board of Health, existing town councils being so named for the purposes of the Act, as well as those independent bodies of Improvement Commissioners who had obtained each for itself a special Act of Parliament, usually embodying the Towns Improvement Clauses Act and some others, and who were (and continue) nearly of the same constitution as local boards of health. Under the facilities afforded by the Public Health Act, 1848, towns began to carry out sewerage and drainage, water supply, and other sanitary works, of their own local motion, but subject to a provision of the general Act that these works should be approved by the General Board of Health.

There arose an unfortunate and very regrettable opposition to this by the civil engineers, some of whom were, and many more expected to be, employed in designing and carrying out these works, but who were not pleased at having to submit their plans for approval to those who were not, as they thought, qualified to sit in judgment upon them; and although, probably, they were wrong in this supposition on the whole, yet an unfortunate thing happened and was published which confirmed the justice of their tirade against the General Board of Health. It was a very natural thing that in proposing to offer certain necessary directions to local boards in the execution of works the General Board should desire to see such works carried out without unnecessary expense; for in directing works to be done at the local expense the Board had to consider the interests of the contributors to the expense as well as the interests of the inhabitants in general; and it seemed, from the fact that Captain Vetch, R.E., Captain Denison, R.E., and others were called in to report upon sanitary works, that there was a disposition to oust the civil engineers from their legitimate position, and especially so when the Board directed experiments to be made on the flow of water in pipes with the view to prove that the knowledge of hydraulics which the civil engineers had always acted upon was wrong.

But civil engineers in England have always had a very proper faith in the authorities on hydraulics, having always found their dicta borne out by facts when opportunities have occurred for independent experiments. The persons entrusted with the trials on behalf of the General Board of Health were the Surveyors of Sewers under the Commissioners of Metropolitan Sewers, and not only were their experiments very crude, and few in number, but they were published in a blue book, as if to confound all established knowledge on that subject. It was easy, however, for the engineers to show that the experimenters had neglected several of the precautions ordered by the authorities on hydraulics to be taken in all such cases, and that the very results erroneously arrived at by the Board had often been pointed out as likely to occur if proper precautions were not taken; and, in short, the proceedings of the Board in this matter were exposed to severe criticism. Nevertheless, it was a thing apart from the merits of the Public Health Act, and by making too much of it the engineers showed no great wisdom.

It had, however, some effect in shaking public confidence in the proceedings of the Board, especially in what was called their arbitrary attempt to direct the proceedings of local boards of health. These latter were willing enough,—too willing,—to be undirected, and rather enjoyed the temporary discomfiture of the great Board; but partly because time has ameliorated the memory of the escapade, and partly from the necessity of the position, all designs for carrying out sanitary works by loans of money obtained through the Government must still to-day be approved by an Inspector of the Local Government Board, if for no other reason, yet for the important one of seeing that no undue extravagance is indulged in by local boards under the ostensible plea of providing for sanitary requirements.

PRESERVATION OF WOOD.*

BY GEORGE R. TWEEDIE, F.C.S., F.R.M.S.

THE class of expedients which fall under the heading of superficial injection or immersion in antiseptic or other preservative solutions, differ essentially from those that have already been discussed, inasmuch as there is a certain degree of penetration into the pores of the wood of the solutions employed.

In commencing the consideration of this part of the subject, it will be desirable to direct particular attention to a fact too often overlooked by patentees, viz., that crystallisable salts, and especially those which absorb water readily, possess the great disadvantage (if the penetration of the wood be at all considerable, and if it be not considerable the employment of such salts is, as a rule at any rate, a very useless expense) of being liable to crystallise, thus causing a splitting apart of the fibres of the wood, and an increased tendency to absorb water in damp situations. There can be no doubt that those preservatives are most suitable that render insoluble and less putrescible the nitrogenous constituents of the wood, and that alter to the least possible extent the natural structure of the wood; and, moreover, a good preservative should possess no tendency to crystallise or to absorb water. Further, the perfect preservative should be insoluble in water, incapable of appreciable volatilisation, especially in warm situations, and necessarily, of course, it should be a perfect antiseptic, and poisonous or inimical to insect life of every description. In addition to these qualities, it should not increase the combustibility of wood treated with it. How seldom these conditions are satisfactorily fulfilled will be understood after some of the principal processes have been passed in review.

Corrosive sublimate or chloride of mercury solution (one pound of the salt to five gallons of the water) has been employed with a measure of success in the process well known as "Kyanising," though according to Boulton it has invariably failed, like all other processes which involved the use of salts of metals, when the treated woodwork was exposed to the prolonged action of sea-water.

The action of the salt is to render unsoluble the nitrogenous constituents of the wood, and by its powerfully poisonous nature to prevent the development of spores of fungi or the attacks of insects. There can be no doubt that this material does increase the longevity of wood treated with it to a very considerable extent, especially when the wood is not constantly submerged. An experiment well illustrates this. Deal planks were exposed to most unfavourable conditions. In one year those that had been unprepared were rotten; those that had been "Kyanised" remained sound for seven years, and then began slowly to decay; whilst, if may be added, that those that had been "creosoted,"—a process to be described later on,—were found to be sound after twelve years' exposure.

The corrosive sublimate can be applied either by injection, or by simple immersion, for from seven to twenty-one days.

Although Mr. Kyan was the patentee of this once important process, the use of this salt in this particular direction was first suggested by Sir Humphry Davy.

Trotchet's experiments show that mercury salts were the most effectual in preventing growth of fungi; salts of copper, nickel, and cobalt come next; iron, antimony, and zinc seem to have little effect; whilst those of tin and lead were worse than useless. These experiments are not, however, by any means conclusive, nor does experience always agree with the results obtained.

Salts of zinc have been largely used. Sir William Burnett's process (patented 1836) involving the use of chloride of zinc, was at one time very widely adopted. The action of the chloride is to coagulate the vegetable albumen, and it is also, to some extent, inimical to the attacks of fungi and insects. In the original specification a strength of about one pound of the salt to five gallons of water was recommended, and the wood was to be immersed in the solution for from ten to twenty-one days. A defect, shared by chloride of zinc in common with a large number of other metallic salts used in preservative solutions, is, that iron and copper nails inserted in wood that has been treated with them are liable to rapid corrosion, especially if at all exposed to moisture.

The absorption of this and other preservative solutions is said to be much facilitated by taking advantage of the expansion of the wood by heating it to the highest possible point consistent with avoidance of damage to its structure, and then plunging it into the bath of preservative, so that as the fibres cool and contract the liquid is, to some extent, sucked in.

Other patents, involving the use of zinc salts, are those of Boulton (Pat. 62, 1882), and of Roper (Pat. 3,761, 1882). In the former a combination of tar and tar products with naphthalene, chloride and sulphate of zinc, and alkalis is recommended. In the latter the wood is first impregnated with sulphate of zinc and then with chloride of calcium; in this way double decomposition results, the insoluble sulphate of calcium which is formed closing the pores of the wood and locking in, as it were, the greater part of the chloride of zinc formed, at the same time.

Sulphate of iron was patented by M. Bréant as a preservative of timber in 1837, and it enters into the composition of many patented mixtures. As recently as 1883 a method was patented in which the timber was first to be placed in a vessel with water heated up to 248° F., and then plunged into a mixture of sulphate of iron and chloride of sodium (common salt), or lime water and alum.

In another patent it is recommended first to boil the wood in a solution of gallo-tannic acid and then with sulphate of iron, or injection may be employed in the place of boiling. An obvious objection to this process is that the wood is rendered decidedly acid, a condition which would favour its decomposition; whilst the tannate of iron formed, in conjunction with the nitrogenous constituents of the wood, would, especially in warm, damp situations, favour the development of destructive ferments.

The most effectual mode of applying this material is that known as "Paynising" (patented by Mr. Payne in 1841). This consists in first filling the pores of the wood with chloride of calcium, followed by the application of sulphate of iron. In this way the insoluble sulphate of lime is formed in the body of the wood, which is rendered impervious, and as hard as stone. Chloride of iron takes the place of the sulphate, and is for the most part locked in the wood; but is of comparatively little use, the chief advantage of the process being the hard resistant surface given to the wood.

Copper salts alone, and in combination with other materials, have been largely used and with a moderate degree of success, though for submarine woodwork it cannot be relied upon, as it affords no protection against teredo and in fact, wherever the wood is exposed to the solvent action of water, soluble salts, like the sulphates, are useless. It is likely, as Boulton points out, that sulphates of copper

* See p. 290, ante.

ight be most usefully employed in conjunction with oily and bituminous fluids, or even with salts which do not possess great potency as fumigants.

In Margary's specification the acetate and sulphate of copper are mentioned as suitable, a pound of whichever salt is preferred being dissolved in four gallons of water, the length of the time of immersion being according to the thickness of the wood, two days for every inch being the recommended period.

The best mode of application, where the conditions are suitable, is that of Boucherie, which is largely used in France, especially for telegraph-poles, which consisted in connecting a newly-fallen timber at one end, or in the middle, by means of suitable pipes and connections, with a reservoir containing solution of sulphate of copper fixed at a height sufficient to enable the antiseptic to expel the sap from the timber and take its place. De Lafolaye describes a series of experiments which were made with a view of discovering the change that sulphate of copper suffers when injected into green wood and wood in different stages of decay. Green wood absorbs large quantities of sulphate of copper, which gradually disappears without apparent change in the constitution of the wood. This observation, he remarks, leads to the assumption that the free sulphate, as is not the preserving medium, but that the antiseptic action is brought about by a certain quantity of the sulphate of copper being combined with the wood-cells. This circumstance does not apply to wood in a state of decay, such wood when used merely loses all free sulphate of copper, but a quantity of combined salt diminishes in accordance with the progress of the decay. To the preservation of telegraph-poles, Lafolaye further points out that young trees more efficaciously preserved by the process in older ones.

In MM. Bazin & Hémy's patent the sulphate of copper solution is warmed to 60° or 70° C., after which the timber is immersed and heated for about twelve hours, and then order to cause the solution to enter the pores of the wood alternate currents of electricity are caused to pass through the wood by wires placed at either end of the timber connected with a magneto-electric machine, the logs may be merely thrown into an electrified bath. The wood becomes a conductor of electricity when heated and the electric current will carry with it the chemical action.

Another patentee recommends boiling the wood in a mixture of sulphate of copper, potash, alum, salt, lime, and water.

Aspecially useful for protecting wood-work in the ravages of the white ant, a mixture of arsenic acid and carbonate of soda dissolved in water and added to a strong solution of sulphate of copper has been patented.

Another patentee recommends the treatment of wood first with sulphate of copper, subsequently with chloride of barium, whereby the very insoluble sulphate of barium is formed in the pores of the wood, lessening its porosity of the wood and enabling it to take up a large proportion of the chloride of barium simultaneously formed. A further advantage is that the barium sulphate is insoluble, so that the wood would be less liable to the attacks of insects, &c.

Notwithstanding the comparative uselessness of salts of lead for preventing the decay of wood, various devices have been patented involving the employment of a soluble salt of lead, and subsequent treatment with a soluble phosphate and carbonate, whereby the corresponding insoluble lead salt is formed in the pores or on the surface of the wood.

Sodium salt and alum together and singly have been suggested as useful for the prevention of decay. The affinity of the former for iron is a serious objection to its use, although Holland in past times was largely used for pickling ship-timbers, &c., whilst the preservative influence of sea water is well known in the case of oak, the colour of which it alters in many cases, as Mr. H. Maudslay has pointed out, to a peculiar green. Boiling sawn wood in a solution of soda, a process which in the case

of most woods would result in a serious disintegration of the fibres of the cell-walls and a consequent loss of strength and durability, has been patented. In another process the destructive operation of boiling with carbonate of soda or other alkali is recommended, followed by impregnation with a mixture of liquefied resin and silicate of potash or soda (soluble in glass).

In an American patent, the wood is first treated with a solution of sulphate of soda or magnesium, and subsequently with barium chloride. The insoluble and poisonous barium sulphate thus formed is, of course, the preservative, by adding to the density and impermeability of the surface of the wood.

The use of the liquor obtained from saturated peat in its natural condition; the filling in of receptacles, grooves, recesses, and holes cut or bored in the timber, with poisonous and preservative substances, have also been the subject of various patents.

Very few of the above processes have any permanent value. In the majority, the preservative would be dissolved out of the wood by exposure in moist situations for a lengthened period. In a few the action is merely mechanical by closing the pores of the wood, whilst in not a few cases the internal constitution of the wood is so seriously modified that its structural usefulness is greatly lessened. A very large number of patentees seem to have been absolutely ignorant of the nature of the problem that they desired to solve; for example, compounds containing potash salts, phosphates, ammonia compounds, and urine, have all been patented, the probable effect of which would be to increase the liability to the very evils it was sought to avert, inasmuch as all these substances constitute excellent foods for the dry rot and other fungi.

Superficial treatment with hot whale and other oils was in former years considered useful, but the animal and vegetable oils have entirely given way to the oily and other products obtained in the distillation of tar. As regards tar itself, application in the hot state differs materially, and is far more efficacious, owing to the greater degree of absorption, than mere brushing with cold tar.

Crude creosote or oil of tar, crude petroleum, resin oil, carbolic acid either alone or in combination with other materials such as pitch, resin, silicates of potash and soda, mixtures of naphthalene and creosote mixed with resinous substances and soda, naphthalene in a hot or boiling condition, have all been recommended. With respect to naphthalene, considerable difference of opinion exists as to its utility, but Dr. Tidy considers that it is "of infinitely greater value than at first sight appears. It is somewhat antiseptic, but its special value lies in rendering the wood more solid. The objection that its volatility is against it is met by the fact, proved by direct experiment and experience, that this loss is but superficial and soon ceases." These remarks were applied to the value of naphthalene as a constituent of so-called creosote, the material which stands at the head of the list of wood preservatives. True creosote is a product of the destructive distillation of wood, but the article used for timber-preserving is, to quote Tidy's definition, "a product of the distillation of coal tar after it has reached a temperature of about 100 deg. to 120 deg. Fahr.; in other words, after what is known as the light oil has distilled over."

Bethell was the first to utilise this material, and the process of pickling timber with it was for long known as "Bethellising" (Patent No. 7,731, 1838). In the original specification, however, the word creosote does not appear, but combinations of saline solutions and resinous or bituminous substances; coal tar, thinned with one-third to one-half its own quantity of dead oil, to which, if desired, caoutchouc or resin might be added, were mentioned. The impregnation of the wood was effected in a strong cylindrical vessel, connected with a powerful air-pump, so that by first producing a vacuum the pores of the wood might be as it were opened, enabling on the subsequent application of considerable pressure, the liquid to be forced into the

substance of the wood. M. Bréant, in 1831, invented the first apparatus for injecting timber by means of alternate vacuum and pressure in a closed iron cylinder, but he employed as the preservative a mixture of linseed oil and resin. Another mode of "Bethellising" consisted in first placing the timber in a heating-chamber, and passing the products of combustion through it. When thoroughly dry it is taken out, and at once immersed in hot creosote in an open tank.

Although Bethell's name is most prominently associated with the use of creosote, coal-tar vapours had been used for preserving wood by Frantz Moll in England two years before Bethell took out his patent. Space will not allow of my entering into a full description of all the modifications and improvements in the application of creosote and coal-tar products; but those who desire more complete information cannot do better than obtain the reprint of Mr. S. B. Boulton's most excellent paper, "On the Antiseptic Treatment of Timber," read before the Institution of Civil Engineers, on May 6th, 1884.

A brief summary, however, of the chief facts connected with creosote and its allies, so far as their application to timber-preserving is concerned, will not be without value, and, indeed, this article would be singularly incomplete without it.

The complex nature of so-called creosote has yet to be completely unravelled, and varies considerably with the temperature at which the coal has been carbonised, and at which the subsequent distillation of the tar has been conducted.

The usefulness of the material, however, seems to depend chiefly upon the presence of the following materials:—

Naphthalene: the importance of this material has already been referred to, and the most practical authorities now prefer those oils which are rich in it, examination of creosoted sleepers of considerable age having shown that this substance was present in abundance, whilst the more immediately powerful tar acids were absent. In fact, creosoted timber, with plenty of naphthalene in it, will last far longer than that which has been treated with the much-valued tar acids, to which all the credit of the preservation used to be given.

Acridine is one of the alkaloids in coal tar oils of an intensely acrid and pungent character, a powerful antiseptic which, when once introduced into the timber, is not easily eliminated. Boulton is of opinion that it will come to be recognised as one of the most valuable constituents, for timber-preserving purposes, of tar oils.

Carbolic acid, although much over-estimated in some quarters, is doubtless of considerable value, as, owing to its active properties as an antiseptic, it prevents the development of dry rot fungi and the attacks of insects in new timber. Owing, however, to its great volatility and the unstable nature of its combinations, its power in this direction is only temporary. The proportion that should be present in good creosote varies, according to different authorities, from 5 per cent. to 9 per cent. Tidy, on the other hand, considers that only just as much of the acid as may be required to coagulate the albuminous constituents of the wood is necessary; whilst Koch considers the acid to be of but little use, even as a coagulator of albumen.

Heavy oils, which are those that do not distil under 600° F., are considered to be of great value, their impregnating power being large, besides which they possess antiseptic qualities, and are non-volatile.

The value of the above combination of materials, as found in creosote, is to be seen in the fact that eminent engineers have often preferred well-creosoted fir wood to oak in hydraulic engineering, as being both cheaper and more durable. Creosote, however, requires both judgment and experience in its application, and has sometimes entirely failed in consequence of the imperfect manipulation of the timber, or its own poor quality.

The conditions which ensure success are thus summarised by Tidy:—

1. That the timber be well dried, so that

the pores of the wood may be completely pervious.

2. That the creosote should be of a heavy rather than of a light description.

3. That as much creosote should be put into the timber as the timber can be made to absorb.

One or two methods of impregnation have already been briefly described. In some cases mere superficial protection is given by thinning down the creosote with lighter oils and brushing the thin liquid over the woodwork.

One or two patentees have recommended the use of steam, either ordinary or super-heated, mingled with vapours of creosote, carbolic acid, and similar substances, the wood being subjected to their influence in closed chambers.

In another patent the end of each piece of timber is left open to the air, so that the sap and moisture can be more readily withdrawn with the assistance of an air-pump, after which creosote, &c., is injected.

When timber is new or wet the impregnation by alternate vacuum and pressure processes is imperfect, owing to the large amount of water present, and various plans have been devised for getting rid of this obstructive excess. It is fully admitted, as already explained, that naturally seasoned or dried wood is in every respect preferable to that which has been artificially desiccated. Still there are many cases where time is of so much importance that the six or twelve months of stacking necessary to render the wood sufficiently dry is quite out of the question. In all such cases the process of Boulton seems to be the most suitable, in which the wet timber is heated under creosote in a vacuum up to 112° F. (if heated to 250° F. or 300° F. deterioration of the wood will commence). The heat being imparted through the oily medium will not injure the timber, from which the water is volatilised and drawn out by the air-pump. The creosote oils are not volatilised, as the temperature is far below their boiling point. The water is thus effectually removed from the wood and creosote takes its place.

In concluding this sketch of some of the many plans that are or have been in use for enabling the durability of timber to be extended, it may be pointed out that whilst good creosote most nearly fulfils the required conditions, yet there is one important objection that makes its use undesirable for certain classes of work, namely, that wood treated with it becomes more inflammable and burns more furiously than if untreated; in all cases where there may be special danger of fire a mineral preservative would be more suitable.

NOTES.

THE plans and sections of the site for the proposed new Edinburgh Municipal Offices, as issued to competitors, are very well and completely got out, and it was a good idea to add photographs of the existing and adjoining buildings; but this idea would have been still better carried out if each photograph had been numbered and lettered, with corresponding references on the plan, as the identification of the photographs with the various portions of the site is a rather troublesome matter, and in some cases the indications on the plan do not entirely tally with the facts as shown by the photographs. The restriction that until after the award, "no drawings, prints, photographs, or statements in print, writing, or otherwise, with reference to any of the competitive designs, are to be exhibited, sent, or communicated to any members of the Town Council, or to the public, or to any others, publicly or privately," is a very wholesome one, and will put a stop to the tactics of the gentlemen who on such occasions send round pamphlets of their designs to all concerned, in the effort to turn the flank of their rivals. Other provisions in the conditions are more questionable. The prohibition of perspective views has, to our thinking, only one merit: it equalises competitors more, and prevents the chance of a man with a long purse riding ahead of others by dint of merely paying professional

"perspective hands" to get up alluring pictures on a large and costly scale. But why forbid every sort of shading, even "a shade line," and reduce a drawing to such an uninteresting cast-iron hardness of effect? Such a provision seems to show that the promoters of the competition have very little faith in their own discernment, if they are so afraid of being carried captive by a little bit of shading. This, however, is a minor matter; a much more serious one is the statement that the premiated designs are to become the absolute property of the Magistrates and Council, "who may then employ any architect they think fit to carry out the work." Unless this is intended as a mere formal safeguard, not to be acted upon unless in case of very exceptional circumstances, we can only call it a threat of unpardonable injustice and unfairness to the competitors. Do the Magistrates and Council suppose that the premium of 250*l.* is any adequate payment for a first-class design and plan for a building of this magnitude, or that any architect of genius would take that amount of trouble except with the expectation of carrying out the building? We hope the Edinburgh authorities will give some assurance that they intend to employ the successful architect to carry out the building unless there is any very exceptional reason against his employment, and that the best of the intending competitors will hold back until they get some such assurance.

OF the many reasons which have been put forth to account for the falling-off of English trade, we do not think that enough stress has been laid upon the action of the manufacturers themselves in bringing about the depression. The Report of the Sheffield Town Council Committee, which has been sitting for a considerable time, holding an inquiry on trade malpractices, reveals a state of things which is most discreditable to the cutlers of that town, and one which, if it prevails in other towns as it has done in Hallamshire, would be enough of itself to account for any amount of falling off. It appears that in consequence of many and grave complaints as to the quality of Sheffield goods of late years, a strict examination has been made, resulting in the discovery that large consignments of inferior German cutlery and tools are imported by Sheffield merchants and manufacturers; and though some of these are sold as confessedly of German make, the majority are sold as of Sheffield make, by false labels and description of the goods. Not only this, but low-class cutlery is turned out in Sheffield and sold to retail tradesmen and the public generally as first class, by means of untrue descriptions. A more disgraceful exposure of trade malpractices can scarcely be imagined, and the Sheffield makers will have themselves to thank if the same high character of their industrial produce leave them for ever. But they have done more than injure their own town and trade, for they have inflicted damage which it is impossible to over-estimate on English manufactured goods generally. What has taken place in Sheffield may equally well take place in Manchester, Leeds, Birmingham, or elsewhere, and the Committee are well advised in requesting the Town Council to petition in favour of Mr. Mundella's Trade Marks Act, in the hopes of checking such dubious practices.

THE Chairman of the London and North-Western Railway has illustrated very forcibly the inconvenience of the refusal of the companies at large to keep such accounts as should tell what is the cost of each department of the traffic. Mr. Moon says that in the last half-year this company have carried 500,000 fewer first-class passengers, 800,000 fewer second-class, and 6,000,000 more third class. Taking the fares at the 1874 rates of 2*d.*, 1*d.*, and 1*d.*, this change, as far as the information given goes, would be equal to carrying 3,800,000 additional third-class passengers. Setting off the 2,200,000 against the loss of the first and second class fares, the income of the company should be so much to the good,

but, instead of this, there is a decrease in their receipts of 5,000*l.* in the half-year. It is therefore evident that counting passengers is idle, unless the length of the respective journeys is also given. What has actually taken place is, a serious decrease in the long traffic, chiefly of the first and second class, and a very great increase in the short traffic, chiefly in the third class. A diminished net profit of 55,000*l.* in six months is a matter of sufficient importance to the shareholders to demand a fuller explanation than the very inadequate one above cited. As the mileage was reduced by 110,000 miles, it is probable that the passenger traffic, if its accounts were kept by themselves, would be found to have improved during the half-year, as it is more lucrative for a company to run a well-filled third-class carriage than a first-class carriage with its average number of occupants. If the mileage were given, and the cost of the passenger traffic stated, it would be possible for the proprietors to see for themselves where the shoe pinches. As things stand they cannot do this.

THE half-yearly meeting of the Midland Railway also illustrated the imperfect nature of the accounts presented to the shareholders. There had been a decrease of 23,303 first-class passengers, and an increase of 350,000 third class. As far as this statement goes, it shows a net gain of 303,394 third-class passengers, which should have given a lucrative result. But the decline of receipts was 5,286*l.*, and the increase in receipts (third class) was only 3,000*l.* This makes the fare of each first-class passenger equal to 2*s.* 3*d.*, and that of each third-class passenger about 2*d.*; so that the journeys of the former were ten times as long as those of the latter. This is a change to which the Chairman has called no attention whatever. It is one of a far more serious nature than the mere change of class by a passenger, as it shows, first, that the long traffic is declining; secondly, that the short traffic is increasing; and, thirdly, that the latter is so much less remunerative than the former as to show a material loss on the balance.

M. ARTHUR RHONÉ, the illustrious French archaeologist, has published an interesting note on the probable effect of the construction of the proposed Metropolitan Railway at Paris. It appears that an entire *quartier* or neighbourhood formed by the Rue de la Grande-Truanderie and the ancient Rue du Mondétour, with the Rues Piroutte and La Petite Truanderie, will be completely swept away without leaving a trace of these curious names, which have been immortalised by Victor Hugo in his "Notre Dame de Paris," and are celebrated in the annals of the old Paris of the Halles. At No. 5 of the Rue Piroutte is the Hôtel du Heaume, the last of the houses with arcades which surrounded the ancient halles. A long passage with a wood ceiling conducts to two open courtyards, surrounded by galleries with wooden columns, which have another outlet through the house No. 39, Rue de la Grande Truanderie. At No. 11, Rue Piroutte, is an ancient doorway, one of the columns of which is extremely curious. This house is marked upon the oldest plans of Paris. The well and pillory of the ancient Halles were in the immediate neighbourhood, on the site of what is now the Rue de Rambuteau. The name *piroutte* is said to be derived from the popular name of the pillory, which was made to revolve so as to expose the culprit to the four points of the horizon. Hard by this scaffold was frequently erected, and here perished in 1344 Olivier de Clisson, and in 1477 Jacques d'Armagnac, who were both accused of complicity with the English. The carrefour of the Rue du Mondétour and of the Petite Truanderie, and the houses surrounding it, with their overhanging stories, their narrow frontages and winding stairs, are so well preserved that one realises at once the Paris of the Middle Ages so admirably described by Hugo and M. Rhoné suggests, "why not retain intact this little fragment of an ancient city which brings so vividly before our eyes the life of the merchant and the artisan in the Middle Ages?"

The Metropolitan Railway threatens to demolish one of two hotels,—the Hôtel de Beavais, 68, Rue François-Miron, or the Hôtel d'Aumont, No. 5, Rue de Jouy, two buildings of the time of Louis XIV., both admirable in their way, although from different points of view. It is true that the railway undertakes to respect the town mansion of the archbishops of Sens, built in the reign of Charles V. on the outskirts of the royal residence of St. Pol, but it will pass so near that it cannot fail to become a dangerous neighbour to this charming edifice, which is only to be compared to the Hôtel Cluny, fortunately spared to us through the promptitude of the veteran M. Albert Lenoir. The railway will, however, destroy besides a modern market and a school, the Rue de l'Arve-Marie, and with it the doorway of the *Théâtre du Marais*, of which Molière, whose house still remains on the opposite side of the way, was the manager, and where the poet was arrested for a sum of some hundred and odd livres owing to his haberdasher and his candle-snuffer, two important personages in those days to the management of a theatre.

THE second fresco by Sir Frederick Leighton at the South Kensington Museum, entitled "The Arts of Peace," is now completed, and was first opened to inspection at a private view on Thursday. The fresco fills the lunette opposite to that in which is the companion work, "The Arts applied to War." Most frequenters of the Museum have seen the smaller monochrome study for the work, which for some time stood in the gallery where he wall painting (in Mr. Gambier Parry's "spirit fresco" method) is now completed. In "The Arts applied to War," the figures are nearly all those of men, the women only forming a subordinate group on one side of the picture. In the "Arts of Peace" women occupy the prominent and central position, in a carpeted alcove, with a semicircular screen of Classic architectural detail forming a background to the group. On either side of the composition are groups of nearly nude men engaged in landing merchandise, and in processes of manufacture; the mass of warm but subdued tone formed by their (conventional) flesh tints bringing out into prominence the gay and bright colours of the women's draperies in the centre portion. Several of the individual figures are very graceful, especially that of the woman on the right of the alcove, to whom a little girl holds up a mirror, and whose figure is half shown by her falling apart of the drapery; and the general effect, from a decorative point of view, is exceedingly successful. It should be judged, however, from below, both in regard to the general colour effect, and also because the perspective of the architecture is drawn for view from below, and necessarily looks wrong from the level. The scene is on steps and platforms adjoining water, which forms the foreground. The boats shown may be regarded as conventional "decorative" boats, but it is pity they are so obviously inefficient for practical purposes. That in which the man on the left is pushing off is quite too small for him and his merchandise, and from the alarmed expression of his face he seems painfully conscious of this. Sir Frederick, of course, may quote the precedent of those wonderfully impossible boats in Raffaele's *Miraculous Draught of Fishes*. It may be noted that in "The Arts applied to War" the dresses and architectural accessories are Gothic; in "The Arts of Peace," they are classic; a distinction suitable enough.

A CORRESPONDENT of the *Journal des Artistes* has discovered in the little Church of Kermaria, near Portrieux, in Brittany, the remains of a fresco of a Dance of Death, in which the figures of the soldiers, the monk, and the king are yet visible; the costume is of the time of Louis XI., and indicates the probable date of the painting. In the sacristy of the same church are preserved a series of small bas-reliefs very finely executed, representing the history of the Virgin of the fifteenth century. The figures are of the spare and

lengthy type, with long hands and pointed fingers, which one finds in the paintings of the period.

THE stones of Temple Bar and of its companion in misfortune, the colonnade of Burlington House, continue (by their friends) to cry aloud for rescue from oblivion. The *disjecta membra* of the old City gateway are still stowed away somewhere in the squalid and forlorn vicinity of Farringdon Market; and certainly neither the neglected stones nor the ruinous market can be quoted as favourable examples of the good effects of the fostering care of the "grand old Corporation" of London. According to a letter signed "Luke Limner, F.S.A.," which appeared in the *Times* a day or two ago, the stones of the Bar form a "happy hunting-ground" for the "printers' devils" and other working lads who there abound. The writer says that when he discovered the whereabouts of the stones he found these lads "chasing one another over a mouldy, dirty quarry, abraded with their hobnails all that remains of detail on what used to be our last City postern." Is it really too much to expect that the Corporation of London and the Benchers of the Temple should, between them, find a site for this interesting memorial of Old London? We have more than once published suggestions to this effect. Perhaps the stones of the colonnade of Burlington House are in even worse plight, for they are in the possession of Her Majesty's Office of Works, and lie scattered in Battersea Park. "Luke Limner" also calls attention (as we have frequently done) to the half-buried condition of the York Water Gate at the bottom of Buckingham-street, Strand (not "the Buckingham Gate," as the *Times* correspondent calls it). The Metropolitan Board of Works did, some time ago, scoop out some of the earth with which they had previously half-buried the gateway, but the only effect of this has been to leave the structure standing in a hole.

THE monument erected at Châtillon, near Paris, in memory of those who fell there in the last desperate struggle against the Germans, has been recently removed, and its removal has occasioned considerable correspondence in the French artistic papers, and inquiries are made as to who is responsible for what appears to be a gratuitous and ungrateful piece of meddling. The Commission for Historical Monuments and the Minister for War appear not to have been consulted on the subject. At the re-opening of Parliament, M. H. Michelin, Deputy for the Department of the Seine, intends to ask a question of the Minister for War with regard to the removal of the monument.

THE very fine carved oak stalls and return stalls from the former Carthusian monastery at Buxheim, in Bavaria, are to be sold at Messrs. Bonham's rooms in Oxford-street, on September the 1st, and are now on view there. The work is an excellent specimen of the rich and bold, if rather florid, carving of the seventeenth century. There are twelve stalls and three return stalls on each side. The arms and divisions are of pierced scroll-work, ornamented with fruit and garlands, and each terminating in a boy's head. The cornice is surmounted by a series of figures rather more than half life-size, and exceptionally beautifully executed, representing at the sides the twelve apostles, and on the return ends David, Moses, and two High Priests. Over the scrollwork between these figures boy angels lean forward playing various musical instruments. In the backs of the stalls are elaborately-carved niches, containing twenty-seven small figures, among which we noticed figures of SS. Philip Neri, Ignatius, Bridget, Odo, Francis, Dominic, and others. St. Augustine and two others are missing. Our Saviour occupies the niche on the right of the doorway, and the Blessed Virgin that on the left. The desks are equally elaborately carved in a similar manner to the stalls, but some of the

figure work, which chiefly consists of boy angels and the like, struck us as being rather less excellent. The whole is said to have been carved by the monks themselves, and to have occupied them for fifty years. There have certainly been several, perhaps many, different hands and heads at work on them; both design and execution constantly vary in excellence in different parts, though all is good. We hope that such a work of art will fall into the hands of those who will appreciate and take good care of it. Meanwhile, those who do care for such things should see it.

THE new illustrated Catalogue of Terra-cotta Ornament and Moulded Bricks, issued by Mr. J. C. Edwards, of Ruabon, promises a great variety of well-executed moulded bricks to select from; decorative air bricks (some of them very good and original), and a large series of decorative paterae and diapers in terra-cotta, to work with a specified number of brick courses. In regard to these latter, some judgment and selection is called for. It does not do to attempt too much in the way of patterns which are to be mechanically repeated. They should not attempt to rise to the rank of carving. The floral paterae on plates 23 to 25, for instance,—those on plate 25 especially,—are too naturalistic in themselves, and when they come to be repeated, they only produce the effect of being a poor and mechanical substitute for carving. Mechanically repeated ornament should be of a simple and highly conventionalised type. Nos. 234 and 235 (plate 19) are good in this respect; they form good continuous diapers, with a certain amount of invention and ingenuity, but with no attempt at mimicking the higher effects of carving.

MR. C. M. SHINER, a London architect, has written to the *Daily News* in reference to the recent costly purchases of sites in the neighbourhood of St. Martin's-le-Grand for Post Office extension. He points out how the various departments under the control of the Postmaster-General are scattered about in different buildings, and proposes the concentration of all the departments on one site sufficiently central for the purpose. He contends that in spite of the recent costly extension of the existing Post Office sites, these will, after the lapse of a very few years, be found inadequate and incapable of further extension, except at an almost prohibitory cost. "Why," he asks, "cannot the recent example of Scotland-yard be followed and a fine site chosen, wherein the whole of the offices could be centralised?" "There is," he adds, "such a site in Holborn-circus, bounded by Holborn, Hatton-garden, Charles-street, and Leather-lane, nearer to all the great railway termini except Broad-street, nearer to the great news centre Fleet-street, exactly five minutes' walk from St. Martin's-le-Grand." This site, as Mr. Shiner says, has good approaches, and would afford large room for extension, and no doubt if all the offices could be concentrated there, and the costly sites of the existing buildings sold, the cost of the new building on the comparatively speaking cheaper site at Holborn-circus would be more than covered. But we do not think there is any likelihood of the scheme being adopted, seeing the great outlay that has been made upon Post-office buildings within the last few years.

THE attacks which have recently been made on the Royal Academy, to which we have already referred as by no means without excuse, have been unfortunately characterised by so much unfairness and misrepresentation that they are likely to end in creating a reaction in favour of the Academy. Whatever may be said of the shortcomings of recent Royal Academy exhibitions, and the absurdities of particular members who ought to give up exhibiting, it is clear that the special clique of painters who pride themselves on holding aloof from the Academy are an exceedingly crotchety sort of people, with very lax ideas about accuracy of statement. For example, it was most positively affirmed by Mr. Holman Hunt,

that the Academy refused any recognition of Mr. Burne Jones until they found they could not crush him by neglect; while it appears in reality that Mr. Burne Jones was twice invited to join, and refused. Other extravagant statements by Mr. Holman Hunt were completely disposed of in a letter from Sir F. Leighton to the *Full Mall Gazette* two or three days ago. We certainly think the level of intellectual interest in the paintings exhibited at late at the Academy has been in the main very low; but no good will be done by getting up fanciful and imaginative charges against Academicians, scarcely any of which, it appears, can be substantiated as fact.

FROM the answer of the First Commissioner of Works to a question asked in the House on Monday last, it appears that the work at Westminster Hall, as designed by Mr. Pearson, is to be carried out (as, indeed, we expected it would be), and that Messrs. Shillitoe & Sons, of Bury St. Edmunds, have taken the contract. If it is to be carried out with the committee-rooms as planned, a very foolish piece of work is going to be done. How many people, we should like to know, are even now aware that one result of this foolish scheme will be to project a couple of staircases right into Westminster Hall and destroy its now unbroken area? Does Mr. Plunket know that? And will some one in the House who is possessed of a little architectural common sense ask him what he thinks of it?

THE CHESTER MEETING OF THE ROYAL ARCHEOLOGICAL INSTITUTE.

CONCLUDING NOTICE.

WE this week conclude our account* of the recent Archeological Congress at Chester, and will resume by referring briefly to the excellent loan collection of antiquities shown in the temporary Museum at the Town Hall, of which Mr. G. W. Shrubsole and Mr. W. T. Ready were the curators. The collection included a large number of sketches, drawings, and etchings of Old Chester and buildings in the neighbourhood, by Cuit, the late Mr. W. F. Ayton, and Mr. Francis Nicholson. These were all lent by Mr. William Ayton. Some water-colour drawings of old houses in Chester, by Mr. William Tasker, were lent by Mr. Edward Tasker. One of the most notable exhibits was a very beautifully modelled terra-cotta head of a statuette of Jupiter, found at Nemi by Sir Savile Lumley, and lent by Mr. R. P. Pullan. Some specimens of tiles found in Chester were exhibited by Mr. Shrubsole. The churchwardens' accounts of St. John's, Chester, in three volumes (extending over a period of nearly two centuries, viz., from 1633 to 1827), attracted much interest. There was a good display of municipal maces and other Corporation plate, and a golden torque found in 1816 by a miner near Holywell, from whom it was purchased by Earl Grosvenor for two hundred guineas. It is of fine gold, and simple in workmanship.

St. Mary's Church, Chester, was visited on the 10th inst., and the Rector, the Rev. H. Grantham, received the visitors and described the church. He observed that one of his predecessors, the Rev. W. Massie, had compiled a concise history of the church, but it had remained in MS., and the MS. had unfortunately been lost. He believed that no complete history of the church was to be found, although Ormerod and Hemingway gave some details of it. The church was given to the Abbey of St. Werburgh by the fourth Earl of Chester. After the Dissolution the rectory was granted to the Dean and Chapter of Chester, but the patronage of the living now belongs to the Westminster family. The east end of the south aisle of the church was the site of the Trontbeck Chapel. The agreement for building this is dated 1433, temp. Henry VI. A handsome monument formerly stood in the chapel, but the chapel fell down in 1660 and the monuments were destroyed. In 1690, on application being made to the Earl of Shrewsbury (the representative of the Trontbeck family), the ruins of the chapel were made over to the parishioners, and the present

south aisle was erected on the site. The east end of the north aisle was formerly called St. Catherine's Chapel. It contains monuments of the Gamul family, including Edmund Gamul, Mayor of Chester, and Thomas Gamul, his son, Recorder of Chester in 1613. In the north aisle is a fine alabaster tomb in memory of Philip Oldfield, dated 1616. In 1578, according to Ormerod, the chancel window (over the Communion-table), the east window of St. Catherine's Chapel, and the windows next to the chapel, were filled with stained glass. There was no record when these windows were destroyed, but probably the destruction took place during the time the Parliamentary forces were in possession of the city, in 1647. The whole church, except the north aisle, was restored in 1861. The registers go back to the year 1628, and were nearly complete from that date. The church plate includes a very large flagon of the time of Queen Anne, and a silver-gilt chalice said to be of the time of Henry VII. or Henry VIII.; a replica or copy of this chalice, made in 1848, is also among the plate of this church. The church was choked up with galleries until its restoration, and small galleries still remain, being reserved for the soldiers, this being a garrison church. The roof of the nave is old, and in very good preservation, the bosses at the intersection of the moulded ribs being very sharp and clear. The roof of the north aisle is also old, but is in a very dilapidated state. It was mentioned by Mr. Grantham that a new church, dedicated to St. Mary, is being erected at Handbridge, on the opposite side of the Dee, at the cost of the Duke of Westminster. When this church is completed, the old church of St. Mary will be re-named "St. Bridget's," and will serve for the parish of St. Bridget in lieu of the "Classical" church erected fifty years ago in place of the ancient church of St. Bridget, which was removed in making the approach to the Grosvenor Bridge.

The visit to Llangollen and Valle Crucis Abbey, Chirk Castle, and Wrexham, on the 11th inst., was one of the pleasantest excursions of the meeting. Proceeding by rail to Llangollen, the visitors were conveyed thence in carriages to the remains of Valle Crucis Abbey, a very well-kept and interesting ruin. Here, in the first instance, Mr. R. P. Pullan addressed some observations to the party. He said that, though this was one of the earliest of the Cistercian churches, it might be considered, in every respect, a model one. The church was cruciform in plan, with a tower at the crossing, the choir extending beyond the crossing. The conventual buildings were partly destroyed. Documentary evidence stated that the church was founded in the year 1200, but the geometrical tracery of the windows at the west-end would be as late as 1270 or 1272. On the south side of the church there was what looked like a Norman door, though it could hardly be so. Probably all the architecture, except the tracery, was of the same date. He thought there must have been a wooden roof at the east end of the church, and probably at the west end also. The wheel window above the triplet at the west end must have been above the vaulting if this part of the church were vaulted. But he had come to the conclusion that the main body of the church was not vaulted, although in the two chapels on the south side there was vaulting.—Sir James Picton, pointing to some visible differences in the masonry of the inner face of the western gable at different stages, said he thought these differences, taken in conjunction with other things, indicated an intention to vault, though the intention had evidently been subsequently abandoned.—Adjourning to the remains of the conventual buildings, the visitors were again addressed by Mr. Pullan, who said that these buildings appeared to have been of no very great extent, and unfortunately the west and south sides had been entirely destroyed. The remains of the cloisters showed that they were roofed with wood, the corbels which carried the principals and struts still remaining.—Precentor Venables next made a few remarks as to the differences between the Benedictine and Cistercian plans. In the Benedictine houses the refectory was generally parallel to the nave, but in the Cistercian houses it was always at right angles. Sir James Picton said that although one of the doorways existing in the remains of the conventual buildings strikingly resembled Norman work at first sight, yet on close examination of the mouldings, &c., it would be found to have

nothing Norman about it, except that the arch was semicircular. But he believed it to be the earliest part of the work, and it was possibly part of a former structure which might have occupied the site.—Leading the way to the interior of the Chapter House, which is vaulted, Mr. Pullan observed that this portion of the buildings was much later than the other portions. From the character of the moulding and from the tracery of one of the windows which was Flowing Decorated in character, he should put the date of the Chapter House at about 1350. One peculiarity about the Chapter-house is that there are no capitals to the columns which support the vaulted roof, the mouldings being continued upwards unbroken from column to arch. Another notable feature about this vaulting is its great massiveness. Returning to the area of the nave, the visitors listened to portions of a paper by Mr. G. Canning Richardson, on the history of the abbey. Mr. Richardson said that apart from its picturesque situation, the abbey was rendered more interesting from the fact that it is the only ruin of the kind (except Cymanan Abbey) in North Wales. What remains of it shows that it at one time formed a noble pile of buildings, and a fine example of Early English architecture. "Valle Crucis,"—the vale of the cross,—is supposed, said Mr. Richardson, to have derived its name from the sepulchral cross called the Pillar of Eliseg, which, as hereafter stated, was subsequently visited. The Welsh name, Llan-y-gwrestel, "the Church of Egwrestel," suggested that someone named Egwrestel founded a church here, and it was possible, said Mr. Richardson, that this secluded spot was hallowed by religious association before the Abbey was called into existence. Having quoted (from Camden, Dugdale, Leland, Pennant, Willis, and other writers) a number of passages relating to the Abbey, Mr. Richardson briefly referred to the architectural features of the buildings. He said that the beautiful rose window in the west wall, with the quatrefoil opening above it, were later by some eighty years than the lower portion of the wall, and dated probably about 1310. Between these two openings was a panel bearing an inscription to the effect that this part of the building was the work of an Abbot named Adam. As to other parts of the work, such as those carried out by the festive Abbot David, they, no doubt, appeared to be too early in style for the date assigned to them, but this was to be satisfactorily explained, Mr. Richardson thought, by the fact that the Welsh were always a little behind-hand in their knowledge of what was going on architecturally beyond the Border. It was commonly reported that the roof over the nave of Llangollen Church was taken from the Abbey, but Mr. Richardson said that he had satisfied himself, by careful measurements, that that could not have been the case. Down to the year 1851 the ruins of the abbey were in a sadly neglected state, but, thanks to the late Viscount Duncannon and to Mr. Wynne, of Peniarth, assisted by Mr. Penson and the late Rev. John Williams, the rubbish had been cleared out from between the walls and the ruins placed in their present satisfactory state. It may be added that the explanation of the plan of the buildings and their architectural features was facilitated by the exhibition of some measured drawings made by Mr. H. H. Hughes.

The visitors next drove to the Pillar of Eliseg, as to which Mr. R. S. Ferguson read some portions of a paper by Mr. Henry Baker. The pillar, which was formerly surmounted by a cross, is of carboniferous grit stone, and is stated to have been mutilated by some of Cromwell's adherents. It is said to have been one of the first lettered stones that succeeded the Meini-Hirion, Meini-Gwyr, and Llechuan, and to have been erected by Concenn ap Catell, in memory of his grandfather Eliseg.

After luncheon at the Hand Hotel, Llangollen, the carriages were taken to once more, and the visitors had a very pleasant ride to Offa's Dyke and Chirk Castle, traversing for several miles the very remarkable and excellent road made by Telford between Shrewsbury and Holyhead,—the Irish mail route in the coaching days. Arrived at a portion of Offa's Dyke, some discussion arose as to the intention with which this earthwork, which extended for many miles, was made. The general conclusion seemed to be that it was intended to serve as a boundary or fence specially adapted for the prevention of cattle-straying or cattle-"lifting" in the days when, as one speaker put it, Taffy was wont to come "to get a bit of beef." By the kindness

* See pp. 248, 285, ante.

of Mr. R. Middleton Biddulph, the visitors were allowed to visit Chirk Castle, which, now used as a residence, is strikingly and pleasantly situated on, and seems to grow out of, a respectable and well-wooded eminence. The interesting and multifarious contents of the castle, including King Charles's bedstead, were inspected.

Leaving the Castle, the visitors proceeded to Chirk Station to take train for Wrexham, where the church, remarkable for its very fine and rich Perpendicular tower, was visited. Mr. Pullan observed that this tower was one of the finest of its kind in existence, and was certainly the finest tower in the Principality of Wales. In fact, said the speaker, it is reckoned to be one of "the seven wonders of Wales." One thing worthy of remark about the tower was that the statues which filled the niches on its faces remained, having escaped the iconoclastic zeal both of the Reformers and of Cromwell's followers; and although, perhaps, some of them might have been restored, they were the original statues. The roof of the church is very rich, and more ornamented than usual, although it was not so rich a roof as that at Mold Church. Another remarkable feature about the church is its semi-octagonal apse, which, Mr. Pullan said, was a very uncommon feature in a Perpendicular church. It was curious to note that this apse had been thrown out eastward of the original square-ended chancel, the original window being opened out so as to serve as the new chancel arch, although, curiously enough, the "stumps" or terminations of the tracery are still left protruding from the top of the arch. Passing into the apse the original flanking buttresses and the hood-mould of what was originally the east window are still to be seen *in situ*.—Mr. Pullan's remarks were supplemented by a brief but interesting paper on the history of this church by Mr. Alfred N. Palmer, author of "The History of Ancient Tenures of Land in the Marches of North Wales," and who is now preparing for publication "A Systematic History of the Parish Church of Wrexham." Mr. Palmer, in his paper, said that the enlargements and improvements which ended, at the beginning of the sixteenth century, in giving to the building something of the appearance which it now presents, were intended, there was good reason to believe, to be preliminary to a projected collegiate church, the arrangements for which, though far advanced, were never completed. The two aisles are dissimilar. There are six side windows in the south aisle, corresponding to the six bays of the nave, while in the north aisle there are only five windows, which do not centre with the arches of the nave arcade.

In the evening, besides the opening of the Antiquarian Section with the Bishop of Chester's address, which was followed by the Rev. G. F. Browne's paper on "Early Sculptured Stones of Cheshire," as already mentioned, there was a meeting of the Historical Section, when Mr. H. Taylor, author of "The History of Flint Castle," read a paper upon "Grants of Welsh Land to Englishmen by Edward I."

"Chester and Liverpool in their Ancient Commercial Relations" was the subject of an interesting paper read, as already mentioned, by Sir James Picton, F.R.S., before the same Section. At the outset Sir James pointed out that the City of Chester is of Roman origin or adaptation, as shown by its plan, its Roman relics, and its walls. The reason for the selection of this site for a port combining a fortress and citadel is evident upon examination. The old coast line, which is very clearly marked around the neighbourhood, shows that at the advent of the Romans, the river Dee, here making a sudden curve to the westward, swept round the bluff on which the castle stands, leaving the Roodee or Roodeye a marshy island, and expanded into a wide and noble estuary, the waters of which flowed up to the very walls of the subsequent city, as evidenced by the existence of the old Water Tower, with its rings for the attachment of vessels, of the probable date of early in the thirteenth century. Few sites could have been more advantageous, whether for domination over the surrounding country, or for external commerce by sea, and under these circumstances the Roman city enjoyed a long career of prosperity, which is evidenced by its continued occupation for centuries by the victorious Twentieth Legion. It may naturally be asked, said Sir James, supposing the physical features in former ages to have been the same

as at present, why the estuary of the Mersey, presenting deeper water and a much greater tidal flow, should not have been selected. The inquiry is an interesting one, and leads to very important conclusions. The ancient geographers, Ptolemy and Antoninus, in their descriptions of Britain, notice between the Orme's Head and the Peel of Foudry four estuaries,—the Setaian, receiving the outflow of the Deva or Dee; Belisama, identified with the Ribble; Setantiorum Portus, now the River Lune; and Moricambe, now Morecambe Bay. The Mersey is not noticed at all. There is another remarkable fact,—that most, if not all, the rivers have Celtic or Cymric names, with the exception of the Mersey. Whatever meaning may be attached to this word, it is undoubtedly Anglo-Saxon. Now, if the estuary of the Mersey had existed in its present condition during the dominion of the Romans, when the ancient geographers made their survey, it would have been impossible to ignore it, and it would have received a Romano-Celtic name like the others. The probabilities are that the wide expanse of the river between Wallasey Pool and Runcorn was at that time a lake, fed by the upper waters of the stream, the overflow of which found its way to the sea by the low marsh lands which intervened, including the Wallasey Leasowe, and that the barrier to the north was broken down either by gradual wearing away, or by a sudden irruption. This, it is probable, occurred almost contemporaneously with the Danish invasion and settlement in the district. "Walla's-ey," or island, a purely Norse name, points to the period when the eminence on which it is situated was surrounded by water, or, at least, by a marsh. It is this operation of nature which has given such unrivalled advantages to the port of Liverpool. Ages, however, elapsed before the advantages were appreciated. The reverse operation was going forward in the Dee, which was gradually shoaling, and its vast expanse silting up. The prestige, however, remained with Chester, which was slow to lose its supremacy. Towards the latter end of the twelfth century, after the partial conquest of Ireland by Strongbow and his filibusters, a necessity was felt for improved communication with the new realm. Accordingly, a place of embarkation was provided at Shotwick, about six miles below Chester, and a castle built for its protection. The castle has long been removed, but from a plan given by Randle Holme, it resembled much the Plantagenet castles of the time of King John. The impediments to the navigation still continuing, a new haven was constructed in the reign of Elizabeth, on the Flintshire side, to which the name of Queen's Ferry was attached. At a later period Parkgate was selected as the point of departure of the Irish packets, and of the ships called the "Cheesemen," which carried the dairy produce from Chester to London. But all did not avail; the estuary had become hopelessly silted up, and the attempts repeatedly made by the Dee Company to recover land from the river, and to improve the navigation, ended in failure. Nearly contemporary with the construction of the haven at Shotwick, at the beginning of the thirteenth century, it was discovered that a creek or pool existed on the Lancashire side of the estuary of the Mersey, admirably adapted for a haven or port, with access and deep water at all times of the tide. For the purpose of improved communication with Ireland, this opportunity was eagerly embraced by King John, who built a castle, laid out a small town, and by letters patent granted certain privileges to induce his liege subjects to settle there. This new settlement under royal patronage was called "Liverpool," and fully answered the purpose for which it was founded, though many ages intervened before it assumed any degree of importance. During a great part of this time Liverpool stood in a very subordinate position, being considered as a mere creek within the ancient jurisdiction of Chester, where the Government officers and Collectors of Customs resided, having deputies in Liverpool. The Corporation of Liverpool in the sixteenth century, seeing the growing commerce of their own town compared with the declining trade of Chester, felt aggrieved at this, and were determined to throw off the yoke of bondage. Sir James Picton said that circumstances had placed in his hands a large number of contemporary documents hitherto unpublished relating to these controversies, which throw considerable light on the state of com-

merce on the Dee and on the Mersey in the sixteenth and seventeenth centuries. Upon those documents, principally extracts from the official records of the Corporation of Liverpool, Sir James based the remainder of his exceedingly interesting paper. "The failure of the port of Chester," he said, in conclusion, "has been owing partly to natural causes, and partly to unskilful tampering with the channel of the Dee. The rise of Liverpool has been due to its natural advantages, and to the development of the manufacturing industry of Lancashire and Yorkshire. To the commerce of Chester in the Middle Ages we owe the quaint and ever-interesting architecture of her streets and Walls, which are in some respects unique. Long may they remain, carefully and lovingly preserved, calling up to our memories vivid pictures of the dear old England which we love so well."

After the meeting on Thursday, the 12th inst., of the Architectural Section, which was opened by Mr. Beresford Hope's address (already reported in our columns), a visit was paid to St. John's Church and the adjacent ruins. It is believed that a Saxon Church occupied this site, which is outside and a little to the eastward of the city walls. The existing church, as Sir James Picton pointed out, may be likened to a torso, consisting as it does of one bay only of the choir eastward of the crossing, the crossing itself (the transepts having gone), and four bays of the nave westward of the crossing. This fragment is on a scale which shows that when the building was entire it must have been a very fine one, and, as Sir James Picton pointed out, it is an excellent specimen of Transitional Norman work, well designed and admirable in its workmanship. The fine and lofty tower, it may be remembered, fell down about five years ago, crushing the beautiful porch of the church. The porch has since been rebuilt on the lines of the old one, and the tower is now in course of re-erection under the direction of Mr. John Douglas, architect, Chester. The Chapter-house and other adjacent remains are exceedingly picturesque and of much interest. St. John's, it should be stated, was formerly a cathedral, having been commenced by Peter, the first Norman Bishop of Lichfield, when he removed his seat to Chester. The Rev. S. Cooper Scott, the vicar, who received the visitors, has compiled an interesting statement of the history of the buildings, which may be purchased for a few pence by visitors. "A Short Account of the History and Architecture of the Church of St. John the Baptist, Chester," by Mr. Harry Beswick, architect, may also be perused with profit by the visitor. It is illustrated, and is published by Messrs. Philipson & Golder, of Eastgate-row, Chester.

Proceeding next to the Chapter-house of the existing Cathedral, the visitors listened to an historical account of the building which was given by the Very Rev. Dr. Darby, Dean of Chester. Referring to the refectory, which is at present in a very dilapidated condition, the Dean said it was hoped that this fine apartment would be restored before very long, when it would serve as an admirable synod-house for the diocese. Mr. Blomfield estimated the cost of its restoration at 8,000*l*. Speaking of the restoration of the cathedral generally, as carried out by Sir Gilbert Scott, the Dean said he thought that, in some respects at least, it was not sufficiently reverential. After the Dean's address was concluded, the Rev. Precentor Venables conducted the visitors over the most interesting parts of the cathedral and its precincts. In the cloisters he gave a vivid account of the daily life of the monks, and pointed to some striking evidences of the utter disregard shown by Mediaeval architects of one generation for the work of those of a preceding generation. In the refectory he pointed to the reading pulpit, which, he thought, was more beautiful than the one at Beaulieu Abbey. He strongly supported the proposal, referred to by the Dean, for restoring this fine hall and appropriating it as a "church-house" or meeting-place for the diocese. Whatever might be said of Sir Gilbert Scott's restoration, said Canon Venables, the present condition of the cathedral was, when contrasted with its condition before Dean Howson's time, satisfactory beyond comparison. When he (Canon Venables) first saw the cathedral it was the darkest, dreariest, dimmest, dirtiest, and most desolate place imaginable, and was a mere lounge, very much like "Paul's Walk" in Old St. Paul's, London. To the late Dean Howson

(whose grave in the cloister garth was pointed out) was due the credit of having evolved order and decency out of chaos and squalor. It may be added that both the Dean and Precentor Venables warmly commended the excellent little "Handbook to Chester Cathedral" written by Dean Howson.

In the afternoon the members proceeded by river-steamers to Eaton Hall, where they were entertained by the President of the Congress, the Duke of Westminster, and given full opportunity to inspect the state apartments of the princely mansion and its many works of art. The chapel and stables were also visited. The visitors returned to Chester in carriages, and in the evening, as already mentioned, were entertained at a *conversazione* given by the Mayor.

On Friday, the 13th inst., a large party proceeded by a special train to Malpas, where the church was visited, most of the visitors walking from the station to the church, a distance of about two miles, through the rain. They were received by the Rector, the Hon. and Rev. Trevor Kenyon. The church, as Mr. Pullan pointed out, is nearly all of Late Perpendicular date. It has a very elaborate and beautiful roof,—one of the richest in Cheshire. The aisle-roofs, too, are of unusual richness. The tower and portions of the chancel are anterior to the rest of the church, and belong to the Decorated period. The church seems to have been built by the Breretons family, and contains two fine altar-tombs belonging to the Breretons and Cholmondeleys. There is a very peculiar bulge or irregularity in the south wall of the chancel,—an irregularity for which Mr. Pullan said he could only assign a structural reason, such as a difficulty with the foundation.

The rector said that the church was dedicated to St. Oswald, but whether that fact pointed to the existence of a church here in the pre-Norman period he did not know. At the time of the Conquest a castle was built northward of the site of the present church, and, according to Ormerod, the church was within the castle walls. Probably this Norman church was entirely rebuilt in the fourteenth century, when a Decorated church arose, the ground-plan of which, Mr. Kenyon thought, was identical with that of the present structure. The tower and some portions of the chancel are of the Decorated period, but the east window was inserted in the fifteenth century, when the church was almost wholly rebuilt in the Perpendicular style.—Returning to the railway station, the rain having ceased, the party took train for Nantwich, and after partaking of luncheon in the Corn Exchange of that town, visited the church, which was described by Mr. Pullan. Nantwich Church, he said, is one of the finest and most remarkable of Cheshire churches. It is a rich example of Late Decorated work. The tower is octagonal, and the mouldings of the arches of the intersection are deep and rich. There is a curious stone pulpit attached to the screen, and approached from the choir. The stalls are remarkably rich. There was a tradition that they came from Vale Royal, but the accuracy with which they fit the choir (which is of somewhat peculiar plan, *widening out* by means of splay from the eastern side of the chancel-arch), and the absence of any signs of piecing, fitting, or adaptation, render this story very improbable. The Rector, the Rev. F. G. Blackburne, having pointed out some other features of the church, the party proceeded in carriages to Acton Church, which was inspected under the guidance of Mr. Pullan. The upper part of the tower is of very debased Gothic, *temp.* Charles I., but the lower part is of Early English work. The roof over the nave is a nondescript construction of Georgian Gothic. The arcade is Decorated work of a very pure character, the aisle windows being transitional between Decorated and Perpendicular. As will be inferred from this brief description, the church is a curious medley of good and bad work.—Proceeding next to Bunbury, the excursionists were received at the Church by the Rector, the Rev. W. Lowe, who described the church, the tower and chancel of which are of Decorated date, the nave being Perpendicular work *circa* 1450. The fine tomb of the founder, Sir Hugh Calveley, erected in 1416, was examined and described, as well as several other objects of interest in the church. The Ridley Chapel, erected A.D. 1527 by Sir Ralph Egerton, was pointed to by Mr. Pullan as being remarkable for having been erected at a time of change not only in religion, but in art. The ornamentation

of the screen shows the mingling of Classic details with Gothic forms. Mr. Lowe was very heartily commended for taking the pains to append detailed descriptive labels to the tombs and other interesting features of the church. The "Bunbury Lady," a curious carved stone figure strongly suggestive of a ship's figure-head, and which was not long ago disinterred from the churchyard, was seen by some of the visitors. It was, it appears, first erected in the church in memory of a Mrs. Henry Johnson, who died in 1741, but was subsequently ejected from the church on account of its "striking" character diverting the attention of some of the congregation, as well it might. Having thanked Mr. Lowe for his courtesy, the visitors drove to the foot of the rugged crag on which are the remains of Beeston Castle, which were described by the Rev. Precentor Venables. The castle, which commanded one of the three avenues to Chester from the south, was commenced in 1220 by Ranulph de Blundeville, sixth Earl of Chester, on his return from the Holy Land. The Precentor gave a graphic sketch of the historical events of which the castle was, in part, the scene, including the struggle between the Royalist and Parliamentary forces. The triumph of the latter led to the castle being "slighted," or, in other words, blown up by gunpowder. From the walls of the castle a splendid view of the surrounding country, with Peckforton Castle at no great distance, is obtainable. Resuming their carriages, the excursionists returned to Chester, where sectional meetings were held later in the evening. In the Antiquarian Section, Mr. J. P. Earwaker, F.S.A., read a paper on "The Marriage of Children in the Sixteenth Century, as illustrated by the Records of the Consistory Court of Chester."

Mr. T. H. Baylis, Q.C., also read an interesting paper before the Antiquarian Section, on "Treasure Trove." He said that although people had been accustomed to hear and to say, from their earliest childhood, that "Finding is keeping," that was a maxim which, like many others, was true only to a certain extent, for treasure-trove was an exception to the truth of the saying. It, therefore, became necessary to define treasure-trove, and to say who had a right to it. It was easy to infer that the word "trove" was derived from the French word *trouvée*, found. But what kind of treasure was meant, and where must it be found? How did it differ from other findings, and who was its owner? The word "treasure" in connexion with "treasure-trove" was confined to gold or silver money, coins, plate, or bullion. It must be found *hidden* in the earth, or walls, or chimneys, or other secret places. If found on the earth or in the sea, or not hidden, it is not treasure-trove. If the owner thereof or his representatives cannot be ascertained it belongs to the Crown or the grantees of the Crown. In very ancient times treasure-trove belonged to the finder, or to the owner of the soil. That the Crown became entitled to treasure-trove many centuries ago is evident from the statute of the 4th of Edward I. (1275-6), which directs the coroner to hold an inquest to inquire, amongst other things, where treasure-trove is said to be found. In consequence of this right of the Crown to treasure-trove, it had very frequently happened that most valuable finds had not reached the hands of the authorities, but had found their way to the crucible. He (Mr. Baylis) was told that it was now the practice of the Crown to pay to the finder who brought it the intrinsic value of the gold or silver, or a part of it, but that did not hold out a sufficient inducement to the finder to deliver it up. He often retained it or disposed of it for his own profit, although illegally, for the intrinsic value of the find might be small, especially if it were of silver. He thought, therefore, that the Crown should reward the finder and owner of the soil by a percentage based on the real value of the treasure-trove. He was informed that treasure-trove, if rare and curious, was handed by the Government to the trustees of the British Museum, at a price.

In the Architectural Section, Mr. W. Shrubsole, F.C.S., read a paper on "The Age of the City Walls of Chester." The substance of this paper was printed in our last (see p. 287, ante). In the discussion which followed the Rev. Dr. Bruce, F.S.A., in an interesting speech, endorsed the conclusions set forth by Mr. Shrubsole in his paper, as did other speakers.—Mr. Shrub-

sole, in the course of some supplementary remarks, gave some data for estimating the age of the stones of the walls by the extent of the weathering, the rate of which was known.—The Duke of Westminster, who presided, closed the discussion with the remark that he feared that he and most Cestrians would have to give up the belief that their city walls as they now existed were of Roman work, but they would do so with regret. In the same section, Mr. R. P. Pullan read a paper entitled "Observations on the Discovery of the Artemesium at Nemi,"—a discovery which was made by Sir Savile Lumley.

In the Historical Section, Mr. Alderman Charles Brown read a paper giving a short epitome of the charters at present in the possession of the Corporation of Chester. Fortunately, on the occasion of the lamentable fire which destroyed the old Town-hall on the evening of the 30th of December, 1861, the greater part of the valuable muniments were saved, together with the ancient corporate plate and the portraits of former mayors and benefactors of the city. The records thus saved from destruction remained for several years in a state of disorder in the old city gaol, but in the year 1878 a sub-committee of the Town Council (of which sub-committee the author was a member) was appointed to endeavour to bring them into order. The sub-committee fortunately obtained the assistance of Mr. John Cordy Jeaffreson, of the Public Record Office, who tabulated and arranged the documents in the muniment-room of the present Town-hall, where they are now to be seen. Mr. Jeaffreson, in his report, stated that "few cities possess archives so numerous and valuable as those which, after suffering severely from fire, damp, and other causes, have lately been arranged and deposited in the muniment-room of the Corporation." They consist of charters, municipal books, letters, civic grants and leases, and upwards of fourteen hundred sets of filed documents. The entire collection may be roughly computed to have in its several divisions more than 200,000 separate writings." Among the documents is one of the sixteenth year of Edward II. (1323), being an indenture of agreement between the Mayor and citizens of Chester and John Clypeston, for the building of the "new tower," now called the "Water Tower." Another document of interest in the collection is dated July 13, 1529 (20th Henry VIII.), and consists of a deed of grant for ever, by the Friars Minors of Chester, of the nave and three aisles of their church to the merchants and sailors of Chester, for a place in which to store and repair sails and other things requisite for their ships. Dated 1633 and 1634 are two commissions from the King (Charles I.) to the Mayor and Sheriffs to collect contributions for the repair of St. Paul's Cathedral, London. The charters and other documents included in the collection cover a period of upwards of 700 years.

On Saturday, the 14th inst., the visitors proceeded in carriages to Iarvin Church, which was explained by Mr. Pullan. In parts the work is of debased character, but the church contains some features of interest. There is a curious chapel or chantry on the south side, with a hagioscope. Beneath the east window is a remarkable Jacobean rosette, with carved panels representing incidents in the life of Our Lord.—Returning to the carriages, the excursionists were driven to Kelsburrow, in Delamere Forest (a great part of which hereabouts has of late years been disafforested and converted into arable land), where the course of the old Roman road to Mancunium (Manchester) was clearly seen, the rocky sides of the slope which it traversed remaining as left by the Romans. At Nettleford the junction of this road with one leading to Northwich was also inspected. At a spot called Organs Dale the surface ground had been removed, exhibiting what looked like ruts worn in the underlying red sandstone by cart-wheels, although it was suggested that these ruts had been cut by the Romans to facilitate the traffic,—a very questionable hypothesis, in the opinion of most of the visitors. It was pointed out that the gauge of the ruts is that of modern vehicles, and was too wide for the vehicles used by the Romans. Having climbed Eddisbury Hill to inspect the remains of some supposed Saxon earthworks, which it was suggested should be excavated, the visitors adjourned to a marquee at the rear of the Abbey Arms Inn for luncheon, and after-

yards visited Lob Slack (stated to mean "Devil's Bog") to further inspect and trace the course of the Roman roads. Some of the visitors returned by train from Cudington Station, while others rode back to Chester in the carriages. There were several meetings in the evening. In the Antiquarian Section Mr. T. Rigby read a paper on "Old Farming Customs in Cheshire." In the Architectural Section Mr. I. M. Jones, City Surveyor of Chester, read a paper on "A Roman Hypocaust lately found in Chester." Of this paper we have already printed the substance.

On Monday, the 16th inst., the members started from Chester in carriages, proceeding on the first instance to Hawarden Castle, where they were received by Mr. W. H. Gladstone, and conducted over the ruins of the old castle,* which are in good preservation and are well cared for. Mr. Gladstone quoted from Mr. G. T. Clark's description of the buildings, which, standing on a lofty mound rising from the well-wooded park are exceedingly picturesque. This castle, like Beeston and others, was "alighted" by order of the victorious Parliamentary party in 1647. The visitors next proceeded to Hawarden church, which, Mr. Pullan observed, was very well restored by the late Sir Gilbert Scott, after its destruction by fire in 1857, though in a different style. When he (Mr. Pullan) made drawings of the building before the fire, it was wholly in the style of the Transition from Decorated to Perpendicular.—Having stayed a short time in the church the visitors were driven on to Mold, where, after luncheon, the church was visited. As Mr. Pullan remarked, this church is one of the richest specimens of Late Perpendicular to be found anywhere, and was evidently built by the Stanley family. The ranselling in stone above the nave arcade is very unusual, but a similar feature will be found at Manchester Cathedral. The roofs at Mold are very elaborate. The church, like that at Wrexham, has a semi-octagonal apse. The church was restored by Sir Gilbert Scott. Among the monuments in the church is one to William Wynne, of Tower, "rector of Llanvechan, in his parish," who died in 1776. His epitaph informs us that

"In conformity to ancient usage, from a proper regard to decency, and a concern for the health of his fellow-creatures, he was moved to give particular directions for being buried in the adjoining churchyard, and not in the church."

Also for the good man's laudable intentions! They appear to have been complied with at the time, but some years later, when the church was extended eastward, his grave was included in the space taken by the church, so that his remains now rest within the walls of the church after all. At the east end of the south aisle there is a curious, not to say ludicrous, monument in white marble to "Robert Davies, of Llanerch, esq.," who died in 1728. It is marked "H. Cheere, fecit," and, we suppose, is meant to represent Robert Davies, not in his habit as he lived, but in a Roman toga and sandals, and wearing a study cap of the kind shown in portraits of Hogarth and Cowper. The figure, which is not bad in pose, has one elbow resting on the summit of what looks like a gigantic egg, which in its turn rests in what looks like an egg-cup a few sizes too large for it. After visiting the Bailey Hill, upon which Mr. Wynne Folkes and Professor Clark made some remarks, the visitors drove to Caergwile Castle, and having assembled at the top of the height within the walls, after a laborious climb, were rewarded with a very fine view of the surrounding country. A paper by the Rev. Precentor Venables (read in Gresford Church, as the weather was not very favourable for a prolonged stay at the castle) said that Caergwile, like Beeston, seemed to be marked out by nature as a stronghold and place of refuge in troublous times. The first syllable of its name, "Caer," a camp, indicated that it was a military position in early British times. The paper, which gave a history of the stronghold and a brief architectural description, was preceded by some remarks made by Mr. Shrubsole on the spot. The last building visited on this day was the very fine Church at Gresford, restored by

Street in 1866 or 1867. Here Mr. Trevor Parkins (in the absence of the vicar through illness) and Mr. Pullan addressed some observations to the company. The church is a fine Perpendicular building, dating from the time of Henry VII. What was described as its "great glory" is the remarkably fine and well-preserved chancel and aisle screens, which are very perfect in all their details, although unrestored. The window at the eastern end of the north aisle is mainly of old glass, and there is some old glass in the upper part of the east window. Both these windows have been well restored by Messrs. Clayton & Bell, who have also supplied some new windows of good and appropriate character. As a set-off, however, against this good record must be mentioned the window at the west end of the north aisle, which is of the painted calico transparency blind order of art, and is said to have come from Tours. Externally the stonework of the church is in admirable preservation, though it has never been touched since its erection. It is of grit stone of a very pleasant cream tint. In the churchyard the monster yew-tree was inspected. This tree was said by one of the company to be 1,500 years old, an age arrived at by a comparison of measurements of the tree with some of the surrounding yews whose age is matter of certainty. But this statement was evidently regarded by some of the visitors as one to be taken *cum grano*.

Returning by train to Chester, the members attended sectional meetings in the evening. In the Antiquarian Section, Mr. H. S. Skipton read a paper on "The History of Sport in Cheshire, with some Notice of the Grosvenors." In the Architectural Section, Sir Llewelyn Turner read a paper on "Carnarvon Castle," the substance of which we will give next week. Subsequently the closing general meeting was held, and thanks were voted to all and sundry who had in any way helped to promote the success of this very successful meeting.

Tuesday, the 17th inst., was the final day of the meeting, and an excursion was made to Flint, Conway, and Carnarvon Castles. At Flint Castle a brief but interesting explanatory lecture was delivered by Mr. Henry Taylor, Deputy-Constable of the Castle; and Conway Castle, which is in a far better state of preservation, was described by Sir Llewelyn Turner. The party reached Carnarvon about one o'clock, and, led by Sir Llewelyn Turner, proceeded through Bank Quay to St. Mary's Garrison Chapel, Carnarvon (where a halt was made for inspection), then along the promenade, past the Yacht Club-house, called Porth-ur-aur, or the "Golden Gate," which Sir Llewelyn suggested may have been so called either from its handsome appearance, or it might originally have been the scene of the receipt of custom. The back of Her Majesty's prison, the bond stones of the wall destroyed in Madoc's invasion, the temporary substitute for this wall, and the Castle moat having been inspected, the party entered the castle, and at once proceeded to the drill-room of the R.N.A. Volunteers, where luncheon was partaken of on the invitation of Sir Llewelyn Turner. Subsequently the whole castle was examined in detail, Sir Llewelyn repeating most of the facts adduced in the paper read on the previous evening, as above mentioned. During part of the time that Carnarvon Castle was being explored, a number of the party, under the guidance of Mr. Thomson Watkin, visited the site of the old Roman town of Segontium, and the whole party returned to Chester by special train.

Thus ended a week of hard but pleasurable and healthful work.

Destruction of the Norwegian Town by Fire.—The town of Skien, on the Christiania fjord, so well known to tourists proceeding to the beautiful province of Thelemarken, was last week destroyed by fire, which originated in a carpenter's shop by a drunken workman upsetting a gluepot in the fire. The fire raged for two days, destroying, among the principal buildings, the old Gothic cathedral, the damage being estimated at about half a million sterling. The only building of note saved was the branch of the Bank of Norway, which escaped through being nearly surrounded with lime-trees. The trees were very much scorched and withered, but arrested all approach of the fire to the building. Most of the houses were, as usual in Norway, of wood.

THE REVIVAL OF TRADE BY THE DEVELOPMENT OF INDIA.*

The address delivered before the Chamber of Commerce, Glasgow, by Mr. William Birkmyre under the above title, contains some shrewd observations on a subject in regard to which a great deal of misconception exists, viz., the effect of the present depreciation of the silver currency on Indian trade. Mr. Birkmyre combats the idea that it is prejudicial to borrow in gold while the revenues of India are earned in silver, and he goes so far as to assert that even if India had no currency at all it would be still safe to borrow in gold for revenue-producing works. There is little doubt but that he is right in his assertion as regards the actual benefit to the Indian producer, but the practicability of the remedy which he declares the Indian Government has in its hands for overcoming the loss which it now sustains by a depreciated currency is, to say the least, questionable if not impossible; and that is, that if the worst comes to the worst, the Government of India might revert to the ancient method of taking a proportion of the produce of the land as rent, and send that produce to Europe for sale, and thus place themselves in funds for discharging their gold obligations without requiring a single rupee; and still further, that it is equally competent for the Government to stop the sale of their council bills, to buy Indian produce with the rupees deposited in the Indian treasuries, and, in order to discharge their gold obligations in London, send that produce to Europe for sale.

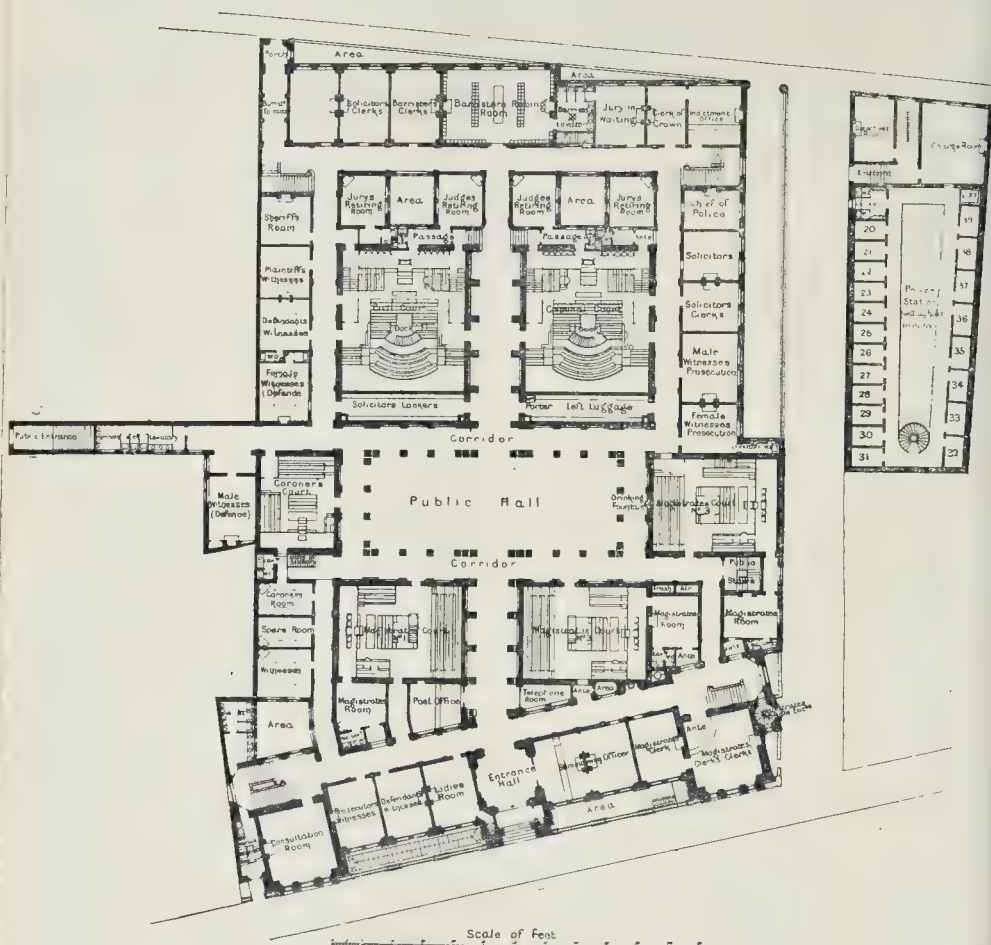
No one with the least practical acquaintance with what the collection of rent in kind means in the present day, let alone the incongruity involved in a Government assuming the functions of the merchant, would have hazarded such an assertion. But he is more correct when he observes that a great deal of the present depression of British trade might be remedied by multiplying the means of communication in India, so as to give those places which are now shut out from the ports easy and cheap access to them, though his recommendations lean too exclusively to railways. The instance he quotes of the coal-fields, virgin forests, and wheat-producing plains of the Central Provinces is just one where it is by no means clear that a railway would be the only or the preferable means of communication, or whether part of the large sums which must be expended on its construction would not be more profitably laid out and go further in improving the already partially available navigation by the river Godavary to the coast. There are, of course, many localities where no navigable lines are possible and where the railway is a necessity, and the sooner such railways are made the better, especially where, as is stated, there are actually no means of carrying off the surplus produce to the markets of the world. If, with the present restricted access to the ports, the trade of India has increased to the extent indicated by Mr. Birkmyre, so that the total tonnage required for its foreign trade increased by 21 million tons in ten years, the progress that will be made when India is as well served with communication as England is beyond calculation. His final suggestion is certainly in the right direction, that with improved and higher cultivation the present produce of the soil may be increased and the Indian average of eleven bushels of wheat to the acre might be doubled, if not raised to at least that of England, which approximates twenty-seven to thirty bushels. We quite endorse the concluding remarks of Mr. Birkmyre's address that India is a very misunderstood country, and that the future of England is much more connected with India than with many of the questions nearer home which are now absorbing public attention.

Portsmouth.—New buildings for the Prudential Insurance Company have just been commenced at Portsmouth. Mr. A. Waterhouse, R.A., is the architect, and Messrs. Stephens, Bastow, & Co., of Bristol and London, are the contractors.

Appointment of Surveyor.—Mr. A. P. J. Cotterell, C.E., of Bristol, has been appointed Surveyor to the Horfield Local Board, near Bristol.

* "Hawarden Castle," a name well known as that of the residence of the late Premier, is a modern castellated mansion, dating from 1752, and is on lower ground than the castle proper.

* The Revival of Trade by the Development of India. By William Birkmyre, of Calcutta and Port Glasgow. Published by the City of Glasgow Chamber of Commerce.



Birmingham Law Courts, Second Competition.—Plan of Design by Messrs. Bateman & Hunt.

Illustrations.

WINDOW IN THE NEW CITY OF LONDON SCHOOLS.

THIS illustration shows one of two east windows erected in the new City of London Schools, Thames Embankment. They are the gift of Miss E. Alston, sister of the Rev. Herbert Alston, Rector of Little Thurlow, Newmarket. The one we illustrate is dedicated to the memory of G. F. W. Mortimer, D.D., formerly head master of these schools. The windows contain representative figures of English and Greek poets. Messrs. Heaton, Butler, & Bayne, of Garrick-street, London, designed and executed the work.

BIRMINGHAM LAW COURTS: SECOND COMPETITION.

DESIGN BY MESSRS. BATEMAN AND HUNT.

We give the perspective view of this design, which was placed second by the assessor. The original drawing is in rather delicate pencil outline, which will not photograph very clearly; but the designers, to whom we referred the matter, expressed themselves satisfied with the representation of their drawing, and accord-

ingly we give it, as it is only a choice between this and not illustrating it at all, and there is a good deal that is very graceful in the treatment of the design. The treatment of the central hall in the plan, which we append, has also a character of its own, and would have been effective in execution.

PLACES VISITED ON THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION EXCURSION.

We give some small views, reproduced from photographs, of Margam Abbey and Oystermouth Castle, which were among the places of interest visited by the Cambrian Archæological Association during their annual excursion this week. Some account of Margam Abbey will be found in the portion of the report of the excursion given in another column, and which will be continued.

A WAREHOUSE FAÇADE.

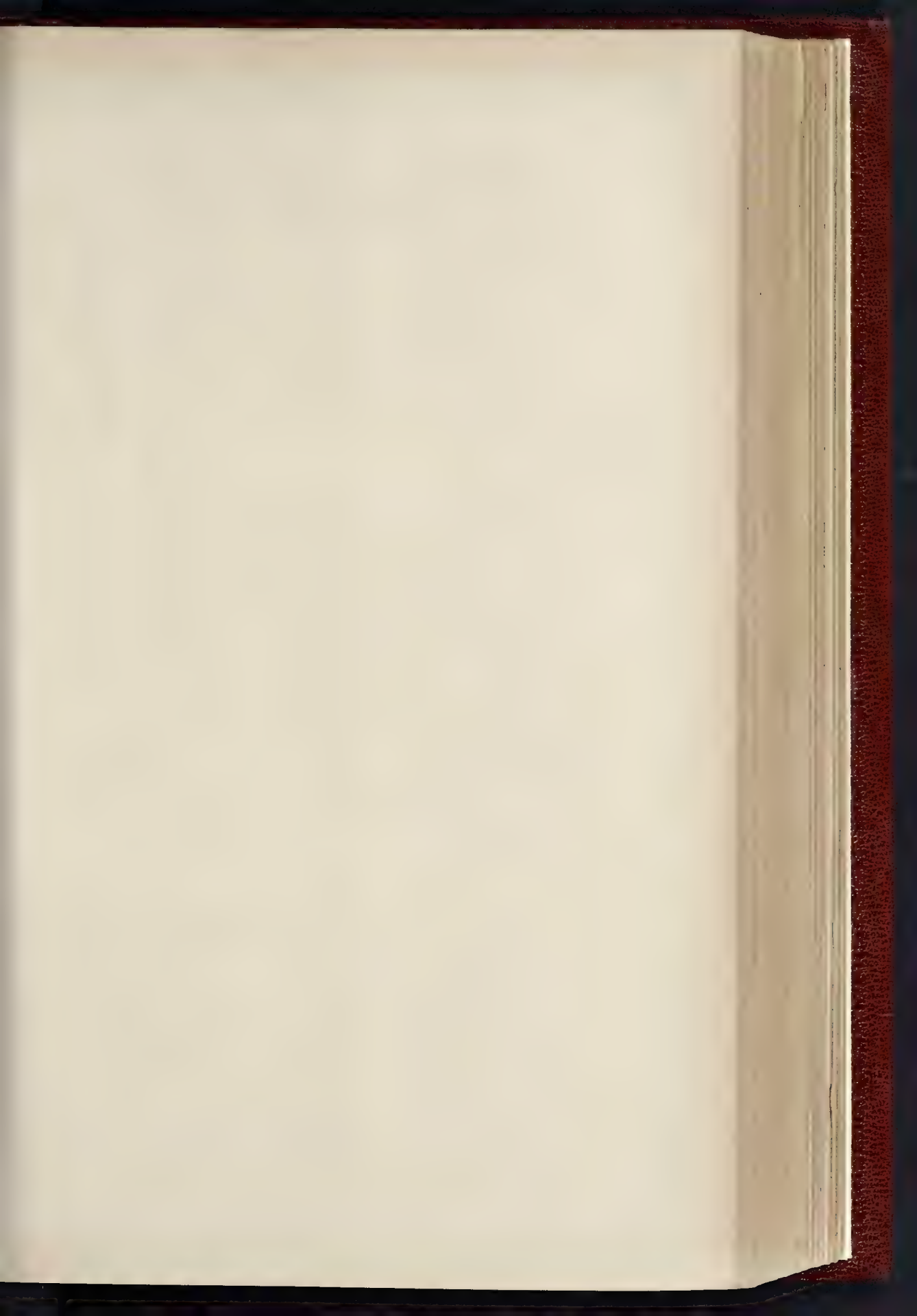
This design, by Mr. W. Stirling, was hung in the architectural room at the Royal Academy Exhibition of this year. The original is a coloured elevation, designed, as its author says, "as a study of what is probably the typical building of our times." The materials indicated

are stone and red brick, and what decoration is not in sculpture is intended to be in mosaic. The design, which we commented on in our review of the Academy architectural drawings, shows a considerable amount of spirit and originality.

SKETCHES ON THE ARCHITECTURAL ASSOCIATION EXCURSION.

We give sketches of three of the places visited by the Architectural Association in their recent excursion in Kent: Malling Abbey and Birling Church, the tower of the latter of which was referred to in our report as one of the most picturesque objects which the party came across in their route; and the courtyard of Ightham Mote House, described in the first portion of the report, pp. 264-5.

Obituary.—We regret to hear of the death of Mr. Matthew T. Shaw (senior partner in the firm of Matt. T. Shaw & Co.), which took place suddenly on the 14th instant. The surviving partners of the firm (Messrs. Harry T. Shaw & C. Chittick) have issued a circular announcing that the business will be continued by them in all respects as hitherto.



One of a series of windows
designed and
The new City -
by Messrs Henson Butler



illustrative of Art & Science
executed for
of London Schools
and Baynes London.

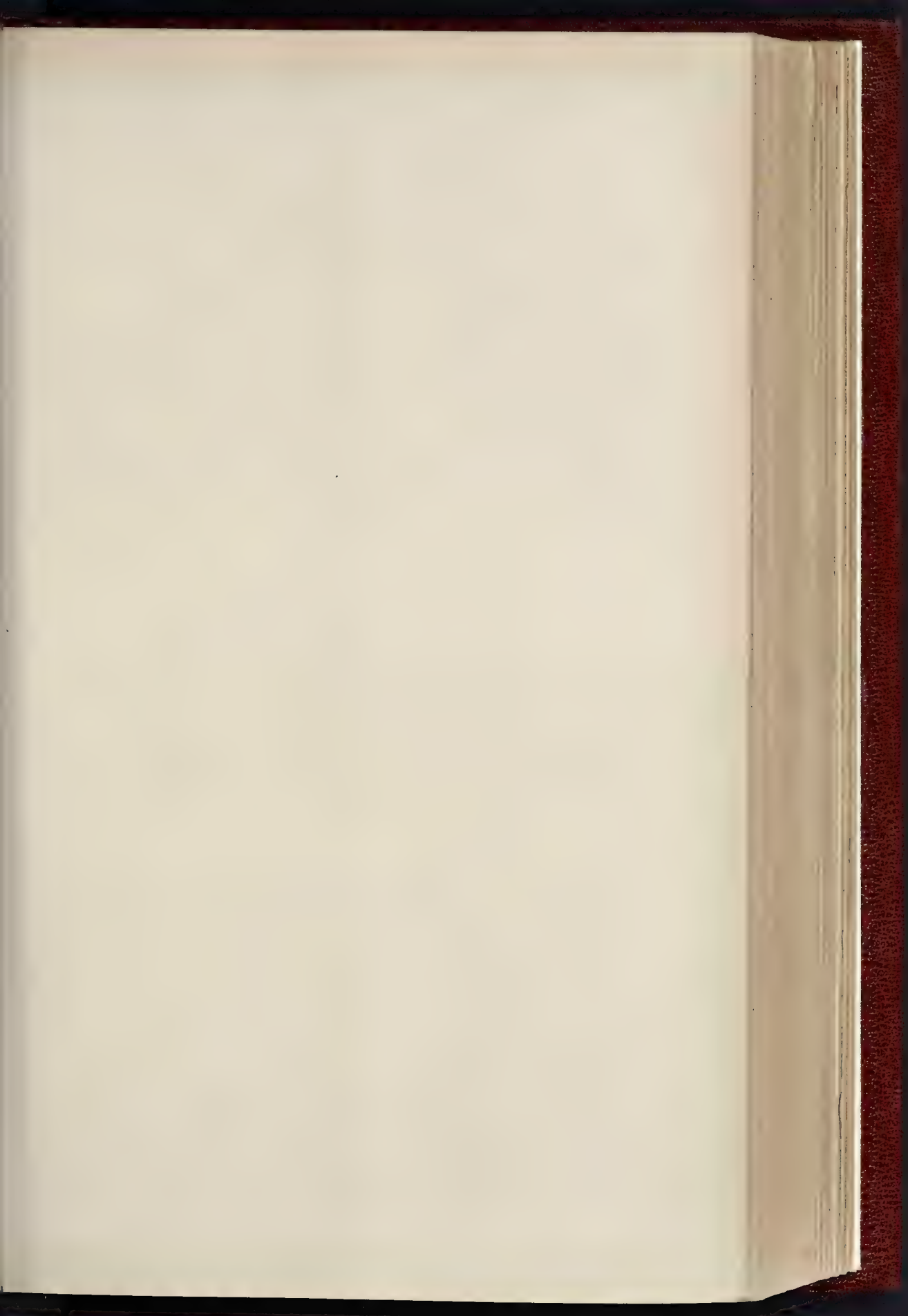




Seneca



Virgilius





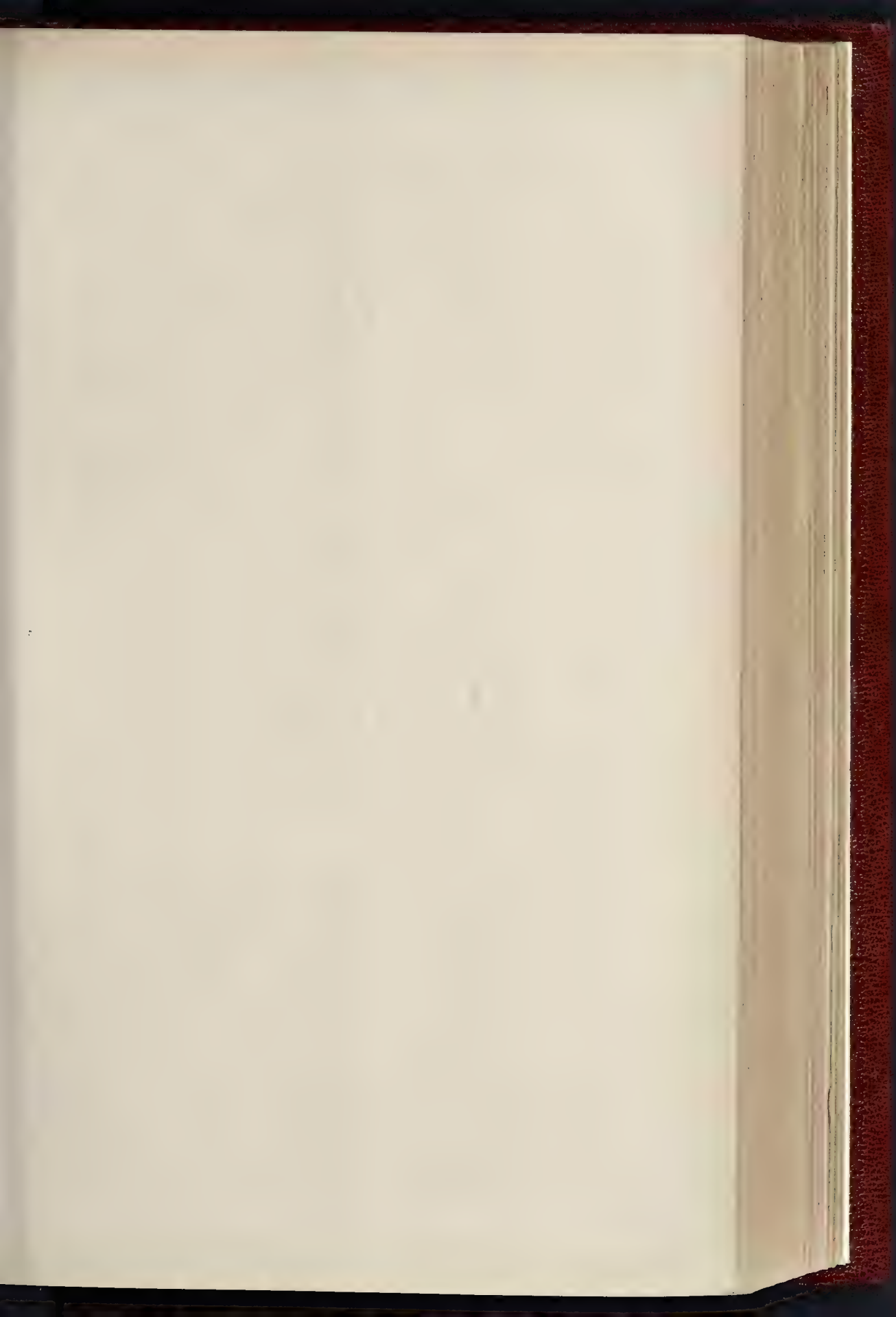
OYSTERMOUTH CASTLE, INTERIOR.



OYSTERMOUTH CASTLE, EXTERIOR.



MARGAM ABBEY.



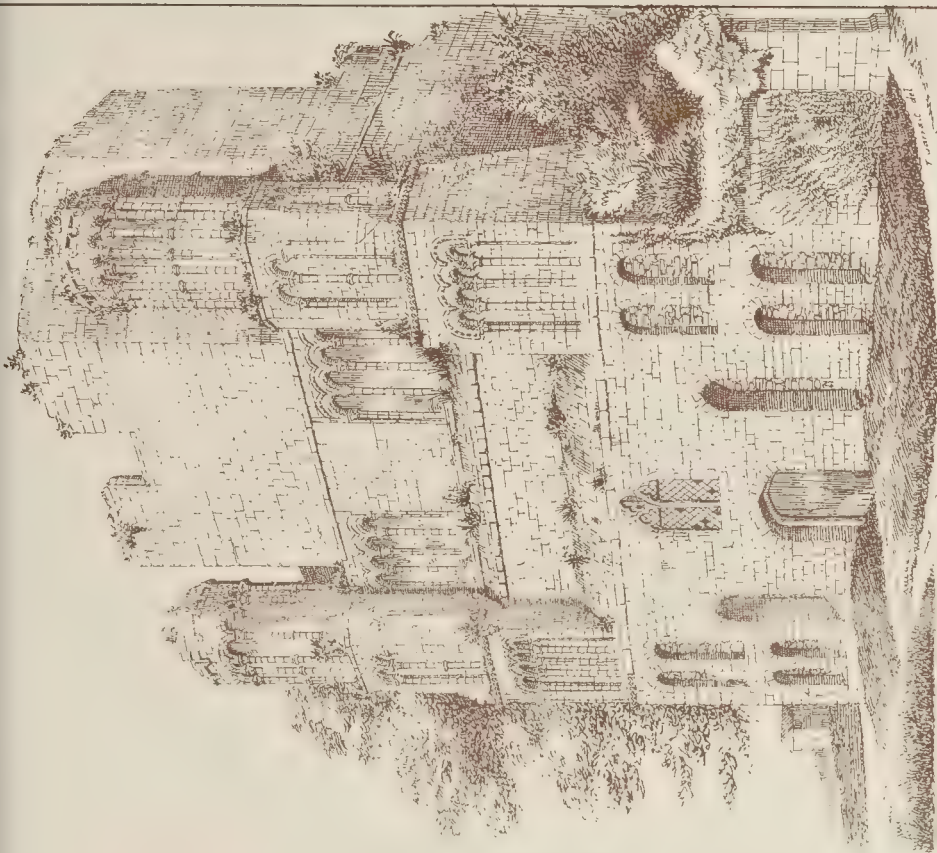
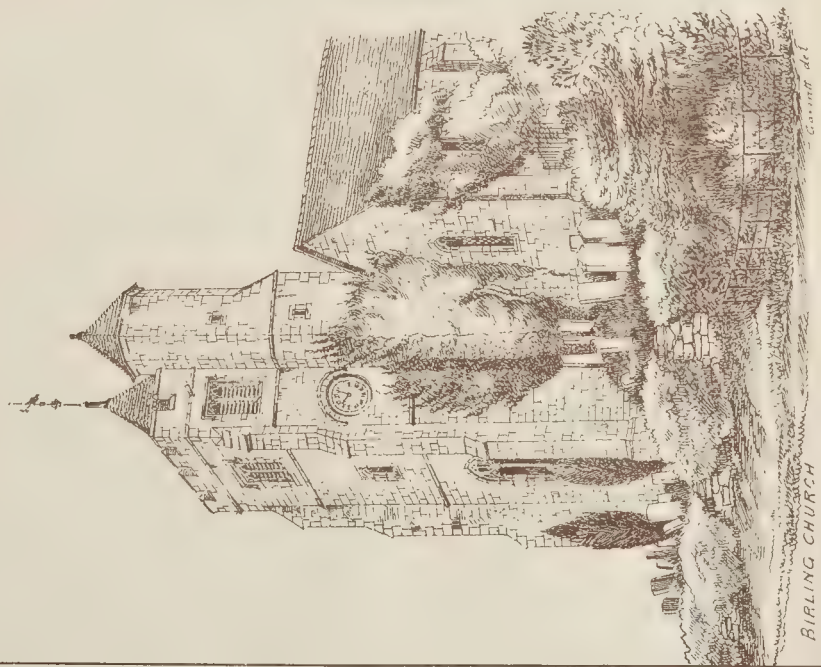
THE BUILDER, AUGUST 29, 1886

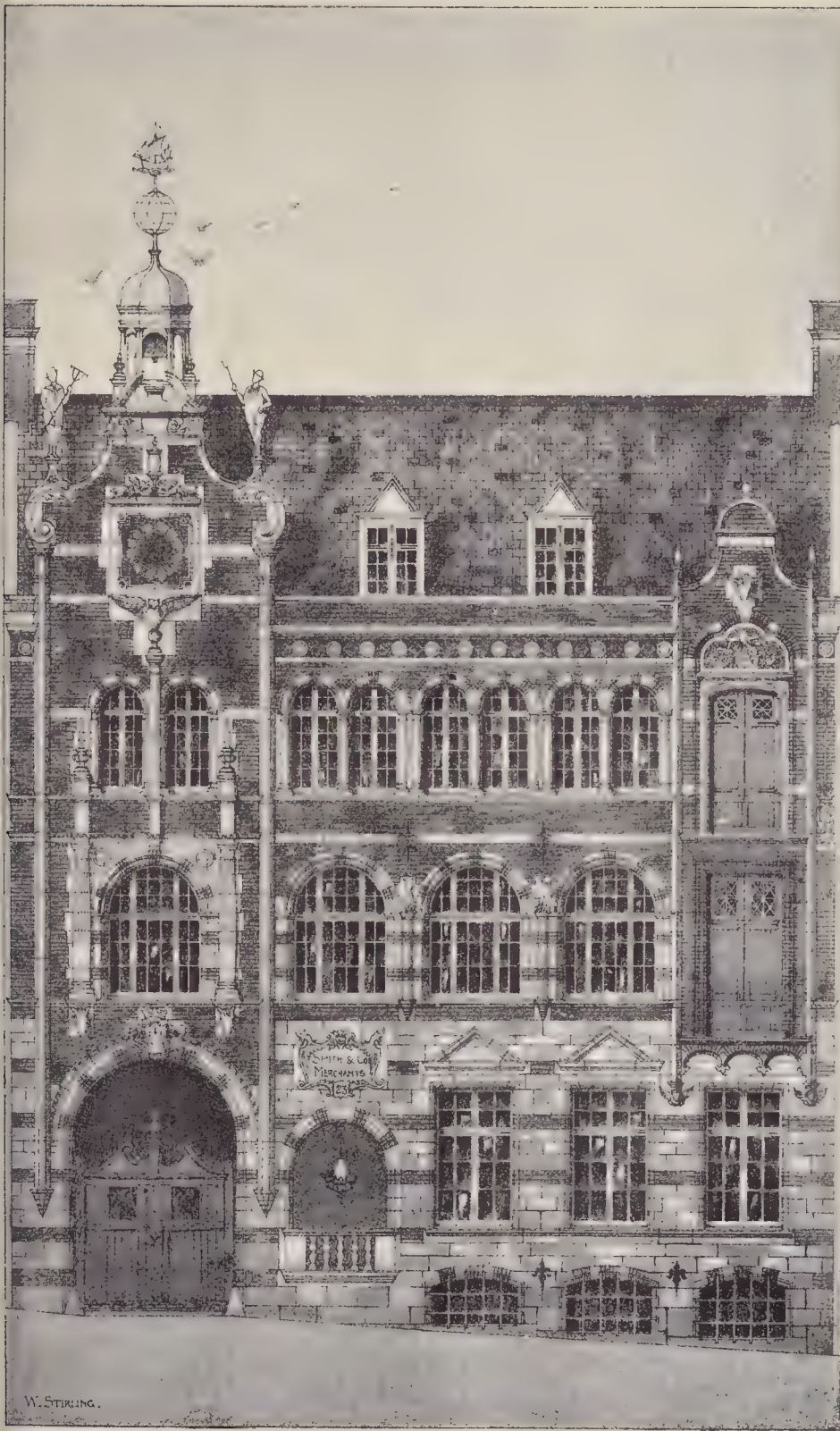
SKETCHES ON THE
ARCHITECTURAL ASSOCIATION EXCURSION.



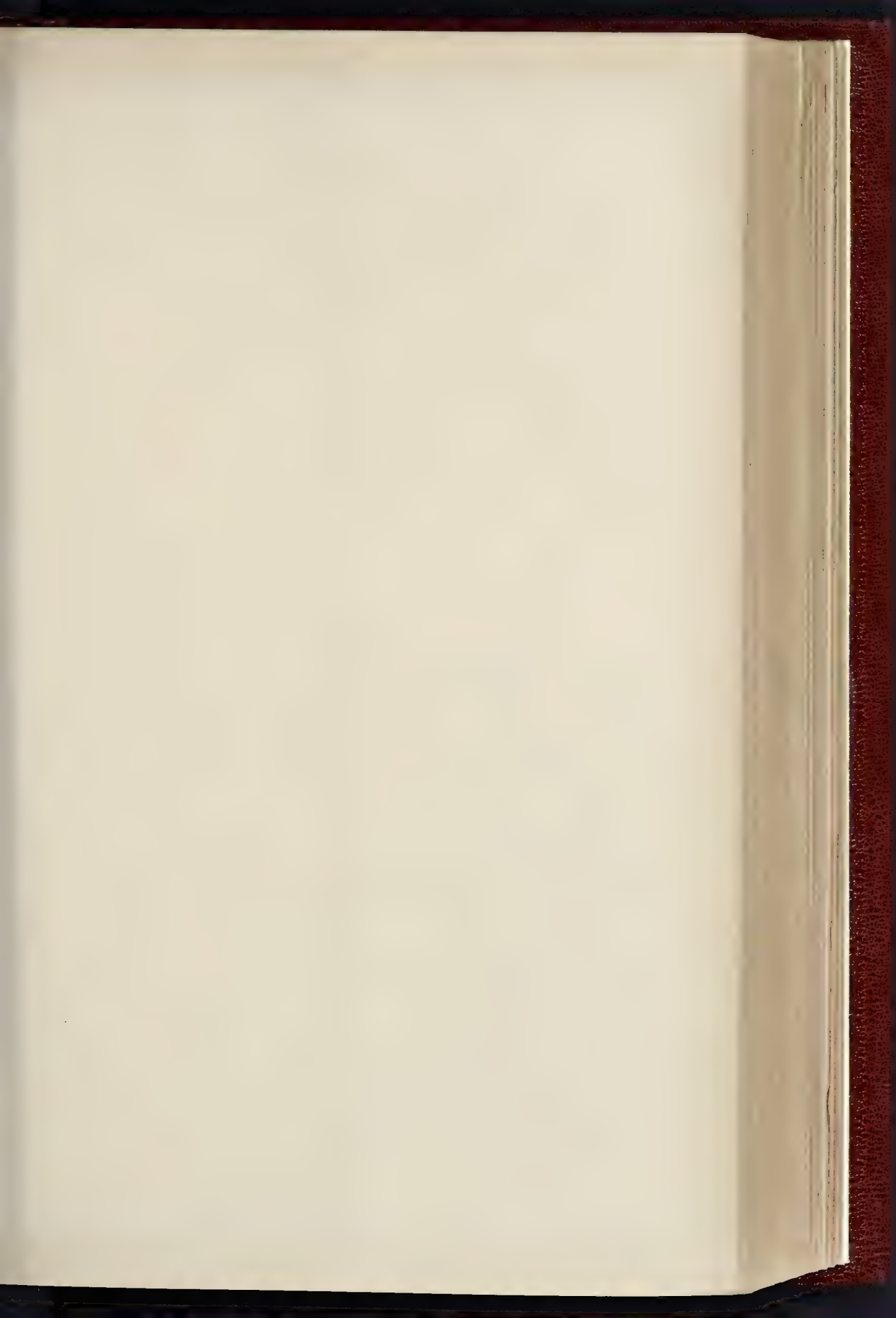
IGHTHAM MOTE HOUSE, KENT. NORTHWEST ANGLE OF QUADRANGLE.

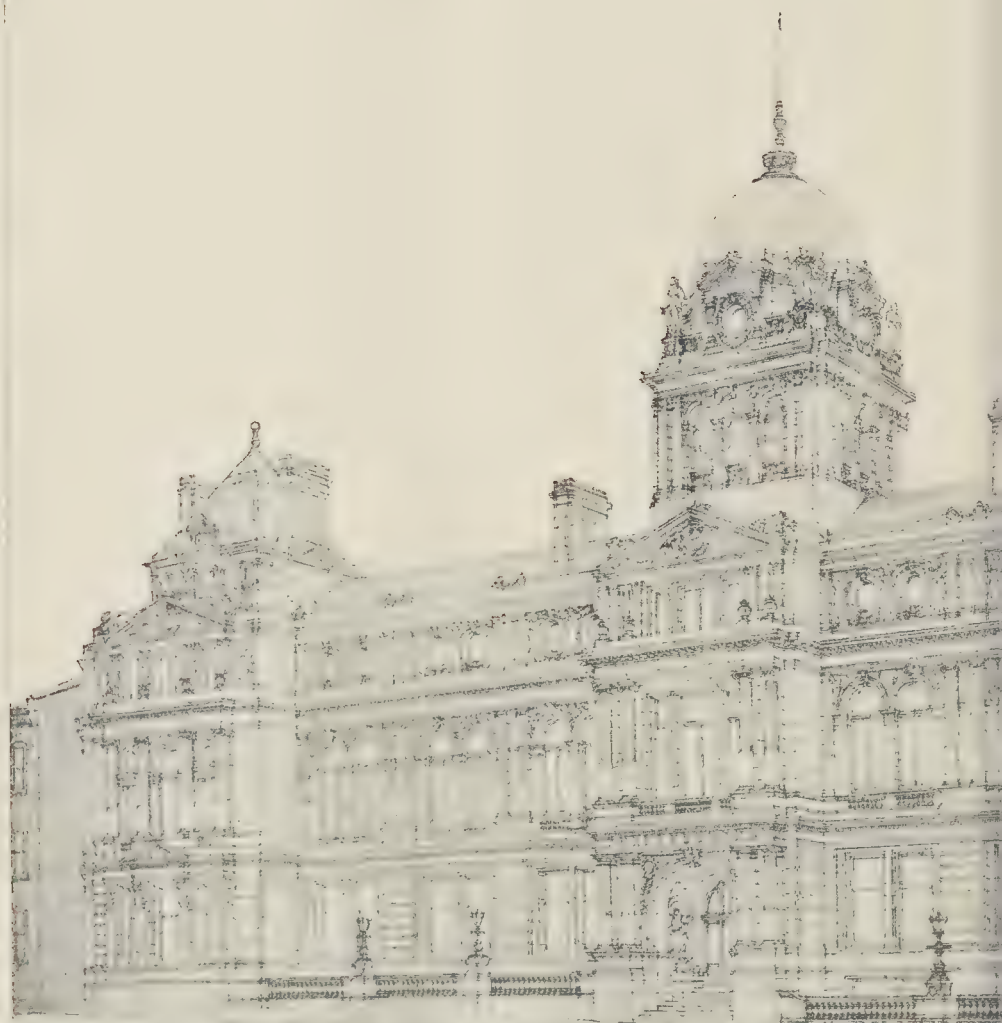
SKETCHES ON THE
ARCHITECTURAL ASSOCIATION EXCURSION.





A WAREHOUSE FACADE.—DESIGNED BY MR. W. STIRLING.



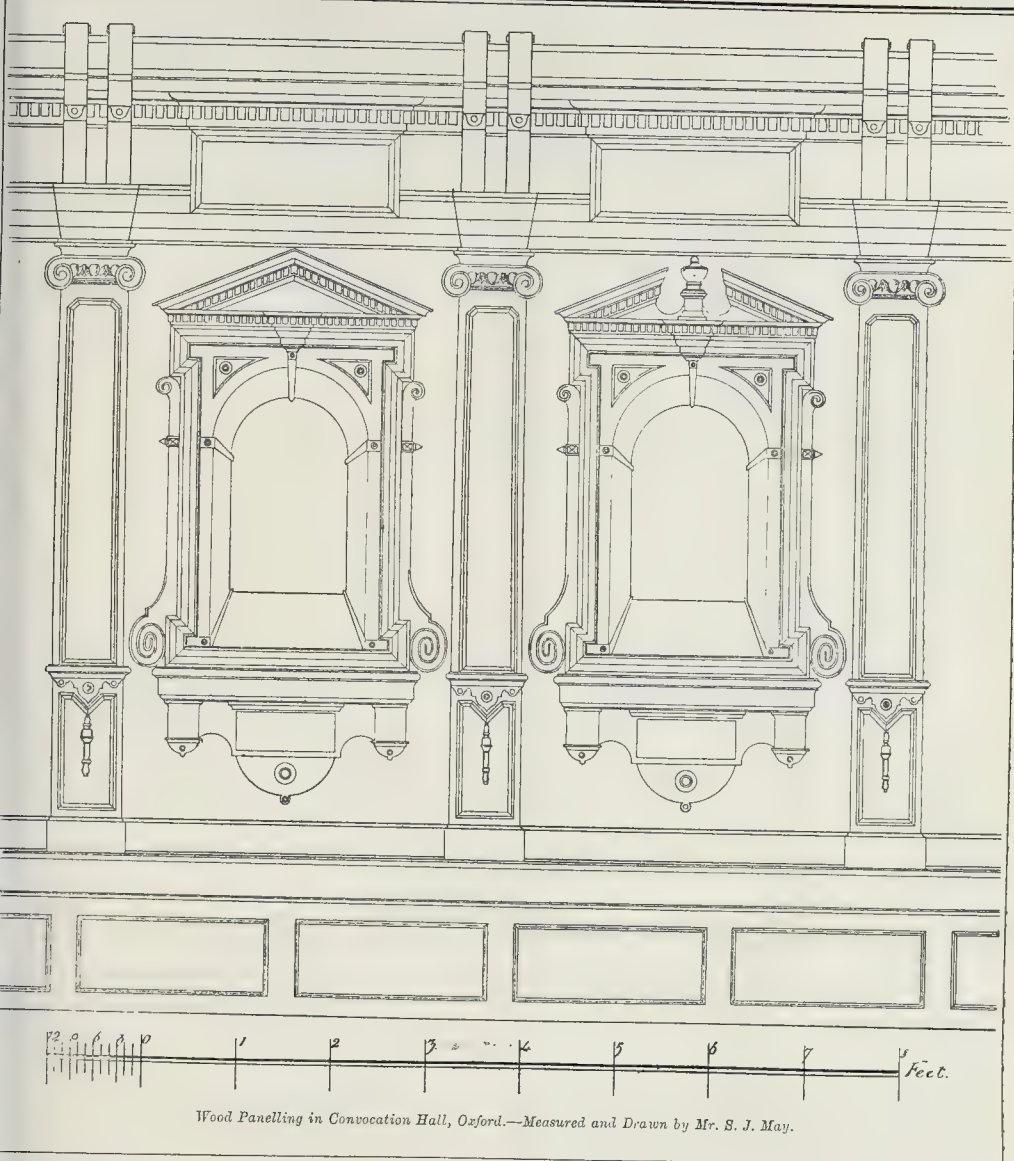


BIRMINGHAM LAW COURTS, (SECOND



ITION.)—DESIGN BY MESSRS. BATEMAN & HUNT.

*INA PHOTO PRAGUE & CO 22, MARTINS LANE CANNON ST LONDON E C



Wood Panelling in Convocation Hall, Oxford.—Measured and Drawn by Mr. S. J. May.

PANELLING, CONVOCATION HALL, OXFORD.

THE Convocation Hall forms a basement story to that part of the Bodleian Library which was built in 1640.

The Hall is used on all occasions when it is necessary that the votes of members of Convocation should be registered, such as in the voting of statutes, and for conferring degrees on those who have satisfied the examiners the public examination.

The oak wall panelling is very interesting, and is in character with a very singular perspective effect in the panels.

S. J. MAY.

New Reredos, Tilstock, Salop.—An addition has been made to the church here by the erection of a reredos, which has been executed by Messrs. Jones & Willis, of Birmingham and London. The reredos is of oak, and contains five zinc decorated panels, enriched with designs and sacred monograms.

NOTES AT THE LIVERPOOL EXHIBITION.

THE general aspect of this Exhibition, now that it is completely arranged and catalogued, is so strikingly different from that presented at the time of the notice in our issue of the 22nd of May last, that some further notes may prove interesting to our readers. Passing over the strictly naval portion of the display, which we have already sufficiently described, merely noting that it has been greatly increased, both in the number and interest of its several parts, and more especially by the introduction of many curious and picturesque models of ancient, and in some instances one is tempted to say prehistoric,—ships and boats, sent by the Swedish Government, we will confine our observations to those sections which more immediately relate to the pursuits of the architect, engineer, operative, and artist.

The walls of the entrance-hall and grand staircase are covered with a series of six painted tile panels by Messrs. Doulton & Co. representing incidents in the lives of "industrial heroes." The subjects are:—"Faraday in his

Laboratory," "Daguerre and Niepce conducting some Experiments in Photography," "Benjamin Franklin working at the Printing Press," "Arkwright at his Spinning Jenny," and "Robert Peel making his first Experiments in Calico Printing," and "Caxton at his Press." Besides these there are four painted tile panels representing processes of pottery-manufacture, viz., (1) "Working the Press in Tile-making," (2) "Throwing on the Wheel," (3) "Lathing," and (4) "Kiln-setting." These panels form very effective pieces of wall-decoration, but some of them are spoilt by the prominence of the joints of the tiles. This is especially the case in the one containing the figure of Faraday, whose black coat shows up the joints of the tiles with disagreeable prominence. Messrs. Doulton's large "trophy" of faience and stoneware in the centre of the main avenue, although built-up of and containing much that has been seen elsewhere, may, with its four supplementary stands or alcoves at the angles, be commended to visitors as affording a varied representation of the capabilities and wide application of pottery in the present day, whether for utilitarian, ornamental, or archi-

tectural purposes. Part of the wall-space on the exterior of the central trophy is covered with other painted tile panels of the character before described. Two of these panels represent scenes on the Mersey especially appropriate to the main subject illustrated by the "Shippers" Exhibition. One is entitled "Liverpool,—Past: 1838," and represents the paddle-steamer *Royal William*; the other is entitled "Liverpool,—Present: 1886," and represents the large screw-steamer *Umbria*, belonging to the Cunard line. The contrast afforded by these two steamers is strikingly indicative of the progress which has been made in steam navigation within the last fifty years. The only point of resemblance between the two vessels is that each has two funnels; in all other respects they are as dissimilar as the primitive railway locomotive, the "Rocket," and Mr. Webb's latest three-cylinder express engine, which may both be seen in a part of the Exhibition not far off. Two other tile panels on this central trophy belong to the "industrial heroes" series. One represents George Stephenson at a colliery forge, discussing with a fellow workman the model of a locomotive; the companion panel represents James Watt and Matthew Boulton discussing the model of the condensing engine. Amongst the things exhibited in and on the trophy is Messrs Doulton's patent "Burslem" stained glass, which we do not remember to have seen before. Upon coloured "cathedral" glass of any required tint, ornament of varied design seems to be painted and burned in, giving a rich decorative effect where the design of the ornament is suitable. The most effective pieces exhibited are the two panes nearest the main entrance. The other panes, having floral designs, are too realistic in character. This seems to be a process of window decoration from which much may be expected, given suitable designs. One of the angle-spaces or stands before referred to is devoted to the exhibition of architectural terra-cotta. These exhibits include a new doorway, designed by Mr. T. O. Jackson, for Messrs. Powell's glassworks at Whitefriars, which, however, as actually erected, has a sculptured frieze interposed between the lintel and the pediment, illustrative of processes in glass-making. This frieze, which is absent from the Liverpool replicas of the doorway, adds much to the effectiveness of the composition as a whole. Another exhibit in this department is a well-executed traceried window in terra-cotta for St. Andrew's Church, Streatham, late in style, and designed by Messrs. Ernest George and Peto. The three remaining angle pavilions belonging to Messrs. Doulton's central exhibit are thus occupied,—one is devoted to sanitary house fittings of all kinds in action; another contains an assortment of sanitary stoneware for drainage purposes, while the fourth is appropriated to the exhibition of stoneware and other pottery for domestic and manufacturing purposes.

We pass on to the annexe containing the machinery in motion, which in May was in a perfect state of confusion, but is now in full operation. This is a very important section of the exhibition, and occupies three large galleries on the south-east wing of the building, measuring in the aggregate 270 ft. by 200 ft. more.

The great bulk of the machinery is driven by a very fine horizontal compound engine, by Galloway & Sons, Manchester, fed by three large boilers, representing an aggregate power of 1,000 horse. In this section one of the most noticeable exhibits (Stand 855) is a large improved horizontal fired engine, by Robey & Co., of Lincoln, designed especially for countries where transport is difficult, and nearly the whole of which can be taken into small pieces, weighing not more than about 120 lb. each, so as to enable the parts to be carried on a mule's back.

Mr. John Anderson, of Newcastle-upon-Tyne, saw-mill engineer, has (Stand 788) an automatic dovetailing and woodworking machine in motion, applicable, it is said, to both heavy and light work, in mortising, tenoning, trenching, dovetailing, &c.

Messrs. Sagar & Co. (Stand 794), of Halifax, exhibit planing, band-saw, and other woodworking machines. These are all solidly and well made, and constitute a very serviceable workshop plant for a builder or joiner.

Mr. Edward Shaw (Stand 806), of Bristol, exhibits a sack hoist applying Professor Hele Shaw's patent sphere and roller mechanism. It is stated that this hoist is self-sustaining, that it can be worked at varying speeds, that it is easily controllable, and cannot over-wind.

At Stand 811 Messrs. T. Robinson & Son, of Rochdale, exhibit some excellent wood-working machinery, including mortising and panel-planing machines, which possess some good points. A combined hand and power feed planing-machine shown at this stand is very compact and well finished, as are all the other machines here exhibited. Armstrong's patent dovetailing machine, shown by this firm, is an admirable and ingenious piece of mechanism. The "Universal" wood-worker, also shown by these exhibitors, combines means for mortising, boring, tenoning, sawing, and planing in one compact piece of machinery, which can be worked at by three men at once engaged on different operations.

We will continue these notes in our next.

CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

The forty-first congress of the Cambrian Archaeological Association opened in Swansea, on Monday, August 23rd, at 8:30 p.m., the theatre of the Royal Institution of South Wales having been filled by the members and their friends. The Ex-President of the Association, the Right Hon. Lord Tredegar, took the chair, and Mr. J. T. Rees, Mayor of Swansea, in a short speech, welcomed the Association to the ancient borough. The chairman most heartily thanked his worship and the other Swansea men for their kind reception of the Society that evening. As regarded himself, he said that last year when he had the pleasure of welcoming the Cambrians in his own country he had prepared a very pretty little speech to conclude the proceedings, but he was then informed that it would not be required until he had completed his year of office, and now that the right time was come he regretted to say that the greater part of his speech had evaporated, so he would at once make way for the President-Elect, Mr. J. T. D. Llewelyn.

The President having taken the chair, proceeded to deliver his address.—In the course of his remarks he said,—I thank the members of the Cambrian Archaeological Association for the high honour they have done me in appointing me to the honourable position of President. A large and industrious local committee has been formed with Mr. Walter Lewis, C.E., for its active secretary, and I trust that, if favoured by fair weather, we may be able to carry out satisfactorily to your minds the programme with copies of which you will have already been supplied. The antiquities of Swansea have already received your attention at a previous meeting in the year 1861; but, for two reasons, another meeting on an already reconnoitred locality may be held with advantage. In the first place, a new generation will have sprung up after an interval of twenty-five years, to whom this meeting will come fresh and full of interest; and secondly, the information acquired by those who were here in 1861 will not only bear refreshing, but very possibly be the germ from which more matured opinions and views will have been developed, and if such find expression in the debates and transactions of *Archæologia Cambrensis*, it will be to the advantage and benefit of the history which it is our special point and object to clear up and emphasise for those who come after us. Truly, it is for this that the Cambrian Archaeological Association exists. Names and legends may, if taken alone, be of little real value, but they are suggestive to many. I will record a legend of my own place given me by my father, as received by him from the old people of the neighbourhood. Penllergar (Pen-ll'e'r gaer) is the chief camp. Traedgar (Troed-y-gaer) is the foot of the camp (situate about three-quarters of a mile to the north). This would indicate that these camps were facing southwards. The names are Welsh. One mile and a half to the south is Cadley, or the battle-field. A well near here is called Fynon Circonan, or Colcona, and the legend is that the Western tribes defeated at Cadley, after the death of their leader, who died from his wounds while drinking at the well, which still bears his name, fled in confusion towards the nearest fords of the Llŵchwr river, which now separates Carmarthenshire from Carmarthenshire, and were routed a second time on the plains of Carn Goch, or the red Carn, which took its name from the bloodshed which occurred here. Another locality in the immediate vicinity is Llŵyn Cadwgan, and

as we know that Cadwgan was king of Gŵyr or Gower, Cntgueli or Kidwelly, and Cantref Bichan, about A.D. 1066, it may be that he was implicated in the Battle of Cadley; and if so, a date would be obtained for the suggestive names above mentioned. Many years ago I was present at, and superintended the opening of the principal Carn on Carn Goch. It consisted of a mound of earth, 60 ft. or 70 ft. across, and 4 ft. or 5 ft. deep, so far as I can remember now. This had once been covered by a heap of stones, which had been removed for making roads before I can remember. On opening the earthen Carn a ring of stones was found, the centre of which was not concentric with the centre of the Carn itself. A number of cists were found, consisting of flat stones, charcoal, and cremated bones. Two flint instruments were found, one a rude knife and one an equally rude spear-head. Nine sepulchral urns or vases of rude pottery were found, ornamented by the impression on the undried clay of twisted thongs or rushes. One of these sepulchral urns then found I now present to the Museum here, while others were deposited with their history in the British Museum, in London. I merely give the story as exactly as possible as I received it from my father, and I daresay there are gentlemen here who will take a pleasure in shredding it into a score of fragments. I cannot conclude without a reference to the valuable addition to the records of the County of Glamorgan, in the publications of Mr. George T. Clark, of Talygarn, his valuable history "The Land of Morgan," and express a hope he may live long to give us a continuation of it up to more recent times.

On Tuesday morning, the Members and Associates, having assembled at the Royal Institution, started in carriages, about 9:30, for Margam Abbey, the seat of Mr. C. R. M. Talbot. They drove seven dreary miles along a road constructed out of dust and ashes, and lined with colliers' cottages. Having at length passed through the collier colony, they reached the pretty village of Bagland, with its handsome new church, and in due time came in sight of the woods of Margam Park. This differs somewhat from one's notion of what a park ought to be; it is a steep hill-side, covered with boulder stones and gnarled oak trees.

On reaching Margam Abbey, the party were welcomed by Mr. Llewelyn, in the absence of the proprietor, Mr. Talbot. The Association were first taken to see the parish church, which is formed out of the nave of the ancient abbey. How much of this is original work, and how much comparatively modern restoration, was discussed. It would seem that the lower portion of the west end is certainly original Norman work, and the nave arches are seemingly the work of the original founders,—the rest seems modern; but the old abbey church when in its glory was the growth of ages, for we can trace in its ruins Late Norman, Early English, and Decorated work. In a chapel are several monuments to the Mansel family. Among others is one in which a Lady Elizabeth Mansel, daughter of Henry, Lord Mansel, rests her feet on the paternal crest, a griffin's head. This seems somewhat unusual, for we have always been taught that ladies were not entitled to bear crests.

The members having assembled within the walls of the ruined chapter-house (see illustration in this number), an exhaustive paper was read by Mr. S. C. Gamwell on the history of the ancient Cistercian foundation. According to Dugdale, Robert, Earl of Gloucester, Henry Beauchamp's bastard son, laid the foundation of the building about 1147. The earl had married a daughter of Fitzhamon, conqueror of Glamorgan, and succeeded his father-in-law in the lordship. The edifice seems to have been rapidly completed; in 1181 Giraldo Cambrensis alludes to it as "The noble Cistercian monastery of Margam." At the dissolution of religious houses under Henry VIII the abbey revenue was assessed at 181l. 7s. 4d. and the domain purchased by Sir Rice Mansel of Oxwich. For several generations the old monastic building was the chief seat of this ancient family. During his "Progress" in 1684, the Duke of Beaufort, Lord President of Wales, was welcomed at Margam with the greatest loyalty, and conducted "to the summer banqueting house, built after the Italian, where regular similes, excellent sculpture, delicate graving, and an infinite of good Dutch and other painting, make

lustre not to be imagined; its pavements are of marble, black, red, mixed, and white, chiefly the product of quarries belonging to the owner in his lands in the county; nothing was spared that the noble place could afford of diversion. Here his Grace was entertained with the pastime of seeing a brace of bucks run down by three footmen, which were afterwards led into Margam antecourt alive, and there judged fit for the table, before the huntsman gave the fatal stroke with his semiter." We trust that the bucks were the victims of this pastime, but for all that appears it may have been the footmen; at all events, whether it was the bucks or the footmen who furnished the feast, "many came, eat, and drank, as their appetites led them." The male line of Mansels of Margam became extinct in 1750, when the property passed by marriage to the Talbots, in whose possession it still remains. The old home of the Cistercians was pulled down about 1780. After luncheon, which was served in the orangery, and a glance at the pictures in the modern mansion, the party retraced their steps to the sister abbey. Down in the marsh land, among unlovely surroundings, lie the remains of Nadd, or Neath Abbey; but in the days of its pride, we are told, the hills, which are now bare and brown (all vegetation having been destroyed by the vapour from the copper-works) were clad to their summits with wood, the stream abounded with fish, and the marsh-land with game of all sorts; these have now been replaced by colliery works. According to Leland, Neath was the finest abbey in all Wales. It was founded by one De Grauvill, a knight who followed Fitz Hamon's fortunes, about 1129. It is recorded that Lelys was his architect—"a man greatly cunning in building;" he also designed Margam. Edward II., of unlucky memory, took sanctuary in this holy house. Little, however, remains of his date. The proprietor, Lord Dynevor, had kindly laid bare some flooring near the high altar for the benefit of the Association. The domestic buildings of the monastery seem to have been reconstructed after the Dissolution, and now appear in the guise of ruined Tudor mansion. The members reached Swansea at 8.30, and, after a hurried dinner, hastened to the Theatre for their evening meeting. We will resume our notes of the meeting in our next.

FOG PONDS.

MANY of the archaic methods which met the requirements of ruder ages have, from their simplicity, efficiency, and economy, continued in use amidst the improved conveniences of modern science. Dependent as were the men of other days upon the phenomena of nature more directly than in our times, they found many ways of increasing the benefits thereby obtained, which are still in use and likely to be so until the end of time.

Water supply for flocks pastured on wide chalk downs would appear a peculiar difficulty; far from streams, high above water-bearing strata, too remote from any publicly-organised system; nevertheless, the fog-pond has supplied the sheep farmers of many a dry down with necessary water.

Gilbert White, writing in 1776, remarks,—"To a thinking mind few phenomena are more strange than the state of little ponds on the summits of chalk-hills, many of which are never dry in the most trying droughts of summer. We have many such little round ponds in this district, and one in particular on our sheep-down, 300 ft. above my house, which though never above 3 ft. deep in the middle, and not more than 30 ft. in diameter, yet never is known to fail, though it affords drink for 300 or 400 sheep, and for at least twenty head of large cattle beside."

The simple operation of making a fog-pond, as noticed on the downs near Worthing in the summer of 1881, is as follows:—The selected spot, on the slope (in this case almost at the summit) of the downs is unturfed, the turf removed, and the chalk dug out to form a saucer-shaped depression, the surplus chalk being deposited on the lower side, forming an embankment. Water is then thrown on the bottom, and a horse, harnessed to a small implement having several wheels something like those of a clod-crusher, is walked round and round, thereby working the whole of the invert into a slurry. This operation is continued for

three days, the horse and wheels going their monotonous round deep in the white mud, which, when sufficiently worked, is dressed to an approved segmental shape and forms a retentive basin, not liable to crack, like a clay lining during dry weather.

The supply is, to some extent, assisted by storm water running down over the saturated turf, but its chief source is atmospheric moisture, which condenses in quantities marvellous to those who have not noticed the fact. The before-named naturalist observes:—"Hence we see that the air, when loaded with fogs and vapours, and even with copious dews, can alone advance a copious and never-failing resource."

The working of the chalky bottom was formerly done by the feet alone, of horses or men, and the whole process is still carried out in a traditional manner by the local peasantry of those districts where fog-ponds are used.

THE ARCHITECTURAL ASSOCIATION'S VISIT TO OXFORD.

THE Architectural Association on Saturday, the 21st inst., made a visit to Oxford. Leaving London by the nine a.m. train from Paddington, the party arrived at eleven a.m. at Oxford, and were met by Mr. E. G. Bruton. A member of the party sends the following notes of the excursion:—

"The first building visited was Merton College; here Mr. Bruton gave a short description of the general arrangement of the colleges. The earliest building erected was always the kitchen, the only record of the members of the college at this early date being the dinner bills. Merton was selected as the oldest type of college, the chapel, which was also the parish church of St. John, having been taken as the type of all the other chapels in Oxford. The plan consists of a choir, tower, and transepts: the nave never having been built, the choir forms the chapel, and the tower and transepts the ante-chapel. The core of the walls of the chapel is thirteenth-century, with fourteenth-century facing; the tower is pure thirteenth-century work, the transepts fourteenth-century. The chapel has been decorated by Mr. Pullan. The arrangement of an open gallery for the ringing-chamber has not been found a complete success. The door to the north transept has some splendid thirteenth-century iron work. The college was founded by Walter de Merton in Surrey, 1264, and removed to Oxford 1274. The buildings date from 1277. Mob Quod, the oldest part of the college, contains the library on one side. On account of its size, Anthony Wood said that the builder of this must have anticipated the introduction of printing, but it is probable that the original purpose of the building was for a dormitory, and the spaces occupied by the books were formerly cubicles. The muniment-room, which occupies another side of the Quod, has a singular stone roof with stone principals; and this building contained all the manuscripts till the library was adapted by Whiston in 1603, whose crest is plentifully displayed on the ceiling. The other quadrangle is dated 1660. The sacristy, now being restored by Mr. Jackson, is a fourteenth-century building with a doorway leading into the choir. The gardens include part of the city walls of the time of Henry III. The fields outside the walls, called Fishpond fields, were given to Christchurch by Lady Montacute. It is related that the Fellows of Merton, being anxious to cut a doorway through these walls, went to Woodstock, where Henry III. was staying, to obtain his sanction; but this request was so curiously couched in Latin that the King was unable to comprehend it, and he recommended the Fellows to return home and stay there till they made up their minds what they did want. The entrance gateway is vaulted, with the signs of the zodiac on the bosses of the groining.

From Merton the party proceeded down Logic-lane to the New Examination Schools, designed by Mr. Jackson, who met the members and conducted them over the building. The general plan of the building is a large entrance-hall with rooms on the ground-floor for vivæ voce examination ranged round a quadrangle, the fourth side of which is as yet unfinished. The angles of the building are formed into lobbies, with marble pillars supporting the floor, the design of which is all varied. The marbles used are Carrara for the plinths, breccia

and Cipolini for the shafts, and statuary for the capitals. Mr. Jackson explained that while adopting the English Renaissance he did not use the style of carving which was found in the old work. The staircase has a carved parapet of alabaster, selected so as to have as few veins as possible, the panels being inlaid with antique African marble of beautifully varied vein and colour, which Mr. Jackson had obtained from a mason's yard near the baths of Caracalla in Rome. The hand-rail and string-course are Rosso antico. The general effect of the staircase is extremely good; the walls are lined with Cipolini marble slabs, fixed with bronze clips. The two columns of this marble were the first specimens brought to England from the recently-discovered quarries. The rooms on the first floor are used principally for written examinations, and are I and T shaped. These forms were adopted as giving the Examiners, who have raised seats, a better control over the students than the ordinary parallelogram shape. The tables used by the students are light movable deal tables. The Examiners' desks are the old ones from the original schools. The largest desk was designed by Sir Christopher Wren, and besides these desks Mr. Jackson has rescued several interesting pieces of Jacobean woodwork from obscurity and decay and worked them in. The ceilings are boldly ornamented with moulded and modelled plaster, with wooden ornamental trusses. The stone used for the interior is Caen; the exterior, Clapham, which is a shelly oolite, which it is hoped will weather better than the local stone, of which so many deplorable specimens exist in Oxford.

The party after examining these interesting new buildings proceeded, under Mr. Jackson's guidance, to Trinity College (founded by Sir Thomas Pope, the Keeper of Queen Elizabeth, at Hatfield, in 1554. The present buildings date from 1618-20. They show how fondly Oxford clung to the Gothic style. A new block of buildings has just been finished containing lecture, reading, and living rooms from Mr. Jackson's designs. The chapel was designed by Dean Aldrich, probably assisted by Sir Christopher Wren. The interior is fitted with cedar, and decorated with carving by Grinling Gibbons. The monument to Sir Thomas Pope, a fine recumbent figure, occupies a curious cupboard with sash windows on the north side of the altar; a corresponding enclosure, also with sash windows with bevelled glass, being provided for the Warden's family. The garden quadrangle was designed by Sir Christopher Wren, who built the north side 1667, the south 1728, and never completed it. The entrance-gates, with massive stone piers, curved on plan on the garden side, form a very effective piece of garden architecture.

The next building visited was Wadham College. The interest in this building was pointed out in the fact that the original structure was completed and had never been added to. The College was founded in 1613, by Nicholas Wadham, and the buildings are of the same date, one curious feature being the chapel, which is very good Perpendicular Gothic, while all the other parts of the building are Early Renaissance. Mr. Jackson quoted from the old records some examples of prices for the various work. The tracery windows of the chapel cost 6l. each; the hall windows, 3l. 18s.; the statues in the niches over the entrance of the founder and his wife, 3l. each; gutter stones, 16d. per foot; Cornish, 2d. per foot; gurgyle stone, 4d.; tunnel stones for the chimneys, 14d.; the stained glass in the east window, the kilns for firing which were erected in the College grounds, 100l. The chapel, which was restored by Blore (who played sad havoc with the Jacobean stalls to convert them to his style of Gothic) is now undergoing some structural repairs under the direction of Mr. Jackson. The chapel has a splendid Jacobean screen and some interesting old glass. The hall, in which the party were entertained at luncheon by Mr. Jackson, has a fine oak roof and some interesting portraits. The college plate was also examined, amongst which was the sugar-box presented by Sir Christopher Wren, who was a Fellow of Wadham.

The party then proceeded to the Bodleian Library. Mr. Jackson gave a short description of the original foundation by Humphrey, Duke of Gloucester, 1426, and the buildings erected for the University schools, 1578. Sir Thomas Bodley restored Duke Humphrey's library in 1610, Thomas Holt, of York, being architect.

He also provided the funds for the third story on the quadrangle, which was commenced 1613, three days after his death. The two lower stories were used for schools, but the library grew, and gradually occupied all the room, and after a long discussion whether to move the library or the schools, the latter course was adopted, and the new examination buildings were the result. The tower, which contains the five orders, was, when examined by Mr. Jackson, found to be entirely of Roman cement, carefully modelled, the stonework having decayed; it was found the decay was so deep that it was necessary to renew the whole. The Hall has a stone vault, with curious drop pendentives, called Wolsey's lanterns. At the further end are the two rooms in which the degrees are conferred. Passing up into the library, some curious MSS. were shown by the librarian; and then Mr. Bruton conducted the members to the roof of the Radcliffe Library for a general view of the city.

The next college visited was All Souls', which was founded by Archbishop Chichele, 1438. The hall was built in 1720 from the design of Dr. Clark. New College, founded by William of Wickham, 1379, was next visited; the chapel was restored by Sir Gilbert Scott, who did away with the sham vaulting of Wyatt and substituted an open hammer-beam roof, which raised the roof above the level of the stone parapet. The reredos is fifteenth-century work.

The Norman church of St. Peter's-in-the-East was glanced at; the crypt has a good carved cushion capital. Magdalen College, founded by William of Waynflete, 1456, was next visited, and then Christchurch College, founded by Henry VIII., 1532, on Wolsey's Cardinal College, founded 1525. The vaulted staircase, designed by Smith in the seventeenth century, is particularly good work for the period. The hall, the largest hall in Oxford, and the kitchen, which is an exact cube of 40 ft., were visited. The Cathedral, built 1120-1180, is extremely interesting. The carving of the Norman work has a very foreign look, especially the rose-window in the east end, restored by Sir G. Scott. The Chapter-house, restored by Bodley, is beautiful thirteenth-century work. After leaving the Cathedral, the party proceeded to Keble College, built 1868-78, from Mr. Butterfield's design. This concluded the excursion, the programme of which had been carefully arranged to give a comprehensive idea of the architecture of the city, commencing with the earliest and finishing with the latest college. The day was one of great interest, and the result fully justified the committee in the new departure of making whole-day excursions.

SHADWELL HOSPITAL COMPETITION.

SIR.—It appears to be wrongly supposed that we were commissioned to adjudicate upon the whole of the designs sent in competition for additions to the above institution, and we therefore shall be glad to be allowed to state that our advice was only asked in reference to the four designs selected by the Managers, viz., "Sunshine," "Thought," "Simplex," and the one marked with a circle. We have not seen the remaining designs.

We gave it as our opinion, that the design bearing the motto, "Sunshine," was the best of the four, and the Managers appear to have acted upon this advice.

We have thought it better to obtain the Managers' concurrence to our sending you this correction. Hence the delay.

H. SAXON SNELL & SON.

No. 22, Southampton-buildings,
Chancery-lane, W.C.

August 25, 1886.

* * If, as we are assured, a circular was sent to the competitors, informing them that the advice of a professional adjudicator would be taken on their plans, while in fact the Managers have only submitted four out of the whole number to the assessor, the authors of the others have a right to ask for an explanation of this way of treating them.

Mosaic in St. Bridget's Church, Wavertree.—Messrs. Salvati & Co. have just completed a large copy in mosaic of Leonardo da Vinci's "Last Supper," on the chancel wall of St. Bridget's Church at Wavertree, near Liverpool.

CHARGING FOR CLERKS' OVERTIME.

SIR.—Perhaps you, or some of your readers, will kindly inform me whether the following transaction is according to the usual professional custom, as to me it seems very much like obtaining money under false pretences.

In a certain light and air case, a surveyor was engaged for the plaintiffs. One day he brought down two assistants to make a survey and drawings of the properties over which the dispute arose. When the surveyor's bill came in (it amounted to over 100l.) the following item was included,—“To clerks' extra time, 10l.” To this no objection was taken, as the two assistants had worked from 1 p.m. on Wednesday till 6 a.m. on Thursday, with only one hour's rest, and had done an immense amount of work in the time.

The bill was paid, including this 10l. item, but it turns out that the surveyor pocketed this money paid for clerks' extra time, and did not pay one farthing for the overtime which he had made a special item of. It must be understood that besides the surveyor's professional fee for acting in the case, every expense incurred by him and his assistants, from beginning to end, was paid by the plaintiffs, who won the case.

Now if this be the usual professional custom, the sooner it is generally known the better, as then payors, whether plaintiffs or defendants, will probably take care that money paid by them reaches the parties for whom it is intended, and is not annexed by middle men.

In the case in question, it is more than probable that had it been known in time that the 10l. were not intended for the assistants for their overtime, the amount would have been disallowed.

T. S.

* * The question is really a legal one, and is not, we may observe, specially connected with the architectural profession; it may be raised concerning any profession in which clerks or assistants are employed. We have no hesitation in saying that the proceeding described is a very shabby one; but upon its legal aspect we do not venture to express an opinion.

EPISCOPAL HERALDRY.

SIR.—I have read with much interest the article on Episcopal Heraldry in the *Builder* of the 14th August [p. 223], but may I be permitted, as a diligent student of the subject to which it refers, to make a few corrections.

1. The date of the assumption of the cross keys in the arms of the See of York is hardly doubtful. The old arms appear for the last time on the seal of Archbishop Lee, 1331-44.

2. The arms of Fordham and Nevill should be added to the helmeted crests of Bishops of Durham.

3. The arms used for the See of Oxford were two bends, the arms of Osney Abbey, until Bishop Underhill, 1592.

4. The arms of Chichester assumed their present shape at the Reformation; see the seal of Bishop Barlow in the collection of the Society of Antiquaries.

5. An earlier instance of the combination of the arms of Bath and Wells occurs on the shield of Bishop Bekinton, 1443.

6. The effigy of Bishop Vesey of Exeter is probably correctly stated to be the effigy of the Bishop of a Bishop in Warwickshire, but several of the earlier Bishops of Lichfield and Coventry were buried at Coventry.

7. The Worcester arms were in existence long before the era of Julius de Medicis. They are probably derived from Godfrey Giffard, 1263: see seal ad *causam*, British Museum, xlii., 33.

W. K. R. BEDFORD.

Sutton Coldfield, Aug. 20, 1886.

QUARRY TILE FLOORS.

SIR.—I have just had a floor laid of 6-inch red squares (Staffordshire pressed quarries) grouted in cement, which, through the carelessness of the workmen, was not effectually washed off. Will any of your readers kindly say what is the best method to adopt to do this now? The floor is of course smeary, and in some parts actually contains a body of cement on its face. Could any solvent be applied to the cement without its injuring the face of the quarries, or is there nothing for it but rubbing it off with water and a piece of York stone or a piece of red quarry, which would be a long job? Although I have laid many quarry floors this is the first time I have been unfortunate in this respect, and so am without experience.

A reply from any of your more experienced readers would be esteemed.

H. G.

The "Four Courts," Dublin.—We are informed that the *Æolus* Waterspray General Ventilating and Electrical Engineering Company have received instructions to apply their complete system of heating, cooling, and ventilating, to the library and reading-room of the Four Courts, Dublin.

The Student's Column.

STONE QUARRIES.—IX.

ENGLISH HORNBLENDE GRANITES (continued).

ATTENTION will now be directed to the hornblende granite of Leicestershire. There are many different kinds of stone quarried in this district, which bear but one name,—granite,—in the market.

The hornblende granite of Mountsorrel, where there are large quarries, is intrusive through a metamorphic schist; but its exact geologic age cannot be defined further than that it is of pre-carboniferous date. The neighbouring syenites of Groby and Markfield are shown by Messrs. Hill & Bonney to have been distinctly intrusive in Silurian slates, probably about the commencement of the Devonian period; whilst the greenstones of the Forest may belong to the period between the carboniferous and the trias.

The stone obtained from the Mountsorrel quarries is of two colours, a pink and a greyish white, due to the difference in the tint of the felspar, this mineral occurring in very small crystals. The mica is black (biotite), and not too abundant, whilst, although the quartz is usually rather small, here and there it is in crystals of medium size, some being at least 14 mm. across. Hornblende occurs as minute, almost black, specks as well as thin elongated needle-shaped crystals. Microscopic sections show the presence of magnetite and apatite; and the brassy lustre of iron pyrites is apparent in places. Little round patches of exceedingly fine-grained mineral matter, of a hard nature, may also be occasionally seen in the rock; which, taken as a whole, might be described as a fine-grained, compact, hornblende granite.

The decomposition of the surface stone by the ages it has been exposed to the weather extends down to more than 20 ft. the stone to that depth being quite friable.

The working face of the Mountsorrel quarries is nearly half a mile in length, and forms a conspicuous object from the Midland main line between Sileby and Barrow stations. To obtain the stone, large chambers are excavated on the top of the hill, in which charges of gunpowder, sometimes as much as half a ton, are placed and fired. The blocks brought down on the floor of the quarry are then shot, i.e., split up by small charges of powder, or dynamite. Masses of the rock are sometimes hurled by these agents to surprising distances; and instances are on record of small pieces having fallen in the village at the foot of the cliffs. Great precautions are taken, however, to prevent accidents.

Large quantities are broken up for macadam, both by hand and machinery. In some parts of the quarries are still to be seen a few of the old-fashioned "ring-breakers," or men making macadam by hand. These breakers use a small short-handled hammer, and hold an iron ring in their left hand. With this ring they rake down the lumps of stone on to the block upon which they are broken, and also hold the pieces together to prevent their flying about. The stone is also used for kerbing, paving, setts, gravel for paths, &c., and for concreting.

A railway line has been constructed from the works to the Midland Railway, and there is canal carriage by the Soar.

The student will find further information concerning these quarries in the *Builder* of November 12th, and December 10th and 24th, 1870.

LEICESTERSHIRE SYENITES.

Large syenite quarries have been opened in Markfield Knoll, near Leicester.

The colour of the stone is dark green, freckled pink. It is composed of pink orthoclase felspar in minute crystals; hornblende, which is dark green, and very abundant; and a little quartz. The minerals are not very well defined, as they so closely interlock each other, and the rock is so much altered that the accessory minerals which might be present are now unrecognisable. It is very close grained and compact, and breaks with splintery fracture. A vein of calcite of pinkish-grey tint and a well-developed rhomboidal structure, crosses the face of the workings. It is so pure that it has been proposed to use it for economic purposes.

* *Quart. Jour. Geol. Soc.*, vol. xiv., p. 199 (1878).
† W. J. Harrison, F.G.S., "Geol. of Leicestershire," 1877, p. 10.

Markfield stone is largely used for kerbs, paving-sets, and road metal.

Grobby Quarries.—These are situated near Glenfield, and about five miles north west of Leicester.

The stone is very similar to that of Markfield, perhaps, if anything, of a little darker hue. It is composed of pink orthoclase felspar, hornblende, and a little quartz. There is also some opaque mineral, evidently in a greatly altered state, perhaps originally pyrites or magnetic oxide of iron. The felspar is in distinct crystals, but has often caught up much hornblende; the quartz fills up the spaces between the other minerals, or is curiously crystallised with the felspar, so as to form a microscopic "graphic granite" or "hebraic felspar"; and it is especially important to bear in mind that the quartz contains very many "fluid cavities," nearly filled with water, which indicate that the rock was consolidated under very great pressure. These fluid cavities also show the spontaneous movement of the bubbles contained in them very well indeed (Sorby).

The stone is used for paving-sets and road-metal. Crushed granite from quarries at Groby is used in making the Victoria stone.*

Stoney Stanton Quarries.—These are situated about nine miles south-west of Leicester, on a patch of igneous rock isolated from the main mass. The stone is a syenite, composed of quartz, felspar, hornblende, and some magnetite; it is easily worked, and is used for kerbs, road-metal, &c.

There are quarries also at *Cliff Hill*, near Markfield.

Charnwood Quarries.—These are sometimes known as "Sheepshed Quarries," and are near Loughborough. The stone is a syenite, as it contains felspar, hornblende, and a little quartz, but has undergone such an enormous amount of alteration, subsequent to its original formation, that it has a somewhat dull appearance.

When breathed upon, it emits the earthy smell characteristic of rocks containing a considerable amount of silicate of alumina. The felspar is of two colours, one being light green, almost white; the other pink. The former frequently occurs in crystals 4 or 5 mm. across; the latter not being one-fourth of this size. The tinge of green seen in the felspar has been, most probably, produced by the decomposition of hornblende. The latter is dark green, and the high specific gravity of the rock is, no doubt, due to its abundance.

The rock has been called by some a "syenitic greenstone." The term "greenstone," however, includes so many rocks of different chemical and mineralogical constitution that it is somewhat ambiguous, and is thus likely to be misunderstood. If the rock were not so much altered and the felspar in it clearly capable of being referred to a trichitic species, we should have no hesitation in calling it a quartz-diorite, which it very much resembles.

It bears considerable mineralogical similarity and might be more strictly compared with the quartz-diorite of Quenast, in Belgium, than with any other rock used in the trade. The Quenast rock is quarried for paving-sets and macadam, being largely used in North-Western Europe, and is not unknown in the London market. The stone, however, is porphyritic—the crystals being small but prominent, and contains distinct accessory minerals. It has been the subject of a searching investigation by MM. De la Vallée Poussin and Renard.

We have described the Charnwood rock at some length, because its high specific gravity and crushing weight have long been a puzzle to engineers and surveyors, it being known in the market as "gravey."

The quarries have been opened about twenty years, and are close to a branch of the L. & N.W. Railway.

Syenite is also found in the *Malvern Hills*, Worcestershire, where it consists of reddish felspar, quartz, hornblende, and sometimes epidote.

OTHER IGNEOUS ROCKS.

Bardon Hill Quarries.—These are situated about eleven miles north-west of Leicester, on the highest ground in the county.

The stone is not a "granite," although known by that name in the market. The Rev. T. G. Bonney says it has orthoclase and much quartz in it. He thinks that the Bardon Hill

mass is the stump or plug of a cone, for there is a great deal of agglomeration on the side of the hill.

There can be no doubt that the rock belongs to the acidic series, and the term "felsite" in all probability is the one most applicable to it. It is less distinctly crystalline than the syenites of Groby or the hornblende granite of Mountsorrel. The prevailing green colour is, no doubt, due to the decomposition of small quantities of hornblende, or other lime magnesian silicates, the resulting green hydrous silicate being more or less diffused throughout the whole rock.

The above description does not apply to the entire mass. Some varieties in the vicinity of quartz veins present mineralogical features of much interest. The quarries are worked on two floors. The mass of the rock has a peculiar apple-green tint, and is very close in texture.*

It is much used as a road metal in the Midland counties, for which purpose it is exclusively quarried. It does not break into cubes, as do the syenites, and is mostly broken by machinery.

Penmaenmawr Stone Quarries.—These are situated in North Wales, and are well known throughout the country for paving-sets and the like.

The stone is very easily split by cutting a fine line with an axe, in the direction required, and then giving the stone a few smart taps with the hammer (Seddon).

Rowley Rag is a basalt found in Staffordshire and used for paving-sets.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,928, Improved Water-closets. A. A. Common.

This relates principally to improvements in closets of the valve or "Bramah" pattern. It allows them to be used also as sump sinks and urinals. The valve is secured so that it will only open to such an extent as will give passage to liquid matter when not used for the ordinary purposes of a water-closet. The seat is made movable on a hinge connected with the ordinary lever actuating the valve, by any suitable mechanical means, or by providing, in addition to the ordinary pull by which the contents of the pan are discharged, a separate independent pull or attachment to the ordinary pull, which operates to open the valve only to the extent required. The effect of the improvement is that, as the raising of the seat or the independent pull opens the valve only to an extent sufficient for the exit of the liquid, any solid body which may be accidentally in the pipe cannot, if emptied into the pan, pass into the pipe and choke it. If the object be valuable or useful it may be recovered. As the lifting of the seat exposes the whole area of the pan to receive the slops, it may serve also as a urinal, or the slops may be emptied into the pan without the seat being soiled.

11,077, Improvements in Brackets. A. B. Milne.

A strip of metal is doubled over on itself in such wise that the ordinary triangular bracket, such as is generally used for fixing shelves, is formed in one piece, or one part is so bent as to form the horizontal member and the other the strut. Holes are pierced through two of the thicknesses and screws bind up the bracket, as well as fasten it to the wall.

11,270, Cement. E. W. Killick.

The improvements consist in mixing together lime, chalk, clay, with coke or coal or other suitable fuel by crushing and grinding by any convenient machinery, so as to form a stiff pug of the said materials, or some of them ready for insertion direct into the kiln for burning, thus dispensing with washing, pumping, and drying previously to the kiln burning as at present. The proportion of the ingredients used is as at present, with about one-fourth fuel to three-fourths stuff.

1,239, Embossed Decorative Material. E. Courth.

This has for its object the manufacture of material for decorating walls and other surfaces which shall be flexible and elastic, impervious to damp, and non-absorbent of vapours or infectious matters. The textile backing of fabric, similar to thin kamptulene, is pasted with brown paper and passed in solution. After the composite material is dry, it is passed between rollers, one engraved in relief the other in intaglio. By using in this way, kamptulene, a very flexible and elastic, waterproof and non-absorbent material is produced, which is of excellent appearance when decorated and finished.

NEW APPLICATIONS FOR PATENTS.

August 13.—10,384, G. Nobes, Door Lock.—10,386, E. Abate, Extinguishing Fires in Chimneys. August 14.—10,408, J. Wilson, Ventilation of Rooms.—10,430, J. & H. Anthon, Band Saws.—10,453, R. Evers and N. Coleman, Flushing Cisterns.

August 16.—10,460, J. Anderson, Beveling Band Sawing Machines.—10,464, C. Thornett, Fastening Window Sashes, either Shut or Partly Open.—10,503, E. Law, Wood Doors and Other Framing with Zinc, Iron, and Other Metallic Frames.

August 17.—10,526, 10,527, 10,528, and 10,529, W. Alford, Knob Attachments.—10,531, A. Boulton, Water-closets.—10,544, H. Hadden, Tiles.—10,554, W. Lake, Preventing the Slamming of Doors.

August 18.—10,572, H. Hills and T. Mencke, Screws.—10,573, J. Rankin and W. Palmer, Sash Fasteners.—10,574, A. Drummond, Manufacture of Glass, &c.—10,589, H. Stanley, Portable Saws.—10,603, W. Lake, Ventilating.

August 19.—10,625, J. Denny, Lock Girder Tiles.—10,631, J. Moberley and H. Perry, Bricks.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,107, A. Dougill, Lining Sewers, Tunnels, and Subways made of Segments of Iron and Concrete.—8,865, W. Baralough, Door Chains and Locks.—9,957, R. Skeoch and W. Woodson, Brick Kiln, &c.—9,150, O. Gilbert, Latch Operating Devices.—9,186, J. Nicholson, Step Ladders.—9,252, F. Dove, Cramps.—9,332, J. Carrell and W. Holland, Varnishes.—9,724, W. Patterson, Water Taps.—9,900, J. Alexander, Cistern Ball Valves.—8,584, F. Botting, Flushing Water Closets.—8,886, J. Price, and J. Wayne, Firegrates.—9,205, S. Newman, Dowel Pins.—9,552, E. and H. Lanaway, Ladders.—9,612, F. Royce, Electric Balls.—9,728, T. Bayley, Colouring Marble.—10,150, J. Baere, Preventing Down Draughts in Chimneys.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,934, R. Stone, Manufacture of Cement.—12,250, R. White, Chimney-pots, &c.—12,403, J. Deely, Flushing Cisterns.—3,214, A. Browning, Gas and Water Meter.—9,202, R. Woodhouse and S. Mitchell, Guards for Circular Saws.—11,225, E. Jones, Gate Latches.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 17.

By BRYAN, BURNETT, & CO.

Fulham—25, Chesilton-road, 94 years, ground-rent 8s. £425
40, Fulham Park Gardens, 94 years, ground-rent, 4s. 490
West Kensington—68, Edith-road, 67 years, ground-rent 11s. 680

By DEBENHAM, TREWSON, & CO.

City, 46, Basinghall-street, freehold 8,000
Upper Norwood—The residence Finchbury, 77 years, ground-rent 17s. 1,600
Finchbury Park—138, Stroud Green-road, 81 years, ground-rent 7s. 1s. 470
Stratford—56 and 58, The Broadway, 30 years, ground-rent 4s. 1,020

AUGUST 18.

By H. C. NEWSON.

Wellclose-square—No. 33, and the King's Arms Public House, freehold 1,950
Fulham—9 and 11, Godson-road, freehold 420

By J. ELLIS & SON.

Amesbury, near—The Bulford Estate, comprising mansion and 1,902a. 2r. 14p., freehold 24,000

By J. H. LYNN.

Islington—119, Remerton-street, 57 years, ground-rent 6s. 230
Shacklewell—1 to 5, Middle-street; 1 to 5, James's Place; and 11 and 13, Hindle-street, 27 years, ground-rent 44s. 1,310
21 to 34, even, Dunn-street, 27 years, ground-rent 16s. 4s. 693
Forest Gate—5, 6, 7, and 9, Chapel-street, 69 years, ground-rent 16s. 445
Old Kent-road—161, Summer-road, 38 years, no ground-rent 365

By MARSH, MILNER, & LAWSON.

Oxford-street—112 and 114, Great Portland-street, 21 years, ground-rent 60s. 1,940
Marylebone—110, Great Titchfield-street, 22 years, ground-rent 18s. 400
16, Welbeck-street, 10 years, ground-rent 40s. 450

AUGUST 19.

By M. MILLS.

Farringdon-road—Nos. 151 and 163, freehold 1,500

By G. A. BICKERTON.

Islington—9, Barford-street, 63 years, ground-rent, 6s. 320
Fulham—32, Wellington-road, 67 years, ground-rent 6s. 6s. 230

By LEARD & DAVE.

Chelsea—523 and 530, King's-road, 69 years, ground-rent 10s. 1,180

By NEWSON & HARDING.

Barnsbury—17, Thornhill crescent, 63 years, ground-rent 8s. 500
Holloway—41, Russell-road, 74 years, ground-rent 6s. 6s. 275
Hoxton—35, Napier-street, 15 years, ground-rent 3s. 185
63 and 64, Napier-street, 19 years, ground-rent 7s. 385

* See the Builder, vol. 1, p. 939.

† See "Mém. cour. et des sav. étrang. de l'Acad. Roy. Belgique," xl. (1876), p. 205.

* W. H. Hudleston, M.A., F.R.S., in "Proc. Geol. Assoc.," vol. iv.—Excursion to Charnwood Forest.

Miscellaneous.

Wood Pulp v. Plaster of Paris.—An important discovery has just been made at the Sogvedal Pulp Factory in Norway, after several years' experimenting, wood pulp being used for the manufacture of the kinds of building ornaments which are generally made in plaster of Paris. The pulp is first ground from wood, and then, by a machine, pressed into any kind of ornament, such as ceilings, friezes, bas-reliefs, rosettes, &c., which are quite as well finished as similar articles of plaster of Paris. Another feature is that the articles made from the pulp show painting or gilding to great advantage. Tests have also been made with regard to their strength, by dropping them from various heights or hurling them against stone walls, the results being highly satisfactory. Thus, for instance, a bar of this material 1 ft. in length, 1 in. in thickness, and 5 in. in width, neither broke nor sustained any serious injury on being hurled with full force against a stone wall a couple of yards distant. Naturally, too, this material is far lighter than plaster of Paris, an important advantage, as no great harm would be caused to a person by ornaments made from it falling upon him, which is otherwise with those made from plaster of Paris. It should also be mentioned that pulp ceilings, friezes, &c., are, by the hardness and compactness of the material, impervious to wet, and that they may, if desired, be fastened by nails or screws. Finally, the inventors state that ornaments made from this material cost only half the price of similar ones made from plaster of Paris. This discovery will, it is believed, give great impetus to the pulp factories of Scandinavia, which are now almost unprofitable, through the low prices of paper prevailing abroad, and the utter failures which have attended the vast production of the latter, direct from wood pulp, by a firm in London.

Dennett & Ingle's Fireproof Construction.—We learn from the Nottingham papers that the patent fireproof floors manufactured by Messrs. Dennett & Ingle, of Nottingham, satisfactorily passed the ordeal of a severe test at the fire which took place recently at Messrs. Henry Cooper & Sons' lace factory, Robin Hood and Roden streets, Nottingham. The floors are formed of concrete, and in the room in which the fire broke out are about 18 in. thick. (This depth of 18 in., we are informed, is "over all," including the wood floor, &c. The thickness of the Dennett arching is 4½ in. in crown, with a rise of 5 in.). There were beams below this to which the Dennett arching is fastened, and above joists, which support the wooden floors of the rooms above. The chief thing noticeable as giving conclusive evidence as to the intensity of the heat is a 3-in. line shaft 9 ft. distant from the floor, which is considerably twisted and contorted. Some large iron girders in the room are twisted into all manner of forms, whilst some zinc at a distance from the floor has evidently been melted. Nevertheless, the fire was entirely confined to the room in which it originated, thanks to the floors. The room in which the fire occurred was situated in the fourth story. It is stated that in a room directly over the spot where the fire must have been the hottest there was stored a large quantity of combustible material and delicate lace machinery, which is none the worse for the heat to which it has been subjected.

Newhaven Drainage.—A Local Government inquiry was held at Newhaven on the 18th inst., by Mr. Thomas Codrington, C.E., to consider an application of the local Board to borrow 5,900l. for the drainage of the town. Mr. W. H. Radford, Assoc. M. Inst. C.E., of Nottingham, explained the plans, and showed the method adopted to store the sewage during high tide. The harbour authorities, Lord Sheffield, and other landowners interested, were represented. The inquiry was adjourned to allow time for Mr. Radford to complete negotiations with the harbour authorities, the Board of Trade, and the War Office.

Shustoke.—A new church is about to be built at Shustoke, Warwickshire. Messrs. Bodley & Garner are the architects, and the building is to be carried out by Messrs. Stephens, Bastow, & Co., of Bristol and London.

A Stained-Glass Window has just been placed in the Wesleyan Chapel at Chislehurst, in memory of the late Mr. Thomas P. Bunting. It is from the studio of Messrs. Powell Bros., of Leeds.

Health of English Watering Places.—The statistics bearing upon the recent health of English watering-places published in the Registrar-General's Quarterly Return, just issued, must afford considerable satisfaction to the thousands who are now migrating from our large towns to these holiday resorts. It appears that the mean annual death-rate during the three months ending June last among the more than a million of the resident population of forty-six seaside and inland watering-places of England and Wales did not exceed 15.6 per 1,000. This rate was 2.4 below the general rate in the whole of England and Wales, and 1.9 below the mean rate among the nearly eleven millions of persons living in the rural districts, comprising the country parishes with their small towns and villages. With regard to the zymotic mortality in these watering-places, the report is scarcely less satisfactory. The annual death-rate from the principal zymotic diseases in these forty-six holiday resorts was 0.97, against 1.55, the mean rate in England and Wales, and 1.36 in England and Wales, exclusive of the seventy-eight large towns. No zymotic diseases were registered during the quarter in Weston-super-Mare or in Tenby, while the rates in the other watering-places ranged upwards from 0.22 and 0.23 in Torquay and Whitby, to 2.11 in Eastbourne, 2.15 in Southend, 2.16 in Folkestone, and 2.63 in Heme Bay. In most cases in which the zymotic death-rate showed an excess this was due to the epidemic prevalence (during the three months ending June last) of measles or of whooping-cough. Measles was somewhat fatally prevalent in Hastings, Exmouth, and Blackpool; whooping-cough in Scarborough, Lowestoft, Folkestone, Eastbourne, and Worthing; scarlet fever caused six deaths in Yarmouth; and diphtheria mortality showed an excess in Southend, Folkestone, Rhyll, and Blackpool. It should also be stated that "fever," principally enteric, caused an exceptionally high death-rate in the watering-places on the Kentish coast, especially in the Isle of Thanet and in Dover. It should be borne in mind that the Registrar-General's figures afford no information of more recent date than the end of June, since which it is quite possible, for instance, that the outbreak of "fever" in the Isle of Thanet, which appears to have about equally affected the registration sub-districts of Margate and Ramsgate, has entirely disappeared. It would be judicious and useful to intending visitors if watering-places at this season of the year published monthly health bulletins readily accessible to the public. The health of English watering-places has now reached a general standard, and their reputation has most to gain from publicity and most to fear from false reports arising from the difficulty of getting promptly authentic information respecting their health and mortality statistics.—*Lancet.*

A Universal Tinker Company.—Some months since a humorous article by Mark Twain appeared in the American *Century* magazine with reference to the constant small repairs required in houses. In the June *Century* the editor states that the practical suggestions of Mark Twain have been at once taken up in New York, and a "Universal Tinker Co." now announces to householders that they propose to take this annoyance and excessive expense off their hands; that they will put their houses in proper repair, and will, for a small sum monthly, cause the houses to be inspected and kept in a constant state of repair. They state that they will mend gas-leaks, keep the waste and water pipes joint-tight, look after electric bells, inspect the plumbing, silence creaking doors, jack-plane the edges of doors that will not shut, correct obstinate sashes, so that they slip up and down, put a shelf here and there, put in window-panes, mend roof leaks with slate, tin, or shingle, make periodical search for sewer gas, pack water-pipes and waste-pipes where the thoughtful plumber has left them to freeze, fix window-catches that now invite the festive burglar, put on door-knobs, repair locks. In fact, repair and put in shape all breakages and disorders that happen in and about a house. We recommend this idea to ingenious promoters on this side of the water.—*Sanitary Record.*

Stamford Brook.—H.R.H. Princess Mary, Duchess of Teck, laid on Monday last the memorial stone of the Church of St. Mary, Stamford Brook, W. Mr. Charles I. Gladman is the architect, and Messrs. Dove Bros. are the contractors.

The New "Essex-street Chapel" at Kensington.—The new place of worship for the Unitarian body, in course of erection at Kensington, in place of the Essex-street Chapel, Strand, now converted into Essex Hall, is fast advancing towards completion, and it is expected that it will be formally opened in the course of a month or two. The building is Gothic in character, and faced with red brick and Portland stone dressings. The principal elevation is in the Mall, near the Notting-hill Station and Bayswater-road. At the west end of this frontage there is a tower, with spire rising to a height of 125 ft. The upper portion of the tower contains a lofty belfry stage, with angular turrets. The entrance to the chapel is in the centre of the frontage. It is approached by a flight of ten steps, the ground-floor of the building being 5 ft. above the street level. The roof is covered with Broseley tiles. The vestibule at the entrance to the building is enclosed by a screen in pitch-pine, filled in with glass. Internally the edifice is 76 ft. in length and 43 ft. in width, and will seat a congregation of about 500, a portion of which will be accommodated in a small gallery at the west end. The minister's and deacons' vestries are at the east end. The height of the interior is 45 ft., the ceiling consisting of a cove surmounted by a wagon-headed vault in pitch-pine. In addition to the chapel itself, there is spacious schoolroom accommodation in the basement. A residence for the minister is in course of erection on a site immediately adjoining the chapel. Messrs. T. Chatfield Clarke & Son are the architects, and Mr. J. T. Chappell, of Grosvenor-road, is the contractor.

The Oakleigh Park Estate at Harold Wood.—The sale of the first portion of the Oakleigh Park Estate, adjoining the Harold Wood Station of the Great Eastern Railway, was noticed in the *Builder* a few weeks since. On the conclusion of this sale, all the plots offered having been disposed of, it was announced that the second portion of the estate would be offered in the autumn, when the new roads in progress of construction were completed; but in consequence of the demand for more of the building sites, 129 additional plots were submitted to competition last week in a marquee on the ground, by Messrs. Baker & Sons. There was a very numerous attendance at the sale, and all the plots were eagerly bought up, those having frontages of 18 ft., and depths of from 100 ft. to 120 ft., realising from 15l. to 20l. each, whilst those having frontages of 15 ft., and depths of from 80 ft. to 90 ft., were sold for 10l. to 15l. each. One plot, having a frontage of 28 ft., and a depth of 280 ft., realised 80l. There being a call for still further plots, ninety-five more sites were submitted, all of which were sold,—the entire number of sites disposed of during the day being 224. Building has already commenced, and when completed the estate will contain about 500 houses and shops, with accommodation for an estimated population of about 3,000.

The Royal Jubilee Exhibition, Manchester.—The Council have approved of the amended plans submitted by the architects Messrs. Maxwell & Tuke. The alterations include the location of the machinery in motion in an annex at the south side of Talbot-road. This annex will also form the principal entrance to the Exhibition from the railway, and will stand in an enclosure of about nine acres or less, one acre of which will be used for residential rooms and ornamental shrubberies, and six acres for outside exhibits. The architects have considerably improved the elevations by raising the central dome and the two pavilions thus giving to the whole facade a much bolder appearance. The whole area of land occupied by the exhibition and the grounds attached thereto will be about thirty-two acres. Sixteen acres, forming the site of the Royal Botanic Gardens, will be devoted entirely to outside display, including fairy fountains and electric illuminations. We understand that the contractors are to be obtained immediately, and the architects hope that the works will be in active operation by next month.

Horsforth Church, Yorks.—Stained glass has been inserted into another of the north aisle windows, by way of memorial to the late Mr. George Shearer, of Leeds. The subject illustrated is the Nativity of Christ, and the work has been designed and executed by Messrs. Powell Bros., of Leeds.

PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	6 5 0	7 0 0
Teak, R.I.	load	9 0 0	14 0 0
Sequoia, U.S.	foot cube	0 2 4	2 7
Ash, Canada	load	3 0 0	4 10 0
Birch	2 10 0	4 0 0	
Elm	3 10 0	4 10 0	
Fir, Dantsic, &c.	2 10 0	4 0 0	
Canada	2 10 0	4 10 0	
" Pine, Canada red	2 0 0	3 10 0	
" yellow	2 5 0	4 0 0	
Lath, Dantsic	3 0 0	8 0 0	
St. Petersburg	4 0 0	5 10 0	
Wainscot, Riga	log	2 15 0	4 0 0
" Odessa, crown	3 5 0	7 7 6	
Deals, Finland, 2nd and 1st, std. 100	7 0 0	8 0 0	
" 4th and 3rd	8 0 0	7 0 0	
Riga	5 10 0	7 0 0	
St. Petersburg, 1st yellow	8 0 0	14 0 0	
" 2nd	7 0 0	8 0 0	
" white	7 0 0	10 0 0	
Swedish	6 0 0	15 0 0	
White Sea	7 0 0	17 10 0	
Canada Pine, 1st	17 0 0	80 0 0	
" 2nd	13 0 0	17 0 0	
" 3rd, &c.	8 0 0	10 0 0	
" Spruce 1st	8 0 0	11 0 0	
" 3rd and 2nd	5 0 0	7 0 0	
New Brunswick, &c.	4 0 0	12 0 0	
Battens, all kinds	0 8 0	0 13 0	
Flooring Boards, sq. 1 in., Pre-	0 7 6	0 8 6	
pared, first	0 5 0	0 7 0	
Second	0 3 0	0 5 0	
Other qualities	0 0 0	0 3 0	
Cedar, Cuba,	0 0 0	0 3 0	
Honduras, &c.	0 0 2 4	0 0 3 4	
Australian	0 0 2 4	0 0 3 4	
Mahogany, Cuba	0 0 4 0	0 0 7 0	
St. Domingo, cargo average	0 0 4 0	0 0 7 0	
Mexican	0 0 4 0	0 0 8 4	
Tobacco	0 0 4 0	0 0 8 4	
Honduras	0 0 4 0	0 0 8 4	
Maple, Bird's-eye	0 0 6 0	0 0 8 0	
Esse, Rio	7 0 0	10 0 0	
Bahia	6 0 0	10 0 0	
Bor, Turkey	5 0 0	17 0 0	
Satin, St. Domingo	0 0 7 0	0 11 0	
Porto Rico	0 0 8 0	0 12 0	
Walnut, Italian	0 0 4 0	0 0 5 0	

METALS.

IRON—Pig, in Scotland	ton	£. s. d.	£. s. d.
Bar, Welsh, in London	4 7 6	4 15 0	
" " in Wales	4 2 6	4 7 6	
" " Staffordshire, London	5 10 0	8 0 0	
Sheets, single, in London	6 15 0	8 10 0	
Hoops	6 0 0	7 0 0	
Nail-roads	5 10 0	6 10 0	
COPPER—			
British, cake and ingot	42 0 0	43 0 0	
Best selected	42 10 0	43 0 0	
Sheets, strong	47 0 0	48 0 0	
" India	44 10 0	45 10 0	
Australian	0 0 0	0 0 0	
Chili, bars	39 10 0	39 15 0	
YELLOW METAL	0 0 3 4	0 0 4 4	
LEAD—			
Pig, Spanish	0 0 0	0 0 0	
English, common brands	0 0 0	0 0 0	
Sheet, English	0 0 0	0 0 0	
SPELT—			
Silesian, special	0 0 0	0 0 0	
Ordinary brands	0 0 0	0 0 0	
TIN—			
Banco	0 0 0	0 0 0	
Billion	0 0 0	0 0 0	
Straits	98 10 0	0 0 0	
Australian	99 0 0	0 0 0	
English ingots	102 0 0	0 0 0	
ZINC—			
English sheet	18 0 0	18 5 0	

OILS.

Linseed.....	21 17 6	22 5 0
Cocunut, Cochiti.....	32 10 0	33 0 0
Ceylon.....	25 10 0	25 15 0
Copra.....	0 0 0	0 0 0
Palm, Lagos.....	23 0 0	23 10 0
Palm-nut Kernel.....	0 0 0	0 0 0
Rapeseed, English pale.....	22 5 0	0 0 0
" brown.....	20 10 0	0 0 0
Cottonseed, refined.....	19 0 0	20 0 0
Tallow and Oleine.....	25 0 0	45 0 0
Lubricating, U.S.....	8 0 0	10 0 0
" Refined.....	8 0 0	13 0 0
TURPENTINE—		
American, in casks.....	1 6 6	1 0 0
Tar—Stockholm.....	0 15 0	0 15 6
Archangel.....	0 10 6	0 11 0

BRISTOL.—For alterations and erection of additions to shop and premises, Clarence-road, Bristol, for Mr. T. Lamb. Mr. Rhos. Hodge, architect. Quantities by Mr. A. Barrett, surveyor, Bristol:—
Humphreys £848 0 0
E. Gay* 870 0 0
J. James 830 0 0
Graham 726 0 0
* Accepted subject to modified drawings.

CAMBERWELL.—For two pairs of villa residences, Camberwell. Mr. Geo. Hubbard, architect. Quantities by Mr. J. Sargeant:—
Bartholomew £7,336 0 0
Hanson 5,285 0 0
Braid 4,934 0 0
Patman & Fotheringham 4,819 0 0
Balaam 4,890 0 0
Colls 4,788 0 0
Chappell 4,678 0 0

CANNING TOWN.—For alterations to the Vincent Tavern, Canning Town, for Mr. J. Gooch. Mr. F. A. Ashton, architect, Stratford, E.:—
Mansell £525 0 0
Scottney 473 0 0
Nicholls 415 0 0
Taylor 410 0 0
J. & F. Bane (accepted) 383 0 0

CUBITT TOWN.—For building two houses in Hillson-street, Cubitt Town, for Mr. F. E. Kidd. Mr. Stocker, architect, St. Mary Axe:—
W. Buckland (accepted) £244 10 0

DEAL.—For converting the Old Custom House, High-street, into three houses and shops, for Mr. Henry E. Watts, J.P. Mr. E. W. Fry, Dover, and Mr. Alfred Broad, Croydon, joint architects. Quantities by architects:—
W. & T. Denne, Walmer £1,895 0 0
G. Cottew, Deal 1,798 0 0
J. Trollope, Walmer 1,683 0 0
J. J. Wise, Deal 1,568 0 0
G. H. Denne & Son (accepted) 1,565 0 0

ESSEX.—For the erection of a dwelling-house and shop at Manor Park, Essex, for Mr. G. T. Hough. Messrs. Brown & Pritchett, architects, Theobald's-road, W.C. Quantities not supplied:—
Mansell, Stratford £240 0 0
Arthur, Kentish Town 635 0 0
[Architect's estimate, 615.]
* Accepted at 615.

EXETER.—For erecting ball-room, supper-room, and offices as additions to the Rougemont Hotel, Exeter, for the Rougemont Hotel Company. Mr. Charles E. Ware, architect. Quantities by Mr. Charles Finn, Exeter:—
Laphorrie & Goad, Plymouth £2,220 0 0
Rowse, Plymouth 4,270 0 0
Vicary & Son, Exeter 4,050 0 0
Woodman, Exeter 3,994 0 0
Stephens & Bastow, Bristol 3,749 0 0
Gibbard, Exeter 3,742 0 0
Gibson, Exeter 3,670 0 0
Reed, Plymouth 3,643 0 0
Seadding, Exeter 3,630 0 0
Lamcraft, Dawlish 3,479 0 0
Comings, Exeter 3,470 0 0
Pevan, Plymouth 3,430 0 0
Phillips, Exeter 3,414 0 0
Trevena, Plymouth (accepted) 3,390 0 0

HOLLOWAY.—For erecting a mission-room, Andover-road, Holloway:—
McCormick & Sons, Canonbury £997 0 0
G. T. Williams & Son, Barnsbury 957 0 0
McWilliams & Sons, Hornsey-road 950 0 0
Mattock Bros., Holloway 955 0 0
B. Wallace, Tollington Park 700 0 0
* Accepted.

KNIGHTSBRIDGE.—For re-arranging the sanitary and hot water arrangements at 38, Rutland Gate, for Mrs. Barlow:—
Winser & Co., 52, Buckingham Palace-road (accepted) £219 2 0

LEYTONSTONE.—For the erection of a shop and dwelling-house, Leytonstone, for Mr. R. Skelton, M.R.C.V.S. Mr. F. A. Ashton, architect, Stratford, E.:—
Corfield £944 0 0
Roome 805 0 0
Mansell 875 0 0
Hearle & Son 847 0 0
J. & F. Bane 814 0 0
Nicholls (accepted) 815 0 0

LONDON.—For building the Bryanston Club, St. John's-place, Lisson-grove. Mr. George Hubbard, architect:—

	A.	B.	C.
Rhodes	£5,870	£370	£286
G. Shaw	5,618	358	89
Morter	5,440	379	89
Colls & Sons	5,410	360	90
J. Chappell	5,223	340	92
F. Mark	5,209	319	100
J. Holland	5,196	353	60
Holliday & Greenwood	4,949	320	54
Simpson & Sons	4,946	311	42
A. & E. Braid	4,785	287	42
Patman & Fotheringham	3,587	337	17

A. Deduct if part of basement is omitted.
B. Deduct if staircases are executed in Shap silicated stone in lieu of York stone.
C. Deduct for old materials.

LONDON.—For sundry alterations and new bar fittings and counters, &c., at the Redan Tavern, No. 1, Westbourne Grove, for Mr. J. G. Yeale. No quantities.
Mr. F. J. Eadie, architect, Railway Approach, London Bridge:—
Lewes £1,927 0 0
Langridge & Son 1,462 0 0
Yeale & Co. 1,410 0 0
Jackson & Todd 1,318 0 0
Canning & Mullins 1,238 0 0
W. & F. Croaker 1,184 0 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitomes of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
School Buildings	Sunderland School Bd.	50 <i>l.</i> , 20 <i>l.</i> , and 10 <i>l.</i> ...	Sept. 25th	ii.
Public Hall, &c.	Lewes Town Council	20 <i>l.</i> and 5 <i>l.</i>	October 9th	ii.
Statue of late Earl of Dudley	The Memorial Com.	Not stated	Not stated	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Exhibition Buildings, Newcastle-upon-Tyne	Executive Council	W. Glover	Sept. 3rd	ii.
Brick Culvert and Pipe Drains	Yavil Corporation	R. Vining	Sept. 4th	ii.
Paving, Sewering, and Making-up Road, &c.	Beckham Local Bd.	G. B. Carlton	Sept. 6th	ii.
Reproof Floor, Iron and Glass Roof, &c.	St. Marylebone Public Baths and W. Com.	J. Waldram	Sept. 7th	ii.
Granite and Ragstones	Reigate Town Council.	Official	do.	ii.
Paving Works	Rothenham Vestry	E. Thomas	do.	xiii.
Iron Fencing, Roads, &c., of Cemetery	New Shoreham Burial Board	A. Loader	Sept. 8th	xiii.
Cutting through Embankment	Lambeth Guardians	Catt & Smith	do.	ii.
Broken Granite, Flints, &c.	Barking Town Local Bd.	Official	Sept. 9th	ii.
New Coast Guard Station and Battery	Admiralty	do.	Sept. 10th	ii.
Erection of Coal Shed, Grays	Met. Asylums Board	H. Jarvis & Son	Sept. 11th	ii.
Painting and Repairs	City of London Union	Official	Sept. 13th	ii.
New Schools, &c.	Wandsworth Sch. Bd.	E. Finch	Sept. 20th	ii.
Lying-in Wards at New Workhouse	Wandsworth & Clapham Union	T. W. Aldwinckle	Sept. 23rd	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Town Surveyor	Lowestoft Town Council	250 <i>l.</i>	Sept. 3rd	xvi.
Clerk of Works	Fulham Vestry	3 <i>l.</i> 3 <i>s.</i> per week	Sept. 6th	xvi.
County Surveyorships in Ireland	Civil Service Com.	Not stated	Sept. 10th	i.

TENDERS.

BLACKFRIARS.—For alterations, Stamford-street Chapel, Blackfriars. Messrs. Catt & Smith, architects, Furnival's Inn. Quantities supplied by Mr. J. Scott:— Rice	£329	0	0
J. Holloway	315	0	0
Hider & Son	308	0	0
F. Higgs	290	0	0
Smith	242	0	0
T. Dowling (accepted)	233	0	0

BOURNEMOUTH.—For additions to Rylstone, West Hill-road, Bournemouth, for Mr. John J. Shipman. Mr. T. Arthur Lewis, architect. Quantities supplied:—

James	£305	0	0
McWilliam & Son	287	10	0
Davis & Lambert	279	15	0
George & Harding	268	0	0
Lucas & Croser	285	0	0
Lawson & Donkin	255	0	0
Hoare & Sons (accepted)	245	0	0

LONDON.—For new roof and alterations to No. 149, Sloane-street, and 1, Sloane-terrace, for Mrs. McClean. Messrs. Perry & Reed, architects, 9, Job-street, Adelphi. Quantities supplied by Mr. H. E. Pollard:—

	Estimate.	Pointing.	Credits.
Clarke & Bracey.....	£567	237 0 0	25
Burch & Co.....	639	16 0 0	12
Greaves.....	957	27 0 0	13
Years & Co.....	429	21 10 0	5

LONDON.—For repairs to houses, Cadell-street, and Nos. 228, 230, 232, Hackney-road, for Mr. Ernest Benjamin Wilson:—

C. Hyatt (accepted)..... £270 13 0

LONDON.—For alterations and additional floor at 14, Pont-street, Belgrave-square, for Mr. H. Herbert. Messrs. Godwin & Bailey, architects:—

Norris & Luke (accepted)..... £295 0 0

[No competition.]

LONDON.—For sundry alterations and repairs to 4, Bolton-row, Mafair, for Mr. F. C. Grove:—

Lyne & Smith..... £276 5 6

W. & E. Curtis..... 232 0 0

Wetherill, Lee, & Martin (accepted)..... 223 8 0

Hot-Water Work.

Wetherill, Lee, & Martin (accepted).....

LITON.—For alteration, &c., to premises Nos. 13 and 15, Wellington-street, for Mr. C. Jones. Mr. W. J. Pearson, architect:—

D. Parkins..... £129 0 0

Cox Bros..... 225 0 0

Slough Bros..... 216 0 0

Neville (accepted)..... 205 0 0

LITON.—For the erection of a new residence, High Town-road, for Mr. E. Oakley. Mr. W. J. Pearson, architect:—

J. Saunders..... £289 10 0

W. Dunham..... 768 10 0

Cox Bros..... 756 0 0

D. Parkins..... 749 0 0

J. Simfield..... 743 13 0

Slough Bros..... 730 0 0

G. Smart..... 1,485 0 0

C. Wright (accepted)..... 639 0 0

LITON.—For new warehouse, King-street, for Mr. F. C. Scargill. Mr. W. J. Pearson, architect. Quantities not supplied:—

Saunders..... £1,672 0 0

Sinfield..... 1,580 0 0

Ford..... 1,676 0 0

Cox Bros..... 1,635 0 0

Slough Bros..... 1,525 0 0

G. Smart..... 1,485 0 0

Wright..... 1,440 0 0

Parkins (accepted)..... 1,398 0 0

MILE END.—For the erection of new caretaker's house and alterations, painting, &c., at South Grove Board School, Mile End. Mr. Thomas J. Bailey, architect:—

Norris & Luke (accepted)..... £548 0 0

SHADWELL.—For the erection of a new ice factory in Lower Shadwell, E., for the Linde British Refrigeration Company (Limited). Mr. Charles Dunch, architect. Quantities by Mr. James F. Wesley, Forest Gate:—

Gentry..... £18,900 0 0

Morter..... 18,941 0 0

Nightingale..... 18,640 0 0

Harris & Wardrop..... 18,540 0 0

Holland & Hannan..... 18,537 0 0

Asby & Horner..... 18,260 0 0

Mowlem & Co..... 18,057 0 0

Kirk & Randall..... 14,536 0 0

Higgs & Hill..... 14,530 0 0

Brown, Son, & Blomfield..... 13,150 0 0

Chasen..... 12,987 0 0

STRATFORD (Essex).—For a new soap factory for Messrs. Harris & Sons, Stratford, Essex. Mr. J. T. Newman, architect, Fen-court, E.C. Quantities by Mr. C. Stanger, Finsbury Park, E.C.:—

Taylor..... £3,229 0 0

Hoskings..... 3,855 0 0

Marten..... 3,848 0 0

Reed..... 3,818 0 0

Higgs & Hill..... 3,795 0 0

Larke..... 3,728 0 0

Gregar..... 3,647 0 0

Lawrance..... 3,563 0 0

Hack..... 3,494 0 0

Heale..... 3,461 0 0

[Architect's estimate, 3,525.]

STOKE NEWINGTON.—For the erection of a Congregational Church at corner of Breving and Bactory roads, Stoke Newington. Mr. E. A. Lewcock, architect, Bishopsgate-street Within:—

	A.	B.	C.	D.
Boyce.....	£9,299	£30 0	£840	£299
Patman & Fothering-				
ham.....	8,693	27 0	693	279
Nightingale.....	8,585	30 0	760	309
Goodall.....	8,653	32 0	749	277
Dobbs.....	8,547	32 0	670	298
Shurmer.....	8,460	31 0	734	230
Perry & Co.....	8,303	35 0	650	273
Stephenson.....	7,991	31 0	689	257
Mortier.....	7,987	30 0	818	258
Dove Bros.....	7,895	35 0	640	240
Jackson & Todd.....	7,850	27 10	623	226
Lawrance & Sons.....	7,675	26 0	611	212
A. For church and works connected,				
B. For temporary roof of tower,				
C. For upper part of tower and spire,				
D. For boundary walls, gates, and fences,				

STOKE NEWINGTON.—For alterations and additions to Billiard-room of the Albion Public-house, Albion-road, Stoke Newington, for Mr. J. Nicholas. Messrs. G. Carter & Son, architects:—

Norris & Luke (accepted)..... £164 0 0

SURREY.—For the erection of a house at Hind Head, for Mr. R. T. Plumptre, Ph.D. Mr. Arnold S. Taylor, architect, London. Quantities by Mr. Cecil G. Saunders, surveyor:—

Goddard & Sons.....	£1,055 0 0
Tompsett & Kingham.....	1,018 0 0
J. & A. Gammon.....	999 0 0
B. Fink, Milford, near Godalming.....	895 0 0

* Accepted.

TREDDINGTON.—For first portion of superstructure of new parish church. Mr. W. Niven, F.S.A., architect. Quantities by Mr. C. J. Mann:—

Wilson & Son, Birmingham.....	£22,258	A.
J. Shillito, Pury St. Edmunds.....	20,900	900
J. T. Chappell.....	20,547	1,053
B. E. Nightingale.....	20,450	1,300
Stephens & Bawley, Bristol.....	19,178	743
Longmire & Burge.....	18,970	693
Goddard & Sons, Farnham.....	18,934	755
Adams & Sons.....	18,430	625

A. Add for Doubling stone facing in lieu of red brick.

TUNBRIDGE WELLS.—For building a church mission room at High Brooms, Tunbridge Wells, for the Rev. Hay Chapman. Mr. Brett A. Elphicke, architect. Quantities by Mr. J. T. Carew:—

Judd.....	£1,829 10 0
Strange & Son.....	1,778 0 0
Beale.....	1,616 19 0
Deane.....	1,582 0 0
Farnham.....	1,564 0 0
Gallard.....	1,561 0 0
Jarvis.....	1,485 0 0

* Reduced to £1,012, and accepted.

TWICKENHAM.—For alteration and additions at Hill Villa, for Mr. J. B. Chancellor. Messrs. Brown & Pritchett, architects, Theobald's-road. Quantities not supplied:—

Rose & Sons, Twickenham.....	£970 0 0
Jolliffe, Netting Hill.....	643 0 0
Arthur, Kenial Town (accepted).....	630 0 0

[Architect's estimate, £904.]

Re Alterations to No. 8, Half Moon-street, Piccadilly.—We are asked to state that the tender attributed to "Lee" in our last issue, should have been attributed to "Wetherill, Lee, & Martin."

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

Best Bath Stone.

WESTWOOD GROUND, Box Ground, Combe Down, Coreham Down, And Farleigh Down,

RANDELL, SAUNDERS, & CO., Limited, Coreham, Wilts. [Adv.]

TO CORRESPONDENTS.

Registered Telegraphic Address: "THE BUILDER, LONDON."

A.B.—A. P. J. C.—J. C. (of course, concrete is constantly used in that way.—S. T.—G. S.—T. & G.—M. T. there is a good deal of truth in your comments; but we are not disposed to encourage architects to address to this journal anonymous letters criticising each other's works.—S. S. Dalton ditto.—W. S. says at our third foot, one-half larger is generally the best proportion; but we can say nothing about publication until we see the drawing.—G. S.—S. T. Sympathiser.—We fear your real is "not according to our simple" judge, the suggestion you make, however well meant, being simply absurd. We may agree, by the way, that an over-worked horse is not "suffering humanity."—C. J. G.—E. F. C. (It is only necessary to have proper lighting conductors in addition.—W. H. we do not believe it has ever been done in London; and probably there are not many London built brick houses that would stand the operation.—S. & Co.)

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Notes.—The responsibility of signed articles and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [Adv.]

Doubling Freestone.

The stone from these quarries is known as the "Wetherill Stone." It is of a very crystalline nature, and undoubtedly one of the most durable stones in England. It is of the same crystalline nature as the Cheltenham Stone, but finer in texture, and more suitable for the moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Ltd., Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [Adv.]

Doubling Free Stone.

For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone, and Lime Merchants, Stoke-under-Ham, Ilminster. [Adv.]

Ham Hill Stone!

For Ham Hill Stone of best quality and workmanship, apply to JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Established 1837. Agents, MATTHEWS & GEARD, Albany Wharf, Regent's Park Basin, N.W. [Adv.]

Asphalte.—The Scyssel and Metallic Lava.

Asphalte Company (Mr. H. Glenn), Office, 88, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouses, floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tin-rooms, and terraces. [Adv.]

Asphalte.

Scyssel, Patent Metallic Lava, and White Asphaltes.

M. STODART & CO. Office: No. 90, Cannon-street, E.C. [Adv.]

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY.

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

ILLUSTRATIONS.

"The Arts of Peace;" Wall Painting in "Spirit Fresco," at the South Kensington Museum.—By Sir F. Leighton, Bart., P.R.A.....	340, 343
Reredos, Plympton St. Mary Church, Devon.—Mr. G. W. Sesle, Sculptor; Mr. John D. Sedding, F.R.I.B.A., Architect	346-347
The Triumphal Arches of the Romans: View and Details of the Arch of Septimius Severus	350, 351
The Triumphal Arches of the Romans: The Arch of Titus; The Arch of Drusus.....	354, 355

CONTENTS.

The Royal Institute of British Architects' New Charter	329	The New Fresco at the South Kensington Museum	338	Law Court and Police Court Plans	353
A Sanitary Retrospect.—II.	331	Reredos, Plympton St. Mary Church, Devon.....	338	Temple Bar	353
Notes	332	An International Exhibition at Balaire	338	Wrexham Parish Church	353
The Triumphal Arches of the Ancient Romans	332	Cambrian Archaeological Association	338	The Student's Column; Stone Quarries.—X.	353
Letter from Paris	333	Carnarvon Castle	337	Recent Patents	354
The Episcopal Residency of Scotland	338	Choir Stalls from the Convent of Burheim, in Bavaria	351	Recent Sales of Property	354
Pharaoh's House in Tophane, and the Belios discovered there	337	Further Notes at the Liverpool Exhibition	361	Miscellaneous	354
Forests and Forest Culture in Sweden.....	337	City of Buenos Ayres Improvement Works	362	Prices Current of Building Materials	355

The Royal Institute of British Architects' New Charter.



E now have before us the New Charter, as finally settled by the legal advisers of the Institute, with the Council's announcement that application for a Grant of the same is about to be made to Her Majesty.

Thus, as far as the Institute is concerned, finality has been attained in a matter that has been under consideration, in a more or less definite form, for at least the last twelve years. We congratulate the Institute that its Jubilee year is likely to witness a settlement of this question which appears to commend itself to the majority of its members.

On the whole, we consider the general construction of the Charter good and business-like. The document is long, but this length is seen to mean that its framers have considered carefully the detailed working of the Institute, and have made provision for almost every contingency that experience suggests as probable. By analogy, it is a specification written by a competent and careful man, rather than the brief document of a novice who covers his lack of prevision by the general clause, "Provide all that is necessary."

The preservation of the time-honoured Original Charter, with the prestige attaching thereto, has been happily accomplished by a recital of the felicitous and dignified preamble and incorporating section of that ordinance.

After provision for the Transition from the old to the new order, we get in natural sequence, first, the classes of members constituting the corporate body; next, the executive heads; then the Council to advise and direct. Examinations follow, as occupying a prominent place among the duties of the Institute. The holding of property is then regulated. The mode of expressing the corporate voice in general meeting is next provided for, and the rights and privileges of the classes are defined. Lastly, provision is made for the creation of By-laws, and all that is new being declared, Her Majesty's confirmation of the unrepealed portions of the Old Charter is added.

We now turn to a detailed examination of the new administrative provisions, and we shall endeavour to make these the clearer by comparing them with those to be superseded.

Section 3 of the "Original" Charter defined the members of the Institute to consist of three classes, viz., Fellows, Associates, and Hon. Fellows. Section 2 of the New Charter defines that there shall be five classes,—three sub-

scribing and two non-subscribing,—and in addition, "such other classes, subscribing or non-subscribing, as may be hereafter established." The five classes are: Fellows, Associates, and Hon. Associates; Hon. Fellows and Hon. Corresponding Members.

Fellows were required to be architects, "who have been engaged as principals for at least seven successive years in the practice of civil architecture." They are now in addition required to be at least thirty years of age, and after five years the Institute has power to make it incumbent on candidates for this class to pass an examination, although the Council has (properly) a dispensing power in special cases. It appears to us desirable that architects in practice only should be Fellows, especially as another class provides a place for those "out of practice."

Associates were to be "persons engaged in the study and practice of architecture for a less term than seven years, and were to be at least twenty-one years of age. They were ineligible for any office but that of auditor, and had no right to vote, or "to interfere in the regulation of the affairs" of the Institute. The words "for a less term than seven years" are now omitted, and this omission incidentally permits of an architect in full practice remaining for life in this class if he thinks fit. This is contrary to the policy often officially advocated, and otherwise strongly urged, compelling qualified members of the Institute to move to the senior class with its greater financial and other responsibilities. Candidature for this class is now only attainable by passing an examination. The insertion of this "Compulsory Examination" test in the Charter (rather than in By-laws) settles finally a question which has been long debated, and on which there has been great difference of opinion. Some of its advocates claim it to be the first step towards obtaining State authority to close the profession.

But probably the greatest innovation in the Charter is that which gives the Associates the right of voting on all subjects except the making, altering, &c., of By-laws, and consequently the right of interfering "in the regulation of" all affairs left to general meetings. Their inability to hold office,—other than that of President, Vice-President, and Hon. Secretary,—disappears. The opinion we expressed in April last that the concession of this right of voting should have been done with more deliberation, is confirmed. We say this in no spirit of niggard conservatism or of distrust of the Associates, but on the ground that the wording of the clause shows, on the face of it, a lack of that thought and consideration which is apparent in the document generally, and we fear it is on the limitation of this "right"

that questions may hereafter arise. We need not discuss the matter in detail, but it must not be forgotten that the Associates are and may remain a majority of the members, and as resolutions of the Institute are by majority, the Associates have the power to determine many things. On the other hand, the reservation in regard to By-laws in fact limits their right to a much greater extent than may at first sight appear.

The old class of Hon. Fellows is now represented by the new class of Hon. Associates. Hon. Fellows were to be "persons unconnected with building as a trade." They had no vote, but were eligible for the office of President. The New Charter omits the quoted words, and so does not exclude persons connected with the building trade, otherwise eligible. Hon. Associates are to be persons of "position" or of "eminence," or "experience" in the arts and sciences, "not professionally engaged in practice as architects." This permits of architects out of practice being elected. The wording is new, but no new principle is introduced. Members of the class are given a right to vote, subject to "such limitations and restrictions" as By-laws may prescribe, and in any event they are barred from voting on the making of By-laws, and from holding the offices of President, Vice-President, and Honorary Secretary.

The new class of Honorary Fellows is, as we have suggested, distinct from the old one. It is now, speaking in general terms, for the most part a class of patrons,—Members of the Royal Family, high officers of State, and other "illustrious or distinguished persons"; and members of this class are eligible as President. No Honorary Fellow, except he be President, has a right to vote, but he is only excluded from holding the offices of Vice-President or Honorary Secretary. It is not clear on what principle "distinguished" men are to be elected to this class, rather than to the class reserved for men of "position" and "eminence in art," &c. We presume some very clear distinction will be made in practice, or heart-burning will result.

Honorary Corresponding Members appear for the first time in the Charter, but they have long been known to the Institute. They may not be British subjects nor architects practising within the British Empire. This class at present contains many highly distinguished foreign architects, and the advantage to the Institute of having such correspondents is so apparent as to need no comment. Being non-subscribers, these members are excluded from voting.

The next clause (8) gives the Council power to decide conclusively on the admissibility or otherwise of candidates. This was made a

subject for strong condemnation at one of the meetings, but on reflection it must commend itself to the members. As was pointed out by one gentleman, there may be grounds for the rejection of a candidate which could not be stated publicly without risking an action for libel or unduly injuring the candidate, and it is, in our judgment, fit and proper that the elected Executive should deal with the matter. In America the election, not of candidates only, but of members, is entirely in the hands of the Board of Trustees, the corresponding body to the Council of the Royal Institute of British Architects. In the Incorporated Law Society members are similarly elected by the Council, and in the Royal College of Surgeons the same applies in respect of those members who do not enter by examination. The Royal Institute of British Architects' Charter is thus seen to be more liberal than any of those quoted, and we think the Institute has wisely committed the nomination to the Council alone, whilst retaining its own power to elect. We trust, however, the Council will, in the exercise of the responsibility now permanently thrown on them, recognise the necessity for investigating the candidates' fitness both from the honourable and technical points of view, and, in order to strengthen their hands, we commend for consideration the By-law of the American Institute in regard to such investigation.

The new matter in this section closes with a clause entitling subscribing members to a certificate. The existence of this will, we believe, be of service, not only to individual members, but to the Institute itself.

We must not omit to notice the power to create additional classes. That practical effect will be given to this permission follows, we presume, on its insertion. It is a little strange that not one of the five classes enumerated is open to the admission (except they be eminent or distinguished) of Borough or Local Board Surveyors,—the "District Surveyors" of the provinces,—or any others of the large technically "official" class with whom architects are necessarily always in contact, and it must be to the interest of the members of the Institute individually and collectively to cultivate fraternal relations with these gentlemen.

Sections 3 and 4 deal with the Executive Council. Section 5 of the Original Charter provided for the President, three Vice-Presidents, and "two Secretaries," who, with not more than fifteen nor less than seven other members, were to form the Council. The President was to be a Fellow or an Hon. Fellow. The other members of Council were to be Fellows. The New Charter omits the "two Secretaries," and it provides for the number of the Vice-Presidents, for the "one or more Hon. Secretaries," and for the other members to be fixed as By-laws may prescribe. The restrictions as to the classes from which the President, Vice-Presidents, and the Hon. Secretaries are to be taken remain as before. The first noteworthy change here is that only *Honorary Secretaries* of the Institute are to have seats at the Council, the Secretary being henceforth one of the officers to be appointed and dismissed by the Council. We think it highly desirable that the Secretary should be removed from the always possible contingency of a non-election, and that he should have one rather than two sets of masters. The other changes of importance, it will be noted, are that not only is the number of the Vice-Presidents, Hon. Secretaries, and other members left open, but the "other members" are not as before confined to the one class.

Acts of the Council under the Old Charter (Sec. 8) were valid provided not less than three members were present. No quorum is now defined, that being left to the By-laws. The New Charter only admits the validity of Acts "provided the number of the Council be not reduced below one half the full number prescribed by the By-laws," a decided improvement.

In framing the By-laws the delicate task is thrown on the Fellows of settling the composition of the Council and the quorum. If, as is probable, Associates are elected to the Council,

it will be primarily as representatives of the junior class, and we think whatever proportion of Fellows to Associates is fixed for the Council itself should be maintained in the quorum. It must not be overlooked that the Council of a large body has to deal with questions involving wide experience and mature judgment, qualities, speaking broadly, pertaining to the senior class in any body.

We now come to another matter. By Section 4 of the Original Charter "general meetings and the Council" had the entire direction and management of the "affairs" of the Institute; and by Section 8 the Council had sole management "subject to the powers vested in general meetings" of the income and other affairs. In the new Section 4, clauses 16 and 17, the council has the sole management of the "affairs" and the application of the "funds" (as distinct from property) for the purposes defined, subject to By-laws. The control of general meetings is thus superseded by that of By-laws, but incidentally the control is still exercised by the Fellows, who previously had it in a different form. This is, as far as the funds are concerned, at variance with the principle laid down in Section 6, to which we shall refer later on. As to the form of control, that of By-laws is more definite and deliberate than a mere resolution of a meeting, taken, perhaps, on the spur of the moment. Of course, the By-laws being more definite will require careful consideration.

The Council is, without control, to fix fees and apply benevolent funds.

Section 5 gives the Council power to make the necessary arrangements for and connected with examinations throughout the British Empire.

Power is given to the Institute to grant "diplomas or certificates" in such manner as By-laws may prescribe. These are, of course, distinct from the certificates of membership previously referred to.

The next subdivision (6) treats of property. Hitherto this has vested absolutely in the Fellows, and they in general meeting had power to dispose of it as they pleased. It is by the new Section 6 made to vest in the Royal Institute as represented by its subscribing members (non-subscribing members being by Clause 25 excluded from participation), and the disposition of it or any part of it is placed in the hands of the Council, subject to a previous resolution of a general meeting (duly confirmed) at which all subscribing members can vote. The principle of this change is sound, as all those who contribute to the property have equitable rights in it and should properly have a voice in its disposition. But the management and superintendence of the property is in the hands of the Council alone,—a businesslike arrangement having its parallel in the trust committed to a Board of Directors.

It does not appear by this section that the Council's management of the property is to be regulated in any way, but it is probable that this may be inferred from Section 4, clause 16. In any event, the regulative power would only rest in the By-laws, and, consequently, in the Fellows, who frame them.

Clauses 23 and 24 are amplifications of the original preamble, serving to particularise the purposes for which property may be received and held.

Section 7 deals with general meetings, which by a subsequent interpretation are described as "ordinary, business, special, annual, or otherwise."

Under this heading the meetings are to be held "at least" once a year, and otherwise as By-laws may prescribe, and the power of members to "requisition" a meeting is noted.

We have already dealt with the rights of the various classes, detailed in Clauses 27 to 31.

Clause 32 ordains the mode of recording the vote of the Royal Institute, an important definition without which it is at least questionable by what authority the seal of the Institute could be used. We notice no provision, as is usual, for the custody of the seal or for its use, either in this clause or in the "matters to be prescribed by By-laws."

Under the old Section 4, "the majority of members present, and having a right to vote

thereat, had to decide upon the matters proposed" at the meeting. The new clause leaves the decision to such a majority as By-laws may prescribe "of those members having a right to vote and voting at such meetings." Presence is no longer essential, and the majority is of those persons exercising their right to vote. The casting vote of course remains.

By-laws are to determine whether voting is to be "in person, by proxy, by ballot, by voting papers, or otherwise," but we have little doubt that some method of voting by absenteees will be at once decided on. We think this right, with proper safeguards, a danger to be guarded against is the possibility of an unscrupulous use of this machinery for personal or party purposes. Thus, a circular asking for votes for a particular meeting might be sent far and wide, containing *ex parte* statements of an alluring kind in support of this or that policy or person. At the meeting the fallacy of the statements or the injurious consequences of their adoption could and would be exposed, but this exposure could not influence the votes held by proxy. To meet this difficulty it might be a By-law that the decision of any meeting should be held in abeyance if challenged by a majority of those present and having a right to vote, and the question should forthwith stand adjourned until a future meeting, to give all members the opportunity of reading the published proceedings at the original meeting and forming their judgment thereon: the adjournment to cancel the proxy. This need only apply to matters held by the said majority to be of urgent importance.

The last section (8) is devoted to By-laws.

The Transition Section (No. 1) states that until new By-laws "to be prepared as ordained by this our Charter have been adopted as hereinafter provided," the Royal Institute shall be administered in accordance with the original Charter and the present By-laws. This wording had, when the draft was under consideration at the last meeting, relation to an elaborate clause showing how and when the new By-laws were to be prepared. The clause has disappeared (following a suggestion and reference ordered at the meeting), but the wording of the Transition Section has not been modified, so that it is scarcely applicable to the new Clause 33, which does not ordain any preparation, but simply provides that the Institute "may from time to time" make and adopt By-laws not repugnant to the law or inconsistent with the Charter.

Then follows a series of "matters to be prescribed by By-laws." The list omits the subjects of "Management by the Council" and "Diplomas," both specially mentioned in Section 4 (clauses 16 and 21 respectively) as subject to By-laws.

In the draft settled by general meeting, there was a final clause in these words, "and generally such other matters as may from time to time seem requisite for the better execution of this our Charter, and for the furtherance of the objects of the Royal Institute." If greater brevity were desired, the end could have been attained by adding to the second line of Clause 34 the words "among other things." We trust that the pointed excision of the one and the omission of the other taken in conjunction with the inelastic wording of the defining clause cannot be held inferentially to exclude from the By-laws anything for which provision is not otherwise made in the Charter.

We also notice the omission from paragraph (2) of the words added at the meeting dealing with "mutual professional relations." This omission is, perhaps, of little importance, and the question may have been held to be one that would be dealt with by one of the "standing committees" for which provision is made in paragraph f.

These standing committees for the first time appear as an integral part of the Institute's machinery. They are likely to do good, and in any event their appointment,—already an accomplished fact,—bears evidence of the vitality of the guild.

We conclude by drawing attention to the last, but by no means least, of the subjects contained in the list. Paragraph h contains

the germ of what is popularly called "Federation." It treats of the "relations" of the Royal Institute to branches or "other societies having kindred aims and objects." Already the Institute has made progress in this direction. Its committee, containing representatives of many provincial societies, has been sitting for some time, and we are glad to learn from an announcement at the last meeting that good progress has been made in the preparation of a scheme. We, of course, reserve our judgment entirely as to the merits of this until we see it, but all members of the architectural profession throughout the Empire will be glad if the means of intercourse among them are improved, and their common action rendered possible,—if, in short, the seed sown in an inconspicuous corner of the Charter blossoms into a great tree, under whose shelter they may have a common home, and the art they love so well may be fostered and developed, "Usui civium, decori urbium."

A SANITARY RETROSPECT.—II.

IN their sewerage and drainage works most of the towns at first looked no farther into the question than the means of getting rid of the sewage at the nearest practicable outfall,—the river or any stream of water,—the main object being to do away with cesspools, which were sunk a few feet below the surface of the ground, and into which the refuse liquids thrown out of the houses found their way, or rather partly so, for they had mostly to meander over the surface in irregular channels. Cesspools were not intended to contain the liquids, but to let them soak away into the ground, otherwise they would have been troublesome to empty. After the ground had become thoroughly permeated with these foul liquids, which of course took a long time, it was found that they had polluted the water of the wells to an alarming extent. All sorts of people, it was found, had died after short illnesses without the cause being apparent, until by diligent inquiry, and by comparing numerous circumstances one with another, it was found that the wells from which these people had procured water were contaminated, whereupon they were closed and the pump-handles taken away. How many persons were enfeebled to one who died was not ascertained, but possibly the effects have lasted to this day. It was found that living in foul air and drinking bad water produced sickness, feebleness, and inability to work; probably also carelessness of the quality of the work done. The air was fouled by exhalations from decomposing refuse on the surface, especially where the houses were so crowded together that the air was stagnant for long periods of time; for although the wind might blow freely over the house-tops, the air took a long time to get into motion down below, in the closed courts with no outlet at the farther end and but a small archway at the entrance. It made things worse that the refuse liquids were thrown on to the ground along with the solid refuse, for if the dry refuse had been kept dry there would have been but little exhalation from it, but by mixing slop water and all together the vapour impregnated the atmosphere, and made it most unhealthy.

So the foul liquids were carried off by drains and sewers to any outfall. It was thought better to discharge the sewage even into a river than to leave it on the premises of houses, part of it soaking into the ground and the rest evaporating, except a portion which was now and then carried off by rain into the street drains; but this made things even worse, for the drains, which had been formerly laid to carry off the surface-water of the streets, were of very rough construction,—although they were sometimes called sewers, nevertheless,—and the sewage left behind a deposit of black mud which could not be got at by the scavenger, and it became even a greater nuisance there than on the surface, for part of it had before been occasionally carted away. It was very much insisted upon, at the outset

of the drainage and sewerage of towns, that the interior of sewers should be even in form and not too large, and that where large sewers were required the bottom should be made smaller than the upper part, in the form of an egg in cross section, so that the flow of sewage might be as much as possible concentrated, which would make it pass off more quickly than when spread out over a wide and rough bottom.

To this end, where the area to be drained was not large, pipes were advised to be used for sewers, the pipes being glazed in the kiln during the process of burning, by which the sewage was carried off much more cleanly.

When it was the general custom to make rivers the outfalls of sewers the evil did not appear in its full extent, for much of the black fetid mud was not discharged directly into them, but lodged in certain parts of the sewers where the current was slight, and, therefore, the deposit proportionately great. When left undisturbed long enough the heavy rainstorms carried it forward from time to time, but at all other times the appearance of the outfall was not so bad as it would have been if the sewers had been of better form and construction. The rivers were in fact relieved of some degree of pollution at the expense of the freshness of the atmosphere of the streets, under which so much of this black mud was spread out. It was, of course, attempted in many ways to lessen this air-pollution, one of which was to prevent filth being washed into the sewers by ordering the inhabitants to remove it from their premises, each for himself, and in the same year in which the Public Health Act was passed, 1848, a Nuisance Removal Act was passed, and another in the following year, in substitution for a similar Act which had been passed in 1846; but these were all superseded in 1855 by a comprehensive Nuisance Removal Act, and a separate one called the Disease Prevention Act, introducing the principle of cure in aid of that of prevention, by providing for the dispensing of medicines, guarding against the spread of disease, and affording medical aid to persons afflicted by or threatened with epidemic, endemic, or contagious disease. These Acts did not, as most others for local government had done, exclude the metropolis.

In 1855 the Metropolitan Board of Works was created, under the Metropolitan Local Government Act of that year, and the old Commissioners of Sewers were abolished. All these great movements are traceable to the action of the General Board of Health. In 1850 that Board issued a long report on the Metropolitan Water-supply, followed by numerous appendices and documents. They pointed out the evils of drawing water from the Thames within the tideway, where it was exposed to sewage contamination (for, be it remembered, even the metropolis discharged its sewage direct into the river at that time), and in 1852 the Metropolitan Water Act was passed, obliging all the Thames water companies to remove their intake works beyond the tideway, which extends as far as Teddington Lock.

The Lambeth Waterworks Company had, indeed, already led the way by voluntarily removing their pumping works from Belvedere Wharf, Lambeth, to Thames Ditton, and after the Act of 1852 all other companies took a similar course. These were the Chelsea Waterworks Company, who took their water at Chelsea Reach; the Southwark and Vauxhall Company, whose works were at Battersea; the West Middlesex, at Hammersmith; and the Grand Junction, at Kew Bridge. The East London Waterworks Company, who took water from the river Lea, afterwards also established an intake on the Thames above the tideway. The New River Company retained their original sources, and incorporated with their own works those at Hampstead-road.

It may not be necessary to attribute the removal of these works to any action of the General Board of Health. Great companies, as these are, are public bodies, and need no interference; but the coincidence of the movement with the existence of the Board may be mentioned as a fact of the time.

Many waterworks had been made, besides

those of the metropolis, for commercial reasons, each one under its own Act of Parliament. A water supply to a town is a measure as essentially sanitary as is that of the removal of waste water and other refuse, but it is also one of convenience, and it has often been comparatively easy to move a town authority in this respect, because manufacturers required a supply of water for trade purposes. But in the numerous non-manufacturing towns, where the powerful advocacy of this interest did not exist, the sanitary requirement has often been neglected. Wells and pumps were, no doubt, expensive things to keep in repair, but the expenses of some members of local authorities were not beyond their means, and for the multitude there were common wells. The water in the well of a private house, however, even in the same town, and within a stone's-throw of another well, may be of much better quality. It is not drawn down so much as is the water of a common well, and being kept up at all times nearly to its highest possible level, it is not so liable to contamination by soakage into it from the surrounding ground as is one which supplies a large number of people, who keep the water down, and facilitate the soakage into the well of whatever foul water surrounds it; and wells of this sort, which continue for any considerable time to yield the large quantity of water which a numerous population requires, are necessarily sunk in porous ground, for otherwise the yield of water would soon come to an end; and it is because the porous ground at once yields water and permits soakage that these wells are improper sources of supply. The case is different where a well is sunk upon a fissure of rock which brings water from afar. Deep wells often afford the best kind of water, when its natural hardness has been reduced, and when this is caused by an excess of carbonate of lime, as it is in all chalk waters, it is easily and perfectly removed, on the large scale, without injury to the brightness of the water by the process invented by Dr. Thomas Clark, and since modified by others.

But of the shallow wells in gravel in towns where the overcharged cesspools had no other natural drainage-outlet, statistical investigations into the causes of illness and death proved that it would be advisable to close some of them. When they were sunk they were not surrounded with houses, and, probably, answered their purpose, but in the altered circumstances it seemed desirable to procure a supply of water elsewhere, even though it was not required for trade purposes to any great extent; and it was much urged by the General Board of Health that where sewerage works were made water supply should accompany them. It would have been useless to urge water supply without drainage, and equally so to drain houses without having first provided sewers with which they might be connected, but the two works together seemed very desirable. The supply of water, however, has always been looked upon more as a self-paying commercial concern than in any other light,—as a commodity to be disposed of at a price.

The numerous special Acts which had been passed for the construction of waterworks led to a general Waterworks Clauses Act being passed in 1847, embodying most of the clauses usually inserted in these separate Acts, so that afterwards this Act was incorporated with each special Act, which in itself related only to local circumstances. One of the objects which the originators of the sanitary movement seem to have had in view in urging the necessity of a water supply was the establishment of public baths, and the Acts passed between 1846 and 1848 enabled inhabitants of towns to supply themselves with the means of cleanliness, if they could induce the local authority to put the Act in force, the preamble of which asserts that it is desirable, for the health, comfort, and welfare of the inhabitants of towns, to encourage the establishment therein of public baths and washhouses and open public bathing-places, and enacted certain small charges to the labouring population. Rivers, the water of which is mostly of such small degree of hardness as to be suitable for

ordinary bathing, and which are the natural bathing-places of the labouring population, were fouled by manufacturing refuse and other refuse, and made unfit for the purpose. If, then, it was intended to provide, at a small charge, a substitute for the loss of these places, it was a very proper thing to do, but it is one thing to offer facilities in an Act of Parliament and another to get them carried out. The local authority might, "if they think fit," establish such alternative bathing-places, but the expenses being directed to be paid out of the borough fund the local authority in many cases left the Act in abeyance, perhaps not seeing any sufficient reason why people should be provided with bathing-places at all, and forgetting that the rivers had been rendered unfit for the purpose, not by those whose proper bathing-places they were, but by those who contributed to the borough fund and held the key, and to whom the baths and wash-houses were of little or no use. Where these have been established and afterwards closed, on the representations of committees that they did not pay, or for other reasons easily found or asserted to exist when there was no desire to carry out the Act of Parliament in its integrity, the bath-keepers and subordinate persons employed have not been encouraged by committees to keep them open, by offering no hindrance to their enjoyment by those who could pay but little. One penny each person, or one penny for several children, was all that the local authority could charge under the Act. It might very well have been enacted,—very reasonably enacted,—that free bathing-places should be substituted for the rivers made unfit, but at that time, forty years ago, those who had the health and welfare of the people of a town committed to their hands did not take any wide view of affairs and did not see that national welfare is but a multiple of that of every locality. In 1858 the functions of the General Board of Health were transferred to the Local Government Act Office, that Act and the one of 1848 being construed as one, which took effect in all places where the Act of 1848 was in force. The Act of 1858 transferred to the Home Office certain sanctions, orders, and appeals, which had been exercised by the former Board, and the Local Government Act Office was made a sub-department of the Home Office for the execution of the Act, and for the assistance of local boards, and became, without the necessity of further legislation, or sanction of the central authority, capable of adoption by resolution of town councils or improvement commissioners. Local boards might take lands compulsorily, under this Act, for sanitary purposes, and in other respects their powers were greatly extended. An Amendment Act in 1861 provided for the cost of proceedings in adopting the Act of 1858; and another Amendment Act of 1863 prevented the adoption of the Act of 1858 in places of less than 3,000 population; and in each of the years 1860, 1863, and 1866, the Nuisance Removal Act of 1855 was amended. Sewage continued to be discharged into rivers, but in 1865 a Sewage Utilisation Act was passed, enabling local authorities to dispose of sewage on land, and to take measures to prevent the pollution of streams, and in 1867 another Act gave powers to local authorities to dispose of sewage beyond their own districts, and to combine with adjoining districts for the purpose of disposing of the sewage. This, however, they have seldom done.

NOTES.

AS the British public, and those members of the Legislature who are supposed to take some sort of interest in architectural subjects, seem to be still quite in the dark as to the practical results of the proposed "restoration" of cloisters outside Westminster Hall, and their use as committee-rooms, we give a small plan of the Hall, showing how the flights of steps to these cloister committee-rooms will obtrude on the hitherto-unbroken area of the Hall. The projecting steps are shown at A A, and are taken from Mr. Pearson's plan appended to the Report of the Proceedings of the Westminster Hall "Restoration" Committee. One



Plan of Westminster Hall, showing the Flights of Steps to be obtruded into it in connexion with the so-called "Restoration."

flight of steps shoulders up against one side of the main entrance door, the other projects like a promontory into the hall. Westminster Hall has from time to time been used as an arena for great ceremonials; its dignity and symmetry for such purposes will now be destroyed. Nearly every trace of the supposed cloisters had disappeared; the restoration is almost entirely conjectural; the use of the spaces as committee-rooms, for which they are inconvenient in approach and in lighting, is a mere afterthought to pretend a practical object in the restoration, which in reality is an archaeological architect's plaything; and for such a piece of sham architecture as this we are to have the interior of our great historic hall permanently disfigured. Is there no person in authority with sufficient common sense to stop this piece of absurdity?

THE Secretary of the Institute of Architects contributes a letter (in the *Times*) to the Royal Academy controversy, which brings forward pretty strongly one point to which sufficient attention has not been given, viz.: that the function of an Academy of Arts is not limited to the encouragement and illustration of one art only,—that of painting. Mr. White points out that according to the legal document or instrument of its foundation the Royal Academy is to have a professor of architecture, who is to lecture to students upon architecture; and that there shall be a professor of perspective and geometry, who shall give regular instruction in geometry and linear and aerial perspective, the projection of shadows, &c. The professorship of architecture, he observes, has been vacant for five years, and that of perspective and geometry for twenty-six years. It is true that lectures on architecture have been given in a desultory way from time to time; but the professorship has lapsed. Mr. White draws also an instructive contrast between the composition of the English Royal Academy and the French Académie des Beaux Arts; the former consisting of fifty-nine painters, seven sculptors, five architects, and two engravers; the latter of fourteen painters, eight sculptors, eight architects, six engravers, and four musicians, these being always kept up to the same proportion. The consequence in the English Academy has been that art has come to be regarded as the painting of pictures, to the exclusion of the proper study and recognition of other forms of art; and when there is a vacancy, a body so largely composed of painters naturally tends to the election of painters.

SEVEN months and a half after the close of the year, the Board of Trade have contrived to publish the "Railway Returns" of 1885. The length of railway open in the United Kingdom at that date has increased in the year by 305 miles, or from 18,864 to 19,169. The capital paid up has increased by 14,393,688*l.*; or from 801,464,367*l.* to 815,858,055*l.* The gross revenue has fallen from 70,522,643*l.* to 69,555,774*l.*, or by 966,869*l.* The working expenses have fallen from 37,217,197*l.* to 36,787,957*l.*, or by 429,240*l.* They bear almost exactly the same relation to revenue as they did in 1884, or 52.77 per cent. in place of 52.85. And the final outcome of the net earnings on capital has fallen from 4.16 per cent. in 1884 to 4.02 per cent. in 1885, being a lower proportion than has been

found to exist in any year since 1866, which was the same, with the exception of 1867, which was 3.91 per cent. The highest ratio recorded in the Board of Trade tables was 4.74 per cent. in 1872. There were conveyed 2,221,000 passengers more; 2,201,000 tons of merchandise less; and 161,000 tons of minerals more, in 1885 than in 1884, but as no account is given of the average distance in either case, little useful information can be elicited from the statement. It appears, however, that upwards of 2,000,000 more train miles were run in 1885 than in 1884, so that in railway transport, as in so many other industries, more work appears to have been done for an equal cost as compared with the preceding year. The increase in mineral tonnage has been accompanied by a decrease of over a quarter of a million sterling in receipts, but here again the absence of information as to length of haul leaves the calculation imperfect.

WE are glad to notice, from the returns of the American Iron and Steel Association, that this particular trade is manifesting a decided tendency to revival; and although the productions of last year still showed a considerable excess over consumption, yet the lessening of stock was at a much greater proportion than it has been for some years. The resumption of railway building has brought about this, so far, satisfactory result; and while this resumption has principally taken place in the shape of branch lines, there are signs of new and important undertakings springing up again, particularly in the newer states and territories of the far West. It is true that an American iron boom is not of the same immediate interest to this country as it used to be when we supplied the majority of the rails; for the United States are quite capable of supplying themselves, however many miles are wanted. Nevertheless, it is encouraging to find the depression lifting from such a staple industry, and it will not be long before its good effects radiate towards the English markets.

WITH regard to the competition for the proposed new Municipal Buildings for Edinburgh, of which we spoke last week, we learn that at a meeting of the Lord Provost's Sub-Committee on the new Municipal Buildings, held on Monday, communications were submitted from a number of architects,—including the Royal Institute of British Architects and the local Architectural Association,—with the view of inducing the Council to bind themselves to accept the designs of the architect who in the competition may be awarded the first prize of 250*l.* It is understood, says the *Scotsman*, that the Corporation are not likely to adopt such a suggestion, "although the intention is that the plans of the most successful competitor will be selected for the new buildings." In the meantime the matter was remitted to Mr. Morham, the City Architect, and a small committee, for further consideration. We are sorry to hear that the municipality persist in so ill-advised a course as that attributed to them.

IN regard to the Saxon Chapel at Deerhurst, we hear that the Ecclesiastical Commissioners have declined to take this ancient building in hand, but have expressed them-

selves willing that the work of reparation should be undertaken by a responsible committee of gentlemen of the neighbourhood. Accordingly a committee has been organised for the purpose of effecting the substantial repair of the fabric, and of presenting to view as far as is practicable its ancient appearance. Sir William V. Guise, Bart., has been nominated President, and the committee, consisting of the following names,—Mr. J. T. Agg-Gardner, M.P., Cheltenham; Mr. William M. Baker, Hasfield Court; Rev. W. Bazeley, M.A., Matson Rectory; Rev. E. J. Bower, M.A., Charlton Kings; Rev. F. E. Broome-Witts, M.A., Norton Vicarage; Rev. G. Butterworth, M.A., Deerhurst Vicarage; Rev. E. R. Dowdeswell, M.A., Bushley Parsonage; Mr. Samuel H. Gael, Charlton Kings; Sir John Maclean, F.S.A., Glasbury House, Clifton; Mr. J. Henry Middleton, Cheltenham; Mr. Algernon Strickland, Apperley Court; and Mr. J. Reginald Yorke, Forthampton Court,—will be glad to receive any subscriptions towards the expenses of the work. A specification has been presented by Mr. Thomas Collins, of Tewkesbury, which meets the approbation of the committee, and Mr. Collins is prepared to complete the work for the sum of 120.

THE Belgian architectural journal, *L'Emulation*, proposes that a united exhibition should be made of the designs of three eminent Belgian architects not long since departed, to wit, Poelaert, Carpentier, and Neute. The first-named alone is known much of in England, owing to the interest excited by his great building the Brussels Law Courts. He was a man of rare and remarkable genius, though a kind of genius somewhat *outré*, and disposed to wander too much from the logical paths of architectural design, at least as far as detail was concerned. *L'Emulation* styles him "the Gustave Doré of architecture." His great building may be described as a magnificent general conception, full of very odd and often unsatisfactory detail. In a certain sense the credit of this work must be shared by the large-minded and liberal Government which gave him full scope for his genius, instead of cutting down all an architect's chances to gratify a miserable spirit of economy. If the designs of the other two architects named, who had not the same chances, are at all equal in interest and originality to those of Poelaert, the exhibition ought to be well worth carrying out.

A PROCESS for protecting masonry against the influences of rapid changes of the weather is being applied, by the Brick and Stone Waterproofing Company of New York, to the obelisk in Central Park, which has suffered serious injury. The surface of the stone is carefully cleaned, and all loose particles of stone are removed. During dry weather the stone is heated by small charcoal stoves, indented portions by benzine lamps, up to about 48° R., and at once saturated with a hot liquid, consisting of paraffin, creosote, and turpentine. The liquid is prepared in the following manner:—A mixture of 1 part by weight of creosote and 4 parts of turpentine is first boiled. Then 25 parts of paraffin, heated up to boiling-point, are added. This mixture solidifies at 48° R., and has consequently to be applied in a hot state to the heated surface, into which it enters, according to its porosity, 25 to 5 centimetres. In cooling the liquid solidifies, and forms a thin coating, which protects the stone against water as well as the destructive effects of the large quantities of acids present in the atmosphere of large industrial towns. The coating remains smooth, and prevents the adhesion of dirt and soot.

THE works of the Metropolitan Railway Extension have now reached Rickmansworth, and the eccentricities of railway competition are already strikingly exemplified. The new line runs immediately at the back of the main street, for which purpose various houses have had to be demolished. The site of the station at the west end of the town is

already railed off. The present station of the London and North-Western Railway is at the south-east corner of the place, and the line is crossed by the new one about a quarter of a mile away. It would have been obviously far more for the public convenience that there should have been one joint station on the site of the existing one, which could have been made without difficulty. This would also be the station of the line which will some day connect Rickmansworth with Uxbridge, and the Metropolitan line, if extended further northwards, could have run along this line and then turned away up the valley as at present projected. Instead of this, Rickmansworth will have two stations,—always a public inconvenience,—and the High-street, as a site for houses, will largely be destroyed by the proximity of the new line, which runs parallel and close to it.

RESPECTING the movement initiated and carried on by the Plumbers' Company for the registration of efficient plumbers, we have been asked to call attention to the terms of an advertisement which appears in another column, as it seems that there is still much misapprehension as to the conditions under which registration can be effected. A perusal of clauses 4, 5, 6, 7, and 8 of the advertisement in question will serve to remove some current misstatements, and will afford information on other points. We are glad to hear that applications for registration continue to come in in large numbers, and that the question of establishing provincial centres of registration is not being forgotten.

THE Ninth Annual Industrial Exhibition in connexion with the Polytechnic Young Men's Christian Institute (the old "Polytechnic") was opened on Wednesday by Sir John Lubbock, who spoke strongly in favour of the importance of elementary scientific education. The collection of work done in the classes is on view up to the 10th, and some of the young men are at work in the room, as affording practical examples of what is being taught and practised in the establishment. The articles exhibited include some examples of artistic work,—wrought-iron, wood-carving, inlay, &c., which are creditable in design and execution, but the purely mechanical work appears to be the best in its kind. The fees for the various classes are very low, and the whole Institute owes, we believe, a great deal to the practical liberality of Mr. Quintin Hogg, who is doing an excellent work in thus affording opportunity to youths of the poorer class to gain technical instruction which, according to our present educational system and ideas, they have little chance of getting in our public elementary schools.

AN architect has sent us the conditions of competition for the Sunderland School Board Schools, which is another charming example of the ideas of treating the Profession which seem to animate the gentlemen who draw up conditions of competition. The Board offer premiums of 50*l.*, 20*l.*, and 10*l.* for the three designs respectively which shall be placed first in order, and then proceed to say:—

"The design selected for the first prize of 50*l.* to become the absolute property of the School Board, and to be used by them or not, as they think fit, without payment of any further or other commission or allowance whatsoever. The Board do not bind themselves to employ the author of the design selected for the first prize to superintend the building of the said schools if constructed upon his design, and they hold themselves free to employ any other person for that purpose."

This kind of statement is now becoming a constant factor in instructions to competing architects, and the Profession ought to make a firm stand against it. It amounts to this: in the first place, no architect who is worth anything cares to plan and design a building for another man to carry out; secondly, supposing that he is willing to do so, he is entitled, according to the usual scale of professional charges, to a commission of 2½ per cent. on the cost of the building. In the case under notice it is proposed to spend 7,000*l.* on the school, so that the architect who furnished the

plans, without superintending the building, would be entitled to a fee of 175*l.* The invitation of the School Board is, therefore, that the architect they are pleased to select is to be prepared to give them his work for less than one-third its value, and see another person carry it out. We hope no architect of ability will have anything to do with a competition on these terms. Recently a number of architects have undertaken to go in for no competition unless a professional referee is appointed, and the promoters of competitions have been compelled in many cases to bow to this decision. Let the architects add to this an undertaking to go in for no competition unless the successful competitor is to be employed on the usual terms, and this kind of attempt to pick the pockets of the Profession will soon be put a stop to.

THE TRIUMPHAL ARCHES OF THE ANCIENT ROMANS.*

AMONG the many varying works of that remarkable race of men, the ancient Romans, there is a class of monuments which they may be said to have originated,—a class which was entirely the outcome of their martial spirit, or of their recognition of actions rendered for the good of the state,—their triumphal arches.

Their temples, their circuses, the arrangement as well as the adornment of their homes, had their beginnings in the civilisation of Greece; their theatres and their arts of engineering and construction had alike their origin in that favoured country. These circumstances have to be remembered when we look upon, say, the Coliseum; or upon some long stretch of Roman road; or upon an equally, if not more conspicuous, aqueduct; and we may be inclined to consider that the amphitheatre, the road, or the water-supply, is the class of monument which of itself more truly reveals the genius of the Latin race. Would we study aright the spirit of this wonderful people,—which may hardly be said to have passed away from the men of to-day, so much does it yet live in our midst,—we must study all their works. If we would shorten the study, we can obtain the most ready insight by the consideration of the single class of triumphal arches.

A moderate amount of research reveals the fact that the number of these arches still remaining is very considerable, far more so than many casual observers may anticipate; and although the task would be a very laborious one to make an entire catalogue of all existing or known specimens, yet reference to the most important of those remaining will furnish instructive results.

Perhaps the policy of the wise fathers of the Roman people was never better exercised than in fostering the martial spirit of its sons, and when so much was done to render rewards to all who had served their country well on the field of battle. Crowns and rewards were bestowed on the brave soldiers who had sustained the prestige of their city and country on some hard-fought fight; while, above all, the honour and applause rendered to the heroes on their return from war was freely and unstintedly lavished. It was, in fact, a part of the national spirit to recognise at its proper worth all acts of bravery and endurance undertaken or suffered by the army. How many a stubborn fight was won, and difficult campaign carried to a successful end, by the hope of the reward, the hearty applause of the assembled multitudes welcoming back their victorious troops! How many pens have described the joy of the city, the ringing cheers, the outbursts of enthusiasm of the citizens, as the toil-worn soldiers slowly marched through the marble streets of the Imperial City!

The "triumphs" granted by official decree were, by policy and by the outcome of the national spirit, the highest reward that could be rendered by the Senate to the victorious chief; and the simple arrangements which were adopted in the early days of the city, in the times of the Republic, were doubtless as eagerly coveted, and the chief's arm was as much nerved to exertion to attain the reward, as were

* We propose in this and the next three numbers to accompany these notes on the Triumphal Arches by illustrations of some of the principal examples. With the exception of the Arch of Septimius Severus, the view and details of which are from Gallabaud, these illustrations will be reproductions from some fine and now scarce Italian and French engravings, which have an artistic value of their own, independent of their illustrative use.

those of the generals of later times when greater display was used.

Indeed, the occasion of a "triumph" very soon became an opportunity for the display of the overweening signs of Roman love of conquest and power. Thus, the processions were made of vast length; trophies of all kinds were multiplied and introduced; representations of the cities and towns captured were borne aloft by the soldiers; works of art; the noblest statues of Greece and Asia; camels, elephants, and many other beasts from the far East; captive kings of renown; gold, silver, images of the gods captured in the cities—all served, with long lines of prisoners, to swell the Roman triumph. The treatment of the prisoners taken in war was the most brutalising feature of these processions. Were they ever so brave or noble, these vanquished foes were exposed to the insults and execrations of the lowest of the Roman population, and the lives spared that the captives might take a part in the show, were frequently taken with more or less cruelty as soon as the procession was at an end. It is recorded that to so great an extent was the procession swelled that one day alone was not sufficient for the arrangements. The triumph of Sulla lasted two days, and that of *Æmilius Paulus*, awarded for the victory over *Perseus*, lasted three days.

The victor to whom the triumph had been accorded would assemble his troops outside the gate of the city by which entrance was to be obtained, which was gaily decorated for the occasion, and here the procession would be marshalled. Then, at the *porta triumphalis*, erected in honour of the occasion, it would be met by the civil magistrates, who would take the head of the procession, licitors with their axes keeping the opening through the crowds of applauding spectators. Then would follow the tibicines, the best of the captured booty, models of the cities, pictures of the battles won, statues of river gods, or such like, either carried by soldiers with crowns of victory, or, where possible, borne aloft on the points of lances. Some of these are actually represented upon the bas-reliefs of the arches which remain, and will be noted hereafter. Then would follow the oxen for sacrifice, having gilded horns, with attendants and priests. Following these, were placed groups of musicians, singers, &c.; and lastly, the hero of the triumph, clad in the toga picta and the tunic taken for the occasion from off the statue of awful Jupiter within the temple of the Capitol. The triumphal chariot was drawn by four horses, although in some cases other animals appear to have been employed, and the hero stood in it to receive the acclamations of the multitude, while a *seruus publicus* stood behind him holding the *corona triumphalis* above his head. The course of the procession was past temples and baths, along the Sacred Way, through the Forum, to the Capitol, the course being planned to enable it to be seen by the largest number of the multitudes present. On arrival at the Temple of the Capitoline Jupiter, the oxen were sacrificed in the presence of the people before the altar, and presented as an offering to the god who had rendered victory to the arms of Rome,—a touching and beautiful act of which heathendom might be proud. Festivities and other rejoicings closed the day to the victors, but not to the captives.

Originally the triumphs were awarded by the Senate, not only to the Dictators chosen to command in times of danger, but to Consuls and *Prætors* and, in later times of the Republic, *Legates* also were permitted to enter the city in triumph, permission being granted to men of the latter rank if they had commanded independently and had brought a victorious army to the Capitol from their own province, the slaying of 5,000 enemies being deemed a sufficient service rendered to the state to warrant the granting of the much-coveted honour. Unhappily for Rome, the day came at length when the jealousy of the emperors would not allow of even the temporary honour being rendered to a subject which a triumph afforded, and they were accorded to the emperors only, the last triumph obtained being that of *Octavius*, after the battle in which *Antony* was so signally defeated. The triumphs which follow may have been celebrated with no diminution of pomp; indeed, it is on record that each succeeding one was made more imposing than its predecessor. More than ever were the streets decorated with trappings and hangings; more than before

were sacrifices rendered in the temples blazing with lights and fragrant with incense. More than before were the notable captives paraded in the processions, with all the gorgeous display of the treasures of the conquered countries.

But still the free martial spirit of the older days no longer existed, the applause was not earned by one of the people, but was rendered, it may be, to some emperor whose share of the campaign had been of the smallest, and who was standing in the place and instead of the generals who were worthy.

It is to these later times and ceremonies that the triumphal arches we are about to describe belong. At first, doubtless, the arches erected were of a temporary festal character, erected for the occasion and removed subsequently. Later, the emperors sought to perpetuate their triumphs for all time by the erection of costly arches in marble or stone, built in a manner to survive the flight of time and the war of elements. While, as we have said, the triumphal arch is the outcome of the Roman habits and requirements, so is the architectural design of these structures essentially Roman and not Greek in its form and treatment. Diversified as they are, built as they may be in varying positions and under different conditions, they yet indicate the great difference that exists between the works of the one people and the other to so marked a degree that in no instance known to us could any one example be taken for a Greek rather than a Roman work. They have the semicircular arch and the vault in a marked manner not found in Greek works; columns are introduced, and all the subordinations of architrave, frieze and cornice; yet these latter features are applied rather than being used structurally as the Greeks would have used them; ornament is introduced with no sparing hand, and sculpture occupies a very prominent position, yet it is used as figured work never was by the Grecian artists.

Among the numbers of triumphal arches which remain to us there are those at Rome which call for special notice, and there are also others in the Roman provinces, in various parts of Europe, Asia, and Africa, which belong essentially to the same class, and were called triumphal arches by the Romans themselves, although they have no relation to the processions such as we have described in the Roman metropolis itself.

References exist in the old Latin writers to several arches which once existed in Rome, but which have now passed away; and interesting as may be the considerations of the architectural designs of these, their position, &c., and the few notices relating to them which we may glean from representations on coins and other records, yet the consideration of the actual works remaining may be the best for the practical purposes of this inquiry. The Arch of *Titus* claims our first attention (see lithograph illustration), since it is the oldest of the three special arches which most particularly merit remark; but it is not that which is nearest in position to the Coliseum at the entrance, to speak generally, of the Sacred Way through the Forum up to the Capitol. It was erected, as is so well known, to commemorate the Jewish victories of *Titus*, in the lifetime of his father, *Vespasian*, but from the fact that it was not completed until the time of his successor, *Domitian*, it is evident that it is not the identical arch beneath which *Titus's* procession passed, and we may therefore conclude that it has taken the place of only a temporary structure. Indeed, the beauty of the sculptures and the richness of the design at once attest that this is no building erected in haste. The date of its erection would prepare us to find a design of simple grace and proportion, and we are not disappointed. A single central archway flanked by two columns on each side, half-engaged only, passes through the pile, the vault of which is coffered, the panels being filled with boldly-carved foliage of great beauty. The sides of the arch are occupied by the sculptured panels containing the reference to the momentous events at Jerusalem which have given to this arch such peculiar interest. The sculpture represents one of the groups of soldiers of the triumph of *Titus*, doubtless as they appeared on the occasion, bearing the sacred seven-branched candlestick and other vessels of the Temple of *Jehovah*. On the opposite side is the triumphal car, with *Titus* standing to receive the applause of the multitude, crowned by a winged Victory, having palm

branches, while the genius of the city of Rome leads the way. These two spirited groups are sensibly put in a position where, instead of being borne aloft to meet the violence of the elements, they are sheltered by the arch of the vault. The order is composite, and the work of great beauty; the frieze is filled with sculptured figures, doubtless intended to represent other portions of the procession, for there are the oxen for the sacrifice, the soldiers, the figure of the river god, *Jordan*, and many others. When we regard the beauty of the work, it is painful to consider the loss occasioned by the hand of man rather than the violence of time, and we are reminded of the wretched vandalism which had rule over the superb monuments of Rome in Mediæval times. Old engravings show but too forcibly the treatment to which this fine arch had been subjected. Its lateral portions were demolished, and the whole was encased in a mass of barbarous brickwork, forming a part of one of the fortified houses of some Roman family. All this has fortunately at last been swept away, and the sides are rebuilt. The difference of appearance between the old work and the new being still apparent after the sixty years that have intervened, the student can thus fortunately distinguish between what is original and what is added. The old design is, however, recovered for all practical purposes. And as an example of Roman work of the best and purest period, the Arch of *Titus* is deserving of the most careful study. The material is white marble.

Next in date, close to the Capitol, is the fine Arch of *Lucius Septimius Severus*, of which we reproduce here the illustration from Gailhabaud's "Monuments Anciens et Modernes." It was erected to commemorate his foreign wars, and may be studied as an example of the deterioration of the beauty of detail and the excellence of workmanship which had occurred in the short period of about a hundred years subsequently to the erection of the arch of *Titus*. The design shows a grandiose mass, doubtless inspired by some one or another of the older arches which have perished. It consists of a bold central opening, and two side arches, there being four wholly-detached composite columns, each worked out of a single block of marble, mounted on pedestals on each side. The frieze is plain, but architrave and cornice are overloaded by carved members. There is a large attic entirely occupied from flank to flank by the lengthy inscription of deeply-sunk lettering, once filled in with bronze, that material so lavishly used in Roman works for this purpose, and for many others. An abundance of winged Victories are represented as inscribing upon shields in attitudes not unlike what some have rendered as the correct design of the Victory (as they would call it) of *Brescia*, while the whole of the wall space above the side arches is covered with representations of battles and sieges, arranged in parallel lines one above another. Winged Victories holding trophies fill in the spandrels of the large arch. The sides of the monument are plain, indicating that it was intended to be seen in front. The internal sides are also plain, but the arched roof is finely coffered. Old engravings show that this arch was also fortified, the more modern buildings being built above the attic, along which ran a row of battlements. These have been removed long since, and in 1803 *Pius VII.* had the earth which had accumulated for centuries from 15 ft. to 20 ft. in height, above the base of the arch, removed to its original level, and a protecting wall of enclosure erected around it.

At the entrance of the Sacred Way closest to the Coliseum, and in advance of the Arch of *Titus* in position, is the magnificent Arch of the Emperor *Constantine*. Its design is not unlike, to speak generally, that of the Arch of *Severus*, since, like it, it consists of a fine central archway and two lateral smaller ones. There are four Corinthian columns on each face, the cornices being mitred around them, and the support heavy pedestals, with statues, the pedestals being much wider than the columns. The inscription is of considerable length, and it occupies the compartment of the tall attic over the central archway. The attic is continued over the side arches, and filled in with quadrangular panels of sculpture, representing scenes in the life of the Emperor *Trajan*, while other subjects also relating to *Trajan* and not to *Constantine* occur in the circular panels over the side arches and in the numerous friezes. The inscriptions on this arch, like that of *so*

many other Roman monuments, were formed of bronze letters, but now only the deeply-cut channels for the bronze remain. The arch was formerly buried to a considerable depth, but it was repaired under the pontificate of Clement XII., and excavated to its original level. This Pope's idea of the needs of the building were somewhat remarkable, since one of the eight beautiful yellow marble columns was taken away by him for re-erection in the Church of St. John Lateran, and another of white marble substituted.

The appearance of the Arch of Constantine has occasioned a discussion of no little interest. The greater portion of its sculptures, its columns, cornices, and the central arch, are of earlier date, and refer to the reign of the Emperor Trajan. They are evidently a portion of an earlier building, and are said to have been brought from the triumphal arch which stood at the entrance of Trajan's Forum, while some authorities believe that they are portions of two earlier arches, instead of one. An examination of the earlier parts shows, however, that the design of which they now form a portion could not ever have been very different from what it is at present. The eight columns, four on each side, the sculptures over the side arches, the arrangement of the cornice, formed of the more ancient work, all point to a design as wide, at any rate, as the present, and all referring to the Emperor Trajan. These portions are mixed up and oiled with the portions of more recent and poorer work, which have been referred to, relating to the Emperor Constantine. Broad pilasters have been added to caps too narrow for them, bases have been cut down to accommodate them to other plinths, and other works of alteration are apparent here and there. The occurrence of so much original work is, however, sufficient to give good reason for the belief that the great bulk of the arch is, in fact, that of the Emperor Trajan in its proper position, and that the interpolation of the later work was but as a matter of repair, and to adapt it for use for the triumph of Constantine on its being rebuilt on its present position. The inscription, too, does not preclude the belief that other processions may have passed beneath it, prior to that of Constantine himself. This monument, the first erected after the conversion of the Empire to Christianity,—erected to commemorate the miraculous victory rendered to him over Maxentius,—is remarkable from the fact that neither the cross nor the Labarum, the sacred sign said to have been seen by Constantine in the heavens, and which he accepted as the presage of victory, does not appear anywhere among the numerous carvings or devices. This is the more remarkable, since it was so soon after used as a badge for the soldiers of the army, being emblazoned in purple and gold. Although used for the triumph, it must be remembered that this event was a direct infringement of the usual rules of such an honour; for the foe defeated was not a foreign enemy, but the victor's former colleague.

D'Agincourt has drawn an interesting parallel showing the relation of the design and execution of the Arch of Severus to that of Constantine. In the period of time that had elapsed between the erection of the two arches, the condition of Roman art had still further degenerated. The arch of Severus is overloaded with ornament and enriched members, which show a falling off from the elegance and beauty of earlier works, but the Arch of Constantine indicates this to a much greater degree. The mouldings are heavy, and the enriched members, although in as great a number if not more so, have their carvings designed stiffly and executed poorly, much of the work being little more than bossed out. This is all the more apparent from the poor later work being joined to the portions of the arch derived from that of Trajan's. All these latter parts are designed in the best style of Roman art, and executed with extreme grace and elegance. The impostas of the central arch and the architrave are of this older date, and indicate, by comparison, the poorness of the side arches, which are of the time of Constantine. The fine columns, each being in a single block of beautiful giallo antico marble, delicately fluted, are, with their elaborately-carved caps and bases, of the time of Trajan, but their pedestals, upon which they are mounted, are of the later date.

In like manner, the sculptured figures, the statuary's portion, rather than the architect's, as we should say nowadays, of the arches of

Titus, Trajan, Severus, and Constantine, being thus in close proximity, the progress and decline of the art may be traced by so many steps. The work of the two first shows some of the best examples of Roman monumental art; that of the arch of Constantine is of the poorest, although the artists were still ambitious to execute subjects of large size. Contrasted with the Arch of Severus, the beholder cannot but be struck with the purity of the design of the Arch of Constantine, which appears much better in this respect than that of the former arch, and strengthens the belief that it owes more to the time of Trajan than to that of the later Emperor.

There are some other arches still remaining in Rome which demand a certain amount of notice, before undertaking the consideration of some of the buildings of the same class away from the old metropolis of the world.

The Arch of Drusus (see illustration) is a plain semicircle, springing from impostas and pilasters, and flanked by large columns of the Composite order. There is hardly any moulding to the arch, and the keystone, which is pronounced, extends along the soffit from front to back like a ridge. There is a moulded cornice above, the whole being in good plain style, betokening an early date. Above there is now a mass of ancient Roman brickwork, a portion of a later aqueduct which was as unconsciously carried over it at the later time as is some railway viaduct over existing buildings in this modern nineteenth century among ourselves.

The Arch of Gallieni is not unlike in design that of Drusus, but it is plainer, poorer, wider, and of later date, having plain Corinthian pilasters to form the abutting piers, which are small for the width. The capitals, which are of the Corinthian order, are only bossed out and are not carved. The two side arches have been removed.

The arch called by older antiquaries the Arch of Janus Quadrifrons is a large, singular, four-sided structure, each side resembling the others, and having a bold semicircular arch springing from impostas. The masses of masonry in the angles are decorated with somewhat plain semicircular beaded niches rising tier over tier. There is a bold moulded cornice and an attic, but no inscriptions remain, and the appropriation of the building is still somewhat doubtful.

The Arch of the Goldsmiths is a beautiful structure of small size, covered with elaborate ornament and well-designed sculpture poorly executed, the single opening being only 10 ft. wide. It was erected by the bankers and principal merchants living near the Forum Boarium in honour of the Emperor Severus and Julia his empress. Being of small size the arch form is not used; the opening is covered by a rectangular entablature having a highly-enriched cornice and an inscription. The piers are ornamented with projecting pilasters with composite capitals. One side of the arch is embedded in the side wall of the ancient church of St. Giorgio in Velabro.*

LETTER FROM PARIS.

POSTHUMOUS honours will not be wanting to Théodore Ballu. His name is to be given to a new street in Paris, and in a few days his bust, by Barrias, will be placed at the Hôtel de Ville, on a pedestal decorated with a graceful bronze allegorical figure by M. Contan. Unfortunately the Municipal Council, while thus honouring the memory of Ballu, are meditating a serious injury to his last and most important work. When the new Hôtel de Ville was raised on the ruins of the old one, Ballu reserved for the sittings of the Municipal Assembly a large hall, richly decorated, in the centre of the administrative buildings on the principal façade. Many political changes have taken place since then, and the Council, from a simple communal assembly, has become a kind of Parliament on a small scale, whose noisy debates are now held in public, and it is required that the Parisian electors should be able to see and hear their members debate. For this purpose it is proposed to take the apartment known under the name of "Cour Louis XIV.," the original design of which Ballu had carefully retained, and which constitutes one of the most interesting parts of the new edifice, and to cover up its sculptures and porticos with timber galleries,

in order to make it a *salle de séances* capable of accommodating a number of spectators.

Instead of this piece of architectural spoliation, which would cost about a million francs, others have suggested installing the new *salle* in the "Cour du Préfet." But 600,000 francs would still be required for this scheme, which would also render it necessary to destroy the fine circular staircase which was Ballu's best work; wiser people suggest a simple gallery or tribune on corbels for the spectators, which would cost little and only disfigure the actual *salle* without injuring the building itself. Apparently, however, the Assembly includes among its members some architects little known to fame who are ambitious to try their hands on Ballu's great building, and financial reasons alone seem to have so far kept their schemes in check. These propositions are the more vexatious because the Hôtel de Ville is at last on the eve of being entirely completed. A few days since, four new statues, representing heralds and archers of the Middle Ages, have been added to one of the two grand entrance doors; four others, pendants to these, will be placed almost immediately; and the *salons de réception*, still awaiting their decorative paintings, have been furnished with mirrors, lustres, and electric lighting instalment at a cost of 450,000 francs. Other matters which the Council has settled before vacation have been the subventions to Paris workmen to visit the exhibitions at London, Edinburgh, and Liverpool, the funds for various road improvements, and those for the completion of the work at the Hôtel Carnavalet. It is intended to open here new galleries of Parisian antiquities, formed within old structures rebuilt here from different parts of Paris. At present the 100,000 francs voted by the Council have sufficed for the rebuilding of the Arc de Nazareth, formerly situated near the Prefecture of Police. This charming remnant of the architecture of the time of Henri II., which, fortunately, escaped the Communal incendiaries, has been transported to the garden of the Carnavalet, where it faces the pavilion "De Choiseul."

Among other operations in connexion with records of old Paris, a marble tablet has been placed in the Rue Française, to commemorate the site of the Theatre of the Hôtel de Bourgogne, which was the cradle of the Comédie Française. The inscription, like all the others of the same kind which have been put up in Paris, has been edited by a committee founded by the Préfet Hérolid six years ago, and which is now presided over by M. Leopold Delisle, director of the National Library, with M. Chas. Garnier as vice-president. Thanks to this committee, we have among other things the outline of the plan of the ancient Bastille, actually marked out on the ground in its precise position; and everywhere in Paris we find inscriptions, informing the public as to great events which have taken place at this or that spot; thus providing a kind of course of popular history open to all. We may also mention here, in connexion with the same branch of Governmental work, some new works of art which are soon to adorn the public promenades of Paris. M. Boisseau's group, the "Défense du Foyer," purchased from the *Salon* of 1884, is to be placed in the park of the Champ de Mars, opposite M. Noël's group of combatants purchased from the 1883 *Salon*. M. Contan's "Porteuse de Pain" will go to the Square of St. Jacques la Boucherie; "Le Ferrailleur" of M. Baran is intended for the Square St. Médard; "L'Aveugle" and "Le Paralysique," by M. Michel, will be placed in the Square de Belleville, while the "Jeune Faune," by M. Charpentier, will be placed in the Parc Monceau. The "Marat" of M. Baffier, a coarse piece of work, purchased much more for political than artistic reasons, will find place in the Parc de Montsouris, along with the "Bâton de Vieillesse" of M. Escaula. M. Roland's "Sauvé" will go to the Buttes Chaumont Park, along with "Le Gné" of M. Lefèvre, "L'Abandonnée" of M. Vital Cornu, and the "Au Loup" of M. Hiollin. Lastly, the "Circé" of M. Michel, purchased from the last *Salon*, will be placed in the Square des Batignolles.* We regret to add to the list the name of M. Captier's vulgar production "L'Égalitaire," which merely symbolises anarchy and ferocity. It is a piece of the worst sort of impressionism, and will probably, when placed in its public

* A list of State-purchased works to be read with envy by English sculptors, with shame by an English Government.—Ed.

* To be continued.

position, be estimated at its proper value, even by popular taste. This reminds one, in passing, of the exhibition of "independent artists" which has just opened its doors. If there is little talent or originality here there is at least entire good faith and honesty, but the collection of works might be very well described as a "Salon des Refusés." The independents, so called because they profess to care neither for the State nor for the jury of admission as judges of their work, are, in fact, so exceedingly independent that criticism is entirely disarmed before this array of audacious improvisations.

In the last number of the *Builder* mention was made of the demolition of the monument to the defenders of Paris, on the plateau of Châtillon, the inscription on which was given in our issue for March 27th last (p. 436). This affair has caused a good deal of public feeling, and the Parisian population, always reverential towards the dead, has been a good deal shocked at learning that the State has sold this site to a private purchaser. The motives of this proceeding, with which the Ministry of War has had nothing to do, are unknown, but at present the fragments of the monument are at the side of the road, and no one knows when they are to be put up again. The carelessness of the Administration under the circumstances has been the subject of much comment.

All the French architects, especially those who are officially connected with the Government, have heard with much regret of the retirement, on account of advanced age, of M. Poulin, "Directeur des Bâtiments Civils" to the Ministry of Fine Arts. He was as remarkable for courtesy as for ability in his office, and had none but friends among the architects, and the best wish that can be given to his successor, M. Jules Comte, is that he may find the same general popularity among the Profession.

The partial suppression of the Paris fortifications, which was demanded not only by public opinion, but by the Municipal Administration, and approved by the Minister of War, has received a check. The "Comité de Défense Militaire" has strongly opposed the project of M. Alphand, which has been negatived by fourteen votes against three, in spite of the efforts of General Boulanger and the Governor of Paris.

We can now complete the information we have already given in regard to the sculpture decoration of the New Sorbonne. Besides the two alto-reliefs entrusted to MM. Chapu and Merle, and which symbolize "Les Lettres" and "Les Sciences," M. Falguière—"Personification of Science" in the features of *Alphand*, and M. Delaplanche will represent "Literature" under the guise of Homer. M. Crank will execute the statue of Robert Sorbon, the founder, and M. A. Lanson that of Richelieu; M. Coutan will undertake the statue of Descartes, and M. Barrias that of Pascal; M. Chaplin that of Rollin; M. Dalou, that of Lavoisier; M. Allar, the University of France; M. Delhomme, that of the Republic,—a subject, it must be admitted, very difficult to translate into a work of sculpture.

The organisation of the work for the 1889 Exhibition is now complete, and the commencement of the work is fixed for September 4th. There is some talk of celebrating the laying of the first stone of the construction by some kind of ceremony.

M. Alphand has already chosen as his principal assistants in the work M. Bonvard (City Architect) and MM. Formigé and Dutert, authors of two of the premiated designs, and M. Barts, engineer-in-chief "des promenades et de l'éclairage." M. Dutert has received instructions to construct the large "Galerie des Machines" on the side of the École Militaire. M. Formigé is to take in hand the Fine Arts Palace, forming the principal façade, and in front of which the 300-metre tower is to be erected. The construction of the two pavilions of the French and Foreign Sections is entrusted to M. Bonvard; and M. Barts will overlook the laying-out of the gardens and plantations in connexion with the Exhibition. The *Journal Officiel* publishes, on its part, the official code of regulations for the Exhibition, drawn up by M. Lookroy, who has appointed a Special Commission to oversee the preparations for the International Fine Arts collection in connexion with the Exhibition. The Commission is composed of twenty-three members, architecture being represented by MM. Bailly and Questel.

By the time these words appear, Paris will have celebrated the centenary of the illustrious

Chevreaux. Without going into the details of the fête, we may mention the fine statue of the venerable *savant* which has been modelled in clay by M. Guillaume, and provisionally inaugurated on August 31 in the great Salle du Musée recently built from the designs of M. André, the architect. At this same ceremony the President of the Municipal Council presented M. Chevreaux with a large gold medal, bearing on the obverse a design by M. Daniel Dupuis representing the Union of the Republic and the City of Paris, and on the reverse an inscription recording the circumstances under which it was presented. We prefer, however, another medal which was struck for the occasion, executed by M. Roty, representing a draped antique female figure offering a palm-branch to the eminent *savant*; this medal was offered in the name of "Le Jeune Français."

We ought to mention, in conclusion, the preparations which are being made at the Louvre, to accommodate the interesting and curious collection brought from Persia by M. Dieulafoy, after five years of laborious research, made often amid circumstances of considerable danger. The Direction des Beaux Arts hopes to open soon to the public the gallery in which will be exhibited the fragments from the palaces of Artaxerxes and Darius, which constitute extremely curious specimens of that Persian architecture of which so little now remains to us.

THE EPISCOPAL HERALDRY OF SCOTLAND.

THE arms of the Sees north of the Tweed lack that spirit of antiquity and tradition which enters so largely into the heraldry of the Southern Bishoprics.

The greater part of them have been assumed subsequently to the Reformation, and the continuity has been repeatedly broken by successive occupiers of the Sees varying their seals at pleasure, and thus destroying in a large measure that feeling of interest attaching to "old coats"; and Woodward records those of St. Andrews, Edinburgh, Galloway, Ross, and Argyll, as the only ones that have been properly recorded by the *Lyon King-at-Arms*.

The See of Edinburgh owes its existence to Charles I., its founder, in 1633. The arms are, "Azure: a saltire argent, in the centre chief point a mitre of the last garnished or," being the old national insignia of Scotland differenced with the mitre.

We cannot expect much historic lore surrounding such a comparatively recent creation as this, and perhaps it is with a feeling of disappointment that we pass on so quickly from "Auld Reikie's" cathedral to one of more ancient foundation.

The See of St. Andrews dates from the very earliest introduction of Christianity into Scotland, and was ushered in with a grand old legend of some bones of its patron saint being brought by a Greek monk from Patmè (in accordance with a vision) in a ship that was driven ashore near the present site of the city which bears the name of St. Andrews, and hence arose the cathedral, and at the same time Scotia's national emblem.

The arms of the See are simple, as becomes the first of Scotland's churches, and the blazonry is brevity itself in all its dignity: "Azure: a saltire argent," the shortest, and at the same time, most truly national specimen of episcopal blazonry that is to be met with, being nothing less than the badge of the realm.

We would mention here that the cross of St. Andrew, conjoined with those of St. George and St. Patrick, forms the far-famed "Union Jack of Old England," first incorporated on the accession of James to the throne of Elizabeth.

In the year 1472 St. Andrews was made an archbishopric, and in 1842 became united with the Sees of Dunkeld and Dunblane.

The Bishopric of Dunkeld was made a See by David I., and the arms generally attributed to it are singularly appropriate for such a purpose, being, "Argent: a cross of Calvary, sable, between two pusion nails gules." According to Parker's "Glossary," a cross of Calvary is a passion (or true) cross elevated upon three steps, which, it is said, are symbolical of the three Christian graces, Faith, Hope, and Charity.

Dunblane is believed to have been founded by the same monarch, and its arms were, "Argent: a cross of St. Andrew, engrafted

azure," thus reversing the colours borne by Edinburgh and St. Andrews.

Aberdeen and Orkney form another united See, and the heraldry usually associated with it is of a very remarkable character, "Azure: a temple argent, in the porch thereof St. Nicholas standing mitred and vested, with his right arms extended over three naked children in a boiling caldron, all proper."

Nicholas is looked upon as the protector of sailors and the patron of schoolboys, and the three children depicted above refer to the Saint discovering them prepared for food during a dreadful famine, and restoring their mutilated remains to life. He was greatly esteemed south of the Tweed, especially in seaport towns; and Parker records that 372 of our churches bear his name.

The arms of the See of Glasgow are also of a very remarkable nature, and their blazonry is a long one, "Argent: in base a tree growing out of a mount vert, pendent from a branch; on sinister side a bell or, and in chief a robin proper; above the mount a salmon fessewise on his back of the last, and in his mouth an annulet of the third (for Glasgow) impaling argent. St. Ninian, pontifically habited, purpure, on his head a mitre, and in his dexter hand a crosier, both or" (for Galloway). The figure of the fish refers (says Woodward) to a legend of a lady losing her ring, and its marvellous recovery by St. Kentigern,—by whom the cathedral is said to have been founded somewhere about the close of the sixth century.

The robin (says the same authority) refers to another legend about the Saint, who is said to have restored to life the pet bird of St. Serf after its head had been torn off.

Moule thinks the salmon may refer to the produce of the Clyde, and that the ring is perhaps a type of the annular money current among the Britons.

Dr. Doran throws cold water upon the many interpretations that have been given to account for the strange combination of figures in these arms of Glasgow city and See (for they belong to both), but unfortunately without giving any theory of his own, and at this we leave the vexed question, simply adding that the fish and ring story is a universal one, and current in many tongues.

The See of Galloway is suffragan to that of Glasgow, and hence its arms appear on the sinister side of the shield; they call for little notice; the figure of St. Ninian is that of its founder in the fifth century.

The arms of the See of Brechin are those borne by the Wisharts (who were formerly lords of the place) and contain nothing episcopal, being simply "Argent, three piles meeting in base gules." The pile as a figure in heraldry is of unknown origin (as many of its figures are), but Lower suggests that it may represent the skin of an animal worn over a man's shoulders with the head-pair downwards, after the fashion of our ancestors; its true shape is wedge-like. Brechin became a bishop's seat about the middle of the twelfth century, and the old Abbey of the Culdees, with its quaint round tower, was used for the cathedral.

The union of Argyll and the Isles was accomplished in 1845: the latter included the Isle of Man until its conquest by the English, when the connexion was severed, and the Hebrides alone remained to Scotland as "The See of the Isles." The arms of the united See are "Azure: two crosiers in saltire surmounted by a mitre or (for Argyll) impaling azure; in base, on waves of the sea, St. Columba praying in a coracle proper; in dexter chief a star or." We may dismiss those on the dexter as a church coat of the conventional type, but the figure of St. Columba (and the star) is very expressive and beautiful as the original founder of the See, which was destined to become such a centre of light and influence amongst the surrounding waste.

Moray, Ross, and Caithness form a united See; the foundation of the latter is a matter of doubt, but Moray is believed to have been created in 1115 by Alexander I., while Ross is supposed to date from the early part of the thirteenth century.

The arms of this triple See are, "Per fesse, in chief per pale dexter azure, Saint Giles standing within the porch of a church mitred and holding within his dexter hand a passion cross, in the sinister a book, all proper" (for Moray). "Sinister argent, Saint Boniface proper habited gules, and a bishop vested purpure, with mitre and pastoral staff or" (for Ross). "In

base, azure, a crown of thorns or, between three saltires couped of the last," for Caltheus.

These devices speak for themselves, and form a befitting shield for the purpose, but there is nothing of special interest about it that we are aware of. St. Giles will be remembered as the patron of all cripples, and Boniface as the apostle of Germany, where he suffered martyrdom in his seventy-fifth year.

As we have already remarked, Scotland is not so rich in her heraldic associations as England, nor does the halo of antiquity so much enshrine them. Her bishops, through their unswerving allegiance to the Stuart dynasty, incurred the censure of William III. of Orange, who abolished the episcopacy they represented; but in spite of this the spirit of succession was not entirely suppressed in them, and in a mutilated form the Sees have held their own down to the present day, fourteen in number.

PHARAOH'S HOUSE IN TAPHANES, AND THE RELICS DISCOVERED THERE.

THE remarkable discovery made by Mr. Flinders Petrie of the remains of "Pharaoh's House in Taphanes," to use the title given in the Book of Jeremiah, will not soon be forgotten, announced as it was in the *Times* of the 18th of June last, by one of the most graphic of narrators. The interest so widely excited by the importance of the remains brought to light, and by the illustration they render to the Biblical story, is about to have additional gratification by the exhibition of a mass of the relics found on the actual spot during the excavations made by the painstaking and enthusiastic discoverer.

Under the auspices of the Egyptian Exploration Fund, in rooms at Oxford Mansions, Regent-circus, kindly lent by the Royal Archaeological Institute for the purpose on Tuesdays, Thursdays, and Saturdays during the hours of ten and four, for some time to come the objects found will be on view to any lady or gentleman presenting an address card. A private view has just been held, and the objects are already fairly well arranged. Let not a casual observer, however, expect a sight remarkable to the eye. On the contrary, he will notice only a moderate-sized room filled to overflowing with a mass of broken pottery and antiquities of moderate dimensions securely placed in glass cases. A closer inspection will show that the fittle ware and many of the other relics command, and deserve to command, the closest attention that can be bestowed upon them, for they are of types hitherto unknown. The collection will be best understood by the inspection of a ground-plan prepared by Mr. Petrie, which shows clearly the position of what must have been the great square tower-like building forming the palace proper. Only the sub-structure remains, showing that the square cell-like compartments had been vaulted over to raise the level of the better apartments well above the level of the plain, the material being sun-dried bricks. This main building was enclosed by a huge wall, forming a parallelogram about three furlongs in length by nearly a quarter of a mile along the smallest side. This inclosed the courtyard, where, leading up to the entrance, according to Eastern usage, was the brickwork pavement, "the brickwork which is at the entry of Pharaoh's house in Taphanes," again to quote Jeremiah.

Sufficient of this pavement remains in position to enable Mr. Petrie to lay its extent down on plan, and to show the exact accord of the Biblical narrative with the actual remains. The plan indicates the direction of the canal, the fresh-water lake, and the position of Lake Menzaleh, of the military camp between the palace and the latter, and of the town on the opposite side, between the palace and the fresh-water lake. A small sketch shows how completely the huge mass of brickwork forming the remains was buried beneath the Mound of Tell Defenneh, which was alone visible to the explorer when he first beheld it "standing high against a lurid sky and reddened by a fiery sunset," when he arrived at it footsore and weary at the end of a long journey.

One of the most interesting groups of objects found are those from the foundation angles. There are small blocks of the four precious metals—gold, silver, lead, and copper; corn rubbers, some of the bones of a bull offered as a sacrifice when the deposit was laid, and of the sacrificial vessel. Also the cartouche of Psam-

metichus, who built the palace about the year B.C. 666. Under the foundation angle of another and later building a deposit of charcoal and pigeons' bones was met with. Among the mass of pottery there are several amphoræ of large size, perfect, or nearly so; one, in particular, measures about 5 ft. in height. Others are of interesting and curious forms, resembling Greek work, although found in Egypt. The finding of clear traces of Greek potters' work was one of the results of Mr. Petrie's discovery of the site of Naucratis. Here, again, there is ample evidence that the pottery found in such abundance on this newly-excavated site was also the work of Greeks, for on many of the vessels Greek characters are inscribed.

Some of these are scratched on the surface, and indicate that Greeks lived at Tell Defenneh, but those referred to were made on the clay before baking, and are clearly the marks of the potters. While many thousands of fragments of pottery have been found, it is a remarkable fact that only a few solitary pieces correspond with the Greek pottery found at Naucratis, the character of the works of the two sites being remarkably different, although both are Greek.

The amphoræ have contained wine, and great care has been used in the securing of the contents. First of all a bung of pottery was inserted. This was covered with plaster, then with muslin, for its pattern remains on the plaster; then it was corded and sealed with the seals of six inspectors. Finally it was all plastered over and marked with the seal of the king. The names of Psammethichus I., Necho, Psammethichus II., and some others have thus been noted. One of these amphoræ has, however, been tampered with, by a bored hole through bung and plaster alike, the latter being covered by a clever interpolation, which is not sufficient to show us 2,400 years afterwards of the theft then committed.

Apart from the pottery, the cases are filled with bronzes, which reach to a late date. Here is a neat little bolt for a cabinet, with a hinge, nails, chisels large and small; swivel rings, probably portion of horse trappings; some very neatly-worked arrow-heads, also of bronze; others of leaf pattern. A draught-board of clay requires notice. The squares are roughly marked out in rows of three, ten times repeated. The draughtmen are rough patches of baked clay. Another draught-board has been roughly marked out on an earthenware plate. Two or three pieces of iron scale armour have been found, of very neat workmanship, of six thicknesses of metal overlapping. The iron implements consist of swords, leaf-shaped knives, an auger, and such like. A few gold ornaments are also exhibited.

Mr. Petrie's former discovery, the unearthing of Naucratis, derives additional interest from the exhibition now of many other relics found at Tell Nebesheh. Here, for the first time, we can trace on the plan exhibited the form of an ancient Egyptian town. The buildings are enclosed within squares of walls separated by narrow streets, each square containing many apartments opening from a courtyard in apparently every case, there being but little attempt at arrangement of the squares, or uniformity of size. The deposit met with at the foundation of the south-west corner of the Temple of Uti consists of limestone, gold, and silver, copper and lead, carnetian and lapis lazuli. Above these was a curious deposit of small models of vases. One of the most recent discoveries here comes from the cemetery. The pottery in one spot is of Cypriote form, identical with what is so familiar to us in the Cesnola collection. Bronze lance-heads and lance-rests are found in abundance on the same spot. Was this a cemetery of Cypriote mercenaries? In any case, it must have been a deposit of great antiquity, for it is cut through by a tomb of the twenty-sixth dynasty.

Opening of a New Public School in Dundee.—Rosebank public school, the latest addition to the school buildings in Dundee, was formally opened by the members of the School Board on Tuesday. Rosebank school, which has accommodation for 1,085 scholars, was built from designs by the late Mr. Ireland, and the plans were so much admired that Mr. Robson, architect to the Education Department, asked permission to take a copy of them to serve as a model for the guidance of other School Boards.

FORESTS AND FOREST CULTURE IN SWEDEN.

IN view of the inquiry which is now in progress in this country, as to the establishment of a school of forestry similar to those which exist in other countries, and the best means to be adopted for the preservation and planting of forests, it may be of interest to note what is done in this direction in a great timber-producing country like Sweden. There is in that country an excellent school of forestry, on German principles, and also a Government board for the protection of the Crown forests, with a whole army of foresters, rangers, &c., located throughout the land. And this body of men does not consist of wood-cutters and lumbermen, but of gentlemen of education and high standing. That this service, which is far from remunerative, should attract such men is firstly due to the circumstance that the forester, or as he is styled in Sweden, *herr forstcandidaten* (i.e., a forester who has passed his examination), is an official of standing in the district in which he resides, ranking among the Government authorities and the gentry; and secondly, that a free and unfettered life in the enormous fir forests of Sweden, teeming with game, has an indescribable charm to many. The Crown forests are divided into "reviers," each being administered by a staff of foresters, who report upon the state of the forests, the prices ruling for timber, &c., to the head office. It is also their duty to mark out once a year those trees which are considered mature for cutting, and report their number to the Government Office. This done, the foresters receive orders to invite tenders for, or hold an auction over, a certain number of trees, the quantity being naturally guided by the prices ruling, and these trees are subsequently sold "on the roots," i.e., in the ground, the purchasers undertaking the removal. During somewhat recent years, however, the thinning, and, in fact, entire clearing of forests, has become so serious that laws have had to be enacted, that a certain portion of the ground cleared shall be replanted, branches removed, &c.; but it is clear that this can only be partially effected in a country so rocky as Sweden. The re-planting is very laborious and expensive, as it takes up such a great deal of time. But in order to save all expense, and, what is equally important, to give the rising generation of peasants an interest in the forests and their protection, and an idea of their beneficial influence on the climate, the Society for the Promotion of Arboriculture, a semi-Government association, has, with the sanction of the authorities, hit upon the brilliant idea of using the school-board children in the country to plant. It is obvious that the undertaking is both instructive and healthy, and affords great amusement and rivalry among the children, and it has been crowned with the greatest success. The young trees are supplied by the nurseries belonging to the society, there being as many as a hundred such in some counties, and forwarded to the schools, when certain hours,—at the discretion of the teacher,—are employed by the children in planting them under proper directions. As an example of what may be done in this manner, it may be mentioned that in the province of Södermania (where the Prince of Wales hunted the elk last autumn) nearly 3,000 school-board children were engaged in this pursuit last summer, and thus learning to all intents and purposes practical forest-culture, the result being the planting of some 200 acres of cleared land with young fir, spruce, and larch trees. In addition to this work, 12 lb. of seed of these species of trees were collected, which were purchased by the society. The result has been equally satisfactory in other provinces. We referred above to the branches of the trees, and these have really more to do than waste and reckless clearing with the gradual extermination of the Swedish forests; for when trees, as is mostly the case, are cut in remote and almost inaccessible parts, the branches have to be hewn off, as they cannot be removed without great expense. These are left to cover the ground, which entirely arrests the growth of the young trees underneath. To this contributes also, naturally, the dragging of the trees through the forests, the tramping of horses and men, &c.; but how this is to be avoided in a country like Sweden it is difficult to say. With regard to the growth of the planted trees,—apart from



Cottages at Entrance to Churchyard, Penshurst, Kent.—Sketched by Mr. G. Ashburner.

the circumstance that, naturally, a great many die,—Sweden might furnish some interesting and important information to the Commission which is now dealing with this subject in this country, as the climatic conditions of the two countries are at less variance than that of England and any other forest-growing Continental country. Thus, it has been found in Sweden,—but, of course, a very wide margin must be allowed for local conditions in coming to any such conclusion,—that a naturally-grown fir or spruce tree, in fair position, takes from twenty-five to thirty years to mature, i.e., say, being 30 ft. in height, and having a diameter at 2 ft. from the ground of 2 ft. to 2 ft. 6 in. An oak or beech tree would take from thirty to fifty years. A cultivated fir, spruce, or oak would, on the other hand, take twice as many years to reach the same dimensions; in fact, it may be doubted whether firs or spruces planted in Sweden this century have as yet reached maturity. It is, therefore, evident that man has but little chance against Nature in this field when once her laws have been violated.

Finally, it may be mentioned, in order to show the timber wealth of Sweden, that the country possesses at present some 105,000 square miles of forests, of which a seventh part belongs to the Crown. The revenue from the latter was in 1884, 1,120,000*l.*, having risen from 750,000*l.* in 1880, and 890,000*l.* in 1882. Last year it is estimated as slightly less than in 1884.

Illustrations.

THE NEW FRESCO AT THE SOUTH KENSINGTON MUSEUM.

WE give this week an illustration of this important decorative wall painting by Sir F. Leighton, to which we have already referred in the last number of the *Builder*.

The general idea of the painting evidently is that the industrial arts in times of peace are mainly dedicated to the use and adornment of the fairer half of mankind, who thus form the centre of the picture and are ministered to by the labours of the men. In the opposite fresco,

where the industrial arts are applied to war, the women work for the men; in the times of peace the men work for the women. This view does not, indeed, cover the whole meaning of the design; industrial art applied to the theatre, for instance, is suggested by the masks seen hanging over the door on the right. Other manufactures suggested are robes, carpets, textile fabrics generally, jewellery, pottery, bronzes, &c.

We should add that the title, "The Arts of Peace," is not that intended by the painter, whose title for his picture is "Industrial Art applied to Peace," in contradistinction to the other fresco, "Industrial Art applied to War." This is more intelligible than "The Arts of Peace," which is a very unmeaning title; though we may observe that "art applied to peace" is not quite a parallel expression with "applied to war," since "war" implies an action or series of actions in a sense in which "peace" does not: swords and spears are useful in the prosecution of war, but we cannot say textiles and bronzes are useful in the prosecution of peace. We should, however, have given Sir F. Leighton's own title had we received his disclaimer of the other in time; but we received an invitation card to the private view with the title, "The Arts of Peace," in very large capitals; and if the South Kensington authorities cannot give the right name to their own picture it is no fault of ours.

REREDOS, PLYMPTON ST. MARY CHURCH, DEVON.

The accompanying illustration of a reredos recently placed in Plympton St. Mary Church, Devon, represents a memorial erected to the Rev. Merton Smith by his brothers, the Rev. Oswald Smith and Mr. Jason Smith. Mr. Merton Smith was killed by accidentally slipping down some rocks near Eaux Bonnes, in the Pyrenees, and his body was not recovered until some twelve months after the accident had occurred.

The reredos is of three compartments. The centre has a recessed niche for the altar cross. The two sides have as subjects, the Adoration of the Shepherds and the Entombment. The

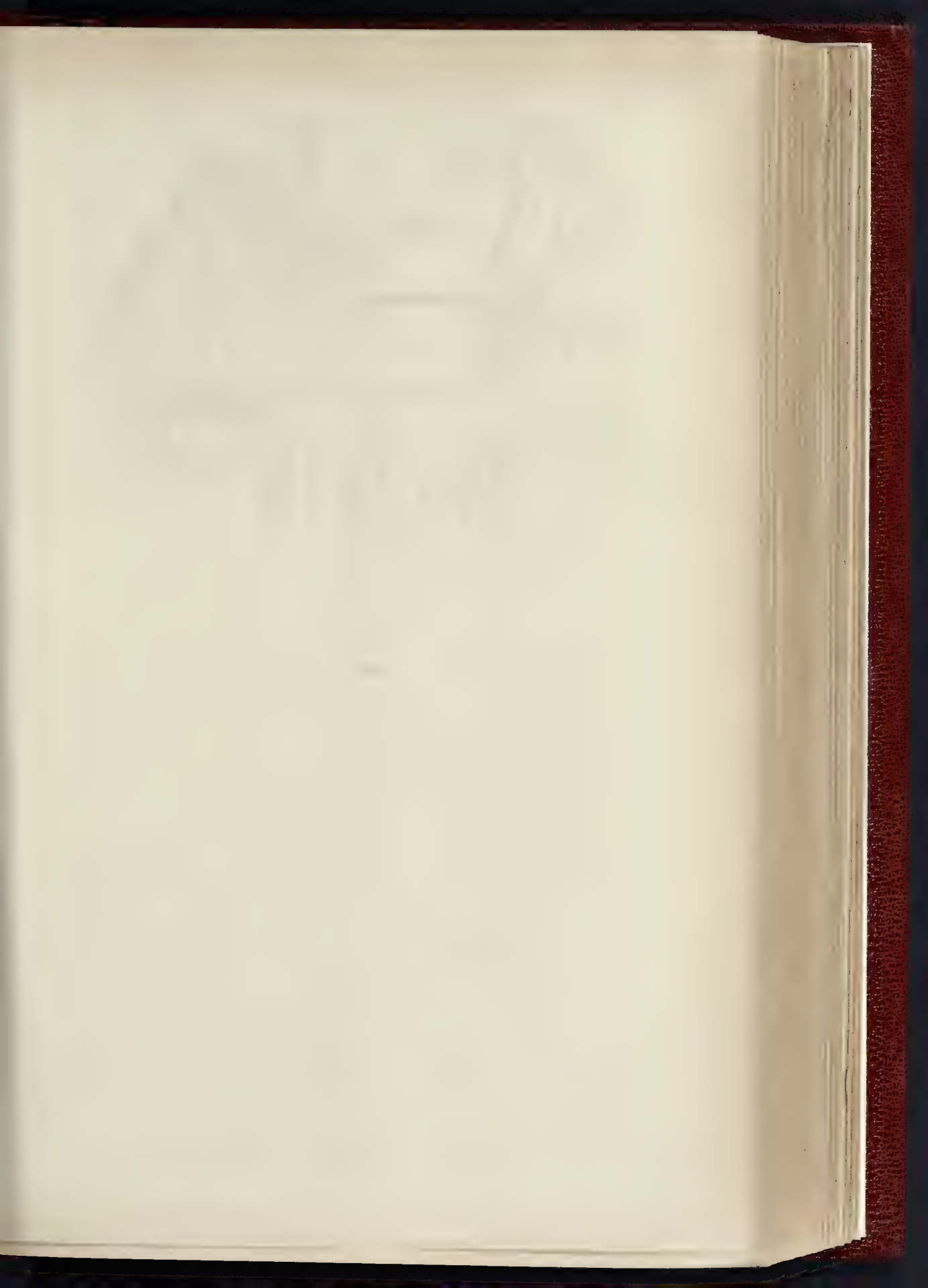
upright panels which divide the reredos into compartments contain figures of angels in low relief. The angels looking on at the Adoration of the Shepherds are singing and playing instruments of music. Those looking on at the Entombment are sorrowful, and carry in their hands the instruments of the Passion. The upper part of the reredos is projected forward, and has panels containing busts of prophets holding scrolls, with prophecies referring to the birth and death of the Saviour. The cornice is of rich open work.

The reredos is constructed of red Mansfield stone; the carved panels are of Caen stone. At the sides of the reredos the church wall is lined with alabaster panels.

The architect from whose designs the work is executed is Mr. J. D. Sedding, of London. Mr. G. W. Seale, of Brixton, is the sculptor.

An International Exhibition at Saltaire.

Simultaneously with the projected exhibitions at Manchester and Newcastle next year there is to be an international exhibition held at Saltaire, in Yorkshire, the seat of the alpaca industry introduced into this country by the late Sir Titus Salt. It is being organised by the Governors of the Salt Schools, which consist of the Institute, Art and Science Schools now in course of erection, and boys' and girls' high schools. The present buildings of the trust, costing over 40,000*l.*, were presented to the township of Shipley by Sir Titus Salt, and the new Art and Science Schools are to form a memorial to Sir Titus Salt, and will cost 10,000*l.* The buildings are to be supplemented by temporary annexes, and the whole will provide 110,000 square feet of superficial area, the permanent buildings containing 50,000 ft. of floor space. Pleasure-grounds and gardens are to be added, and also a spacious concert-room. The objects of the exhibition are to assist in defraying the cost of the new schools, to promote the general work of the Salt schools, and at the same time to give the people of Yorkshire an opportunity of studying examples of the best work achieved in art, science, and general industry. There are to be no fewer than eighteen sections or classes.





REREDOS, PLYMPTON

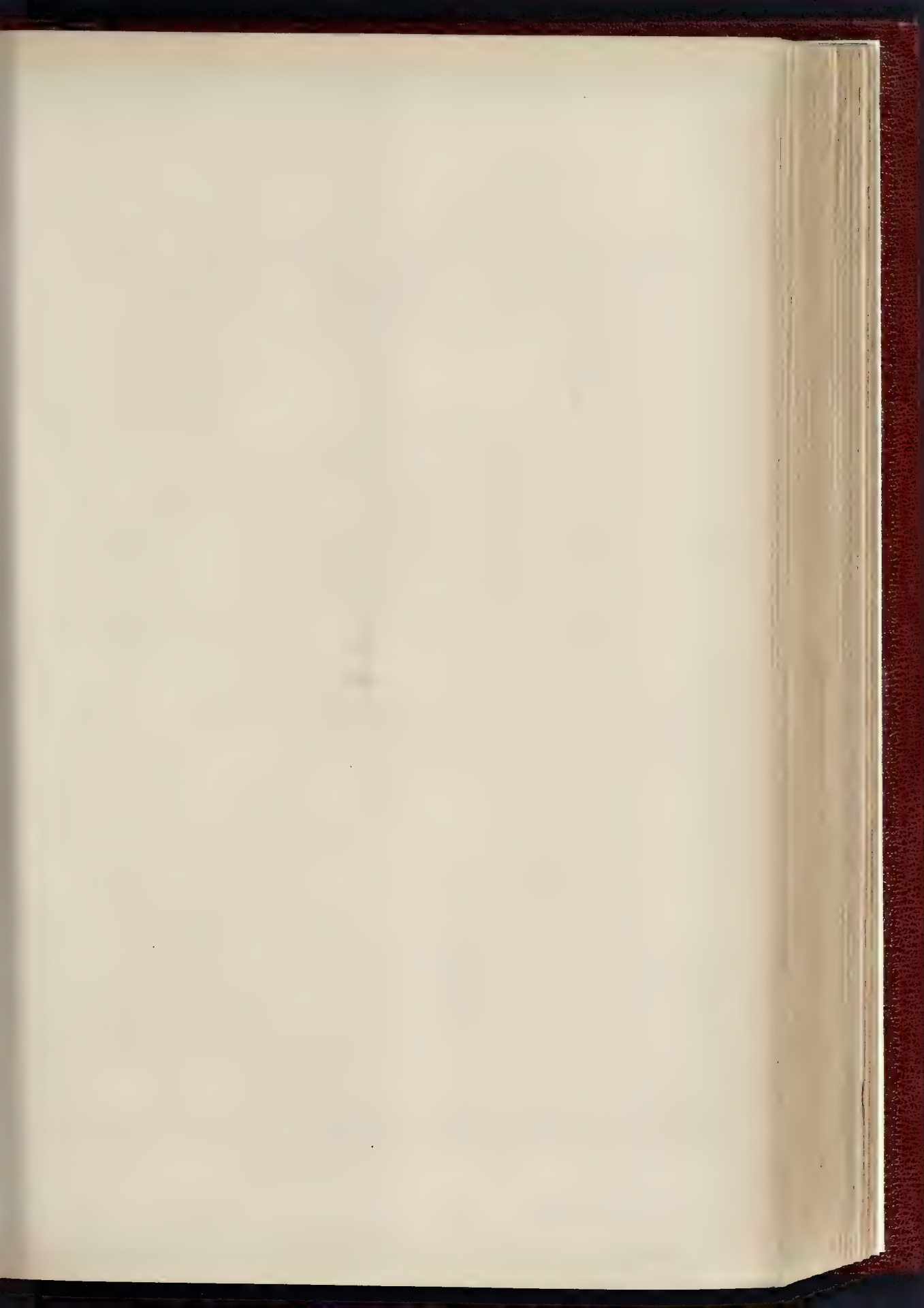
M. G. W. SEALL, SCULPTOR, BRINTON



"PHOTOSIMILE" HILL & COMPTON, 9 MONKWELL ST. LONDON, W. C.

RY CHURCH, DEVON.

N D. SEDDING, F.R.I.B.A., ARCHITECT.



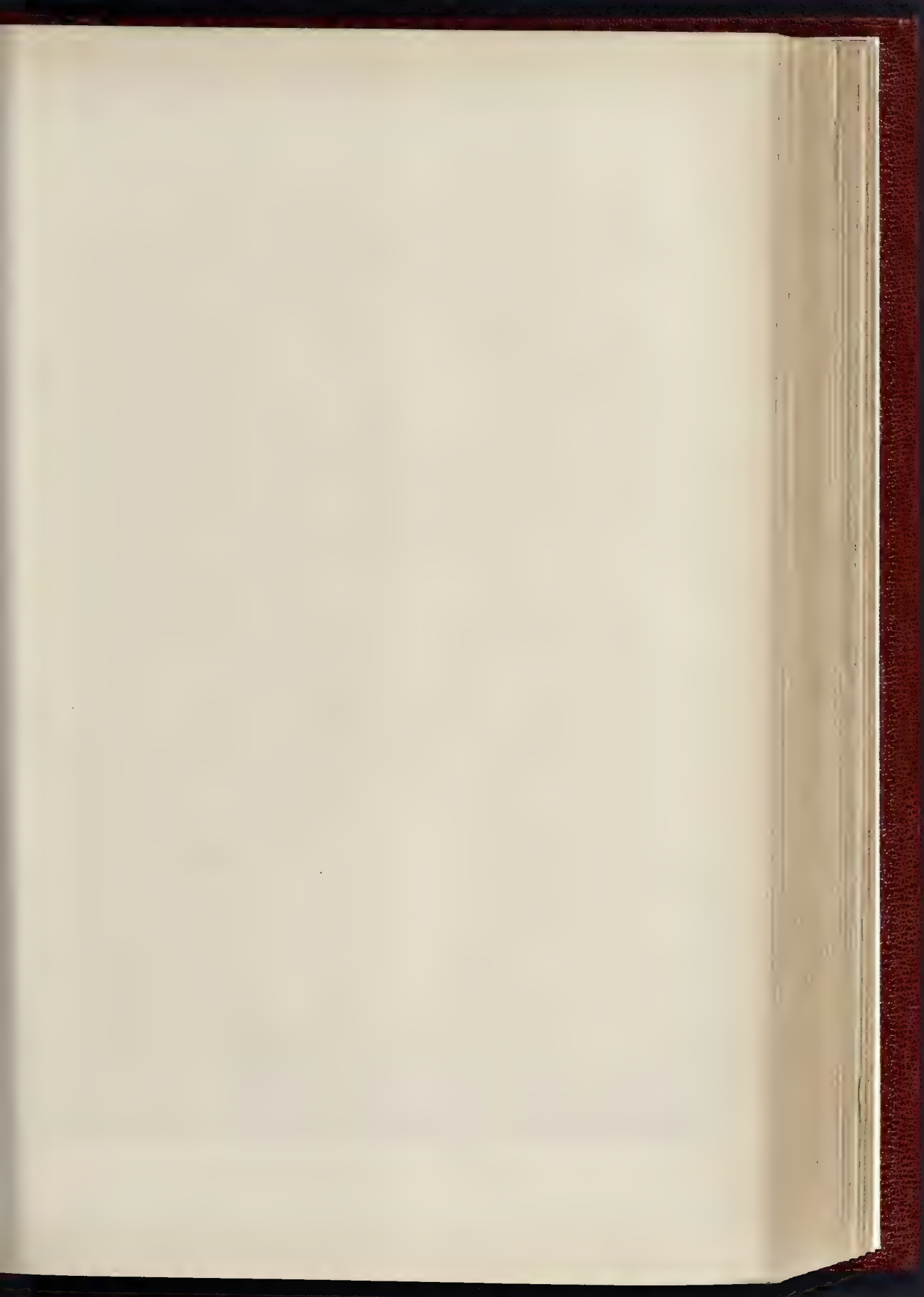
THE BUILDER, SEPTEMBER 4, 1888.



THE TRIUMPHAL ARCHES OF THE ROMANS.

ARCH OF SEPTIMIUS SEVERUS.

From Gailhard's "Monuments Anciens et Modernes."





THE TRIUMPHAL ARCHES OF THE ROMANS.

THE ARCH OF TITUS, AS IT APPEARED PREVIOUS TO 1824.

From an Engraving by Rossini



THE ARTS AND CRAFTS MUSEUM, LONDON, ENGLAND.

By Sir F. Leighton, Bart., P.R.A.

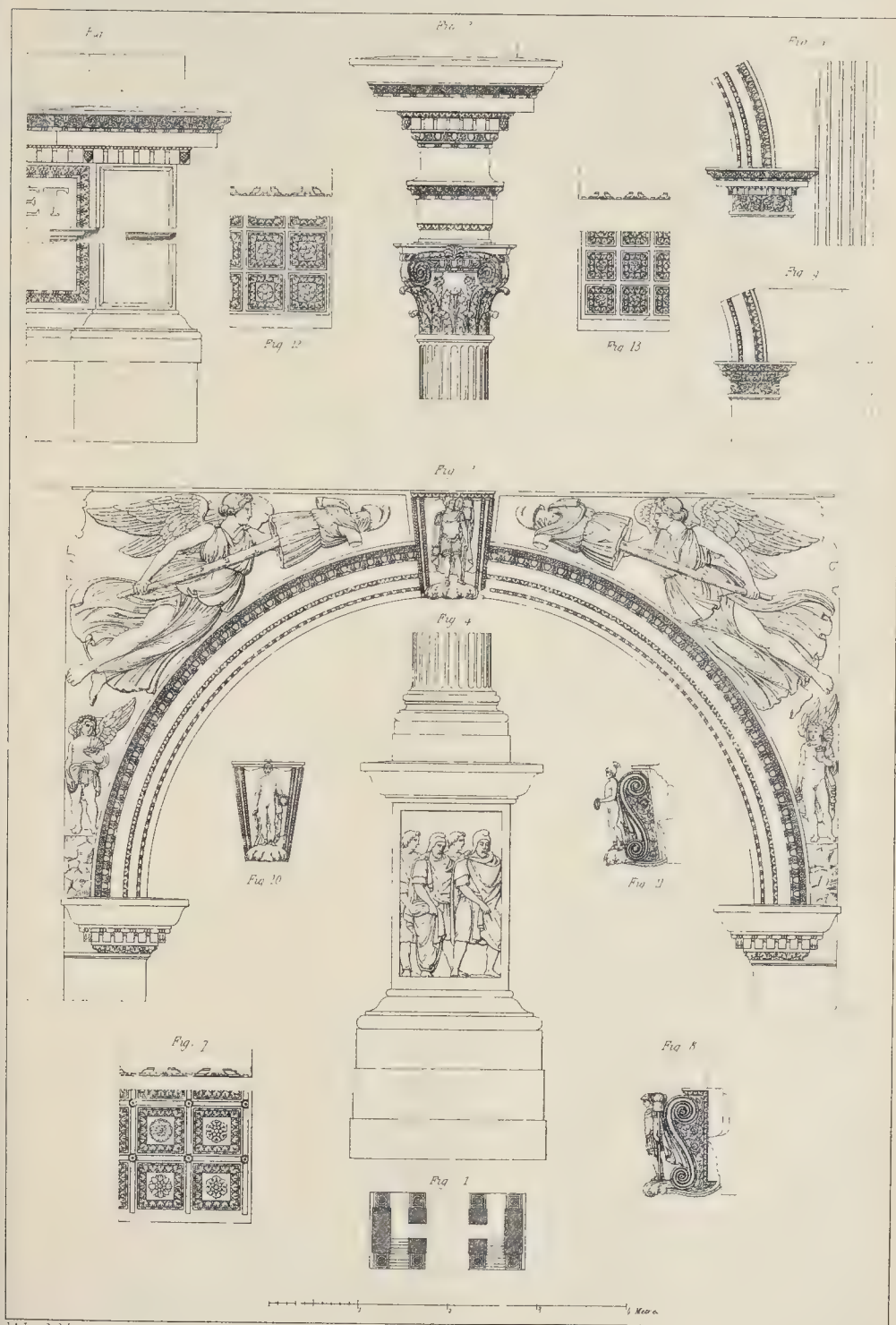
THE UNIVERSITY OF CHICAGO PRESS



THE TRIUMPHAL ARCHES OF THE ROMANS.

THE ARCH OF DRUSUS

From an Engraving by Rosazzi



THE TRIUMPHAL ARCHES OF THE ROMANS.

DETAILS, ARCH OF SEPTIMIUS SEVERUS.

From an Engraving by Rossini.



Towers on the Old Wall, Great Yarmouth. - Sketched by Mr. G. Ashburner.

CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.*

On Wednesday morning in last week about 100 of the members met in front of the Royal Institution, Swansea, and took their seats in carriages of all descriptions for an excursion into North Gower. This time the exit from Swansea was on the western side, and showed a strange contrast to that traversed on the previous day on the road to Margam Abbey. Roads shaded by well-grown trees, and lined with smooth shaven lawns gay with flowers, replaced colliers' cottages and their grimy surroundings. Why is it that towns always turn their seamy sides to the east? Soon after passing the suburbs of Swansea, Fairwood Common was reached,—a tract of moorland some seven miles in length, on which large numbers of semi-wild Welsh ponies are bred. At the further end of this waste land the visitors were met by the Rev. J. D. Davies, author of "The History of West Gower," and conducted by him to the remains of an early church, named Llanpencreg, concerning which edifice a dire dispute took place in the sixth century between Odocus, bishop of Llandaff, and Bivan, abbot of Llantwit, which controversy ended in favour of the bishop. As this tumult still bears the name of Penycrug, Mr. Davies has no doubt that the church of Llanpencreg stood in its immediate vicinity, but as no remains of the sacred edifice exist all the visitors saw was the base of a round or bronze-age tump, which had been dug into and otherwise misused by many generations. On leaving Penycrug the carriages took a road somewhat to the northward, and the first object of interest that presented itself was a large and apparently perfect earthwork crowning a hill to the right. Then a stretch of seascape opened in front, bounded in the extreme distance by the Carmarthenshire hills near Langhorne, while the towns of Llanelly and Pembury occupied the middle distance. The carriages shortly afterwards pulled up on the top of a hill, down which runs a lane leading to Llanrhidian village, where the excursionists were met by the President, Mr. Llewellyn, and Lord Cawdor, who had driven with him from Penllergare. The party went into a cottage garden, to see a

thirteenth-century grave-stone. As was not unusual at that period, only the head of the deceased was represented on the stone. A rubbing of some slight remains of lettering was taken by the Rev. Trevor Owen; but as the stone had been employed as a door-step, the inscription was almost obliterated. As worked stones not unfrequently turn up in the adjacent garden, it seems likely that a church of some description once occupied this spot. Immediately below the cottage containing the grave-stone is a sort of village green, on which are two stones. The lower one appears to be a menhir, which, having been overthrown perhaps by iconoclastic early Christians, was re-erected by the vicar about forty years ago. The upper stone has even a more curious history. It is the portion of the shaft of a very fine wheel cross, which has been jammed into a crevice of the natural rock. A slight portion of the lower part of the wheel remains, and this was used as a pilory within the memory of man, the offenders being secured by a chain which was fixed to two iron staples still remaining. Having examined these curious stones, the party turned into the churchyard. Mr. Freeman, in a paper written some years ago, observes that in the south-eastern portion of Gower, where English place-names abound, the church towers are embattled, but in the north-western division of the peninsula, in which the villagers retain their Kymric nomenclature, the church towers are saddle-backed in both districts; the rule is proved by a solitary exception in the south. The Ilston tower bears a saddle-back; in the north this church of Llanrhidian has an embattled square tower. In the churchyard on the southern side of the church lies a huge block of stone partially buried in the hill, and which is elaborately carved on one face. The side next the hill is hollowed out either by nature or by man, which has given rise to the notion that this object was a stone coffin, but a slight examination disproves the theory; first, the stone from end to end is not more than 5 ft. 6 in. in length; secondly, the depression which is supposed to have contained the head is only 6 in. in depth, and is on one side of the main hollowing, rendering it impossible to place a corpse into the stone. Some of the members deemed the stone had been a churchyard cross, and that the depression had held one arm of the same, others again thought it had been

fixed in the wall of the church, but Mr. Worthington Smith (who made an admirable picture of the carving on the stone) suggested it had once formed the base of the wheel cross previously referred to as having been degraded and used as a parish stocks. The carved work represents two archaic heads, some interlaced work, such as we find on the Pembrokeshire crosses of Carew and Nevern, with other markings, which seem to follow the natural outline of the stone.

From Llanrhidian the party drove on to Weobley Castle, when the order was given that luncheon should be eaten, members having been warned to provide their own commissariat. Weobley, or what remains of it, seems to date from the fourteenth century, and is a somewhat puzzling block of buildings, two sides only being left to give us the clue, and these appear as a labyrinthine cluster of towers, angles, buttresses, and queer projections, the whole being lighted by small quatrefoil and cinquefoil windows. Mr. Davies gave an exhaustive account of the history of Weobley. It is first mentioned in the Brut-y-Tywyssogion, where it is stated that the castle was "built by Harry Beaumont, who came from Somerset, warred against the sons of Caradoc, and built Weobley Castle." It was burned by the Welsh in 1180, and, having been rebuilt, was eventually dismantled by order of the Protector in 1648. From the Castle the party proceeded to inspect a menhir or monolith known as Samson's Jack. At this point the party divided, the bulk returning to Swansea, and one adventurous division climbing the height of Cefn Bryn, to see the cromlech known as Arthur's Stone. This mighty dolmen is formed of an unshapely mass of the conglomerate of the old red sandstone of the district; it is now about 14 ft. long, 7 ft. deep, and 6 ft. broad, but these were not its original dimensions, for there is a block lying by its side large enough to make the cover for a very respectable small dolmen. According to the story this was shorn off by the sword of no less a personage than holy David, the patron saint of Wales. The stone originally was sustained by eight, or perhaps more, uprights, but is now held up by four. Its weight is calculated at twenty-five tons. Being their own masters, the adventurous party referred to determined to proceed from Arthur's Stone to Penrice Castle, which was voted by acclamation

* Continued from page 323, ante.

to be the crowning beauty of the day's excursion. It stands in a beautifully-timbered park, which slopes down to the shores of Oxwich Bay. The castle itself stands on a mound overlooking the modern house of Penrice, one of the many mansions belonging to Mr. C. K. M. Talbot, M.P., of Margam, Lord Lieutenant of Glamorgan, and father of the House of Commons. Penrice is, without doubt, the most important military ruin in Gower, and the visitors regretted that the lateness of the hour prevented them from making a careful examination of the structure. From Penrice they drove back to Swansea, through the wooded lanes of South Gower, and did not reach their destination until ten o'clock, too late for the evening meeting, at which a paper, by Mr. T. L. Fowler, "On Certain Stones found in the Gnoil Neath," was read by the local secretary, Mr. W. Lewis, in the author's absence. On this there was a discussion, in which Major Lawson Lowe, Mr. Banks, and other members took part.

On Thursday Mr. Bath conducted the archaeologists to Swansea Castle. The parapets of open arches, which embattle the keep, form a striking feature. These were built by Bishop Gower in the fourteenth century, and their chief interest consists in their extreme dissimilarity to the building bishop's arch-work at his two palaces of St. David's and Lamphey Court, for at Swansea the arches are elaborated with pillars and wrought capitals, whereas in the Pembroke-shire examples the arches are perfectly plain, round-headed, and formed out of the main wall, the result being much more effective than the more pretentious work at Swansea. In the Castle Mr. Capper read an admirable paper on the history of the Castle. The party next proceeded to St. Mary-street, which formerly was better known as Butter-street, to examine the remains of the old monastic hospital which form part of the old gabled Cross Keys tavern and the adjacent houses in Cross-street. Here Mr. J. Buckley Wilson, M.R.I.B.A., exhibited a ground plan, a section of the roofing of the old hospital, and an imaginary sketch of the interior of the old chapel, the open timber work of the roof of which still remains in place. The discovery of these fine old oak roofs was made by Mr. Wilson about two years ago, and he was cordially assisted in his investigations by Mr. Andrew Cruikshank.

An interesting paper on the remains was read by Mr. Wilson, who said:—I have much pleasure in showing you the remains of that which once formed the Hospital of the Blessed David. A copy of the charter of the foundation and endowment of the hospital by Henry de Gower, bishop of the Royal Institution, Swansea, and is well worthy of the most careful perusal. But while you are here, I wish specially to point out to you what constituted part or parts of the Hospital, and, to convince you that these are undoubtedly their remains, I will read a paragraph from a paper read at the Royal Institution, by the late Col. Grant Francis, F.S.A., in which he begins by saying:—"That Mr. Dillwyn mentions a 'tradition that the Hospital had a frontage in Butter-street,' otherwise St. Mary-street; the words of the Foundation Charter positively confirm this, and adds, and 'I believe I have discovered the very site in the present Cross Keys public-house. Riding one day into the Castle Inn yard from Cross-street, I observed a gable of some old premises, the outlines of arches which struck me as similar in character to those in Swansea Castle, but they being walled up and thickly coated with white lime, a mason was employed to ascertain whether my impression was correct. On being cleared out, we found, in a very old and thick wall of native rubble work, one double and one single trifoliated arch of the early part of the fourteenth century, of the same form and Sutton stone as some of those inserted by De Gower beneath the parapets of Swansea Castle." Possibly many here will remember these words actually delivered. Now, in my opinion, those fourteenth-century windows peculiar to De Gower, are those of the Infirmary or sick chamber. In front, facing St. Mary-street, and running horizontally east and west, was, I believe, the Hospital Chapel. "Whereas the Charter relates that the said master or warden of the said Hospital, and the chaplains for the time being, and the other poor persons dwelling therein, as aforesaid, do celebrate (services) for the soul of our late Lord David, Bishop of St. David's, &c." Upon

examining the roof of this Infirmary, and removing a plaster and gaudily papered partition, I have discovered some early fourteenth-century oak principals. They have the simple chamfer, the flat purlins, and notched ridge, the shoulders of collars being tenoned and secured by as many as four oak pins. The workmanship is rough, as all carpentry was at that period. The part I believe to be the principals are not in such good order, the reason being that it is floored so high that there is hardly sufficient room for headway under the collars: consequently they have been cut away or scooped out, this room being used for a sleeping compartment in a common lodging-house. The work has been much mutilated, but, taking away the first floor and standing upon the original one, the proportion, the simplicity of construction, and design of the roof surmounting the massive masonry and deeply-recessed windows must have had an appearance of grandeur and solidity. The main building forming the general plan of the Hospital of the Blessed David appear to have been an irregular quadrangle enclosing two garths, brewhouse, kitchen, with domestic offices. Of the two garths, one was probably used as a kitchen or herb garden for use of the laity, the other one probably for use of the priests. The old fig-tree at present in the garden is most likely a scion of an older one, although these trees attain a great age. As I have said, the southern side of the present building appears to be the Chapel and Infirmary already described, with offices under. The south-west corner would most likely be the warders' and priests' lodgings, and in the building beyond, on the west side, I should place the refectory, it evidently having been open to the roof: a portion of this is still existing, as in the other portion of the building. Under this probably would be the calefactory or general meeting-room for talk, &c. To the northern side would be the kitchen. The brewhouse still retains traces of the fine. One of the fuses (approximately the kitchen) is lined with flat stones; these are easily seen. A portion of a square shaft, giving every appearance of a hoist still remains. I have traced now with you the undoubted outline of this very important semi-monastic establishment. I hope, if enabled to continue my researches, to trace the remains of still further buildings. There would appear to have been an entrance from the west side to the large garth, and near this is an aperture in the wall which might be the buttery or serving-window for giving out the doles, &c.

The party then proceeded to view the parish church of St. Mary, which is an instructive example, showing how a fourteenth-century church (the tower seems to be older) may be externally and internally converted into a structure admirably adapted to meet all the requirements of a congregation of advanced Welsh Methodists. There monuments have, by some strange chance, escaped destruction. One, of a priest, which, as might have been expected, was removed from its place of honour in the chancel, and turned out of doors (it has now been again put under cover). Some have imagined that this ecclesiastic was no other than Gower himself, a mistake, for the building bishop lies in his own cathedral of St. David. Probably Mr. Gamwell's conclusion is correct, viz., that the effigy represents a bygone warden of the Hospital of the Blessed David. A fine brass on the northern wall of the chancel commemorates Sir Hugh Johnys, Knight, and the Dame Maud, his wife, telling how he was created a Knight of the Holy Sepulchre in the city of Jerusalem on Aug. 14, 1441, having been there for the space of five years waging war against Turks and Saracens in the parts of Troy, Greece, and Turkey under the Emperor John; how he was subsequently created Knight Marshal of France under John Duke of Somerset, and Knight Marshal of England under the Good John Duke of Norfolk, who gave him the manor of Landimor in Gower. This was the Sir Hugh Johnys who courted Elizabeth Woodville, she who eventually became queen of Edward IV. Although recommended by the Duke of York and Richard Neville, the king-making Earl of Warwick, Elizabeth would have nothing to do with the doughty Welsh knight. In St. Anne's Chapel is an altar-tomb to the memory of Sir Matthew Cradock, who was married twice,—first to Alice Mansel, of Oxwich; secondly, to the Lady Catherine Gordon, Perkin Warbeck's widow. The effigy of the latter lady lies by that of Sir Matthew, notwithstanding

that she took to herself a second husband, Christopher Ashton, and reposes by his side in the church of Tyfield, Berks. The condition of this beautiful tomb is simply a scandal, the dirt on it being at least 1 in. deep.

In the afternoon the members of the Association were entertained by their excellent President at Penllergare, where he showed them two small rectangular earthworks abutting on the old Roman road. In the evening a meeting was held, confined to members only, at which it was decided that the Congress for 1887 should be held at Denbigh.

For Friday, the last day, the finest scenery and the rarest prehistoric monument in the peninsula of Gower had been reserved. The party started in a drizzling rain, which, however, cleared up just as the visitors reached Park le Breos, where they were met by Sir Hussey Vivian, Bart., M.P., F.G.S., who had travelled from London for the purpose of entertaining the members. Sir Hussey at once led the party to the famous chambered cairn of Park le Breos. Curiously enough, it is situated in a dingle, such monuments being usually found on high ground. This valuable prehistoric tomb was discovered in 1869, and opened under the eyes of Sir John Lubbock and Sir Hussey Vivian. It consists of a central avenue, the entrance to which is funnel-shaped, and very neatly constructed of dry masonry, 16 ft. long; at the mouth 12 ft. wide, contracting to 3 ft. 6 in.; at this point it joins the central aisle, from which branch off the chambered cells, two on either side. This aisle is built of large stone slabs, and is 17 ft. long, with a uniform width of 3 ft. The chambers are 6 ft. by 2 ft., and the interstices between the slabs are carefully packed with small stones. When the cairn was opened, it contained the remains of at least twenty human beings, two of them having been aged persons, two children, two females, while the remainder were persons in the prime of life. The bones were too fragmentary to decide what was the shape of the crania. With the human remains were deer and swine's teeth, and fragments of sundry pottery. The chambers contained two and three bodies, the remainder were arranged in the central aisle.

A short discussion ensued as to whether the vaults had been originally covered in with large slabs, Sir Hussey Vivian demurring to the theory that they had been previously removed.

Archdeacon Thomas, in the name of the Society, tendered a vote of thanks to Sir Hussey for the exceedingly careful manner in which he had preserved this valuable monument.

Lunch was provided for the Association on the lawn, and the party then divided; one section proceeding to Oystermouth Castle, the rest driving to Pennard Castle and the Bone caves. Oystermouth Castle disputes with Penrice for the honour of being the chief military stronghold of the peninsula. It is a very important piece of military architecture, and a noble but somewhat confusing edifice. Its windows and gables present somewhat of a domestic appearance, and its gateway is poor. Mr. Freeman points out that, both from a military and picturesque point of view, it is damaged by its chapel, which is on an upper story, where its east window is crammed in between small windows, which painfully impress one with the notion that "restoration" is a venerable institution. From Oystermouth the party returned to Swansea. The party which did not return until late in the evening. After the usual vote of thanks, proposed by everybody to everybody else, the proceedings of an extremely pleasant week terminated with a dance.

CARNARVON CASTLE.

The last paper read before the Architectural Section of the Archaeological Institute's recent Congress at Chester, as mentioned by us last week, was by Sir Llewelyn Turner, on Carnarvon Castle, of which he is Deputy-Constable. In the course of his paper, Sir Llewelyn said,—We are very much indebted to the late Mr. Hartsborne for his industrious researches in the Record Office but while according to him all the honour justly due for these examinations, truth requires me to show that the deductions he has drawn are fallacious, and such as I feel certain I would have corrected had he possessed the local knowledge which I necessarily have. My justification for claiming a clearer light upon the

subject I conceive to be this:—While the public records that Mr. Hartshorne found and quoted have equally been accessible to me as to him, my researches have been much more prolonged, and have resulted in the possession of a large number of records, bills, and materials now in my possession. Born within two miles of Carnarvon, and still occupying the same dwelling, I have had a lifetime's acquaintance with the castle, and for many years have been engaged in gradually digging it out and repairing it, clearing out thousands of tons of rubbish from its interior and exterior. As the Chairman of the Harbour Trust, I have had to do with the planning and erection of large contiguous works, and have carefully gone into the question of time and labour necessary for the erection of some of the wonderful structures of the great port of Liverpool, while on matters of evidence I have had the opportunity of consulting some of the keenest analytical minds. At page 237 of the *Archæological Journal*, vol. vii., will be found Mr. Hartshorne's paper, valuable, I submit, for the recitals it contains, but unreliable in other respects, because founded on erroneous deduction. The first error, as I submit it to be, consists in the statement that immediately after the execution of Prince David in 1283, Edward I. "began" the erection of fortresses, and within six weeks afterwards commenced building the Castle of Carnarvon. This statement is the foundation of many mistakes that naturally follow. The king had in 1277 obtained a strong hold of the Principality; he had the castles of Hawarden, Degawny, Flint, and Rhuddlan, where he and his queen lived during the tenth and eleventh years of his reign. He had the castle of Aberystwyth in Cardigan Bay, and later on that of Criccieth, twenty miles beyond Carnarvon, and many other strongholds, including Ruthin, to which the king and queen freely passed during those two regal years. Therefore the assertion that he began to take these steps for securing the country after the execution of the last prince is as erroneous as it is contrary to what would naturally be expected from the known energy of the great monarch to whom we are indebted for these and other grand Mediæval monuments in Wales. Mr. Hartshorne has, I submit, fallen into error in treating the first record he has found as to the erection of Carnarvon Castle as being the first that existed. So far little, if anything at all, has been found as to the erection of Beaumaris Castle, and although I have a large quantity of the bills relating to the erection of Carnarvon Castle, and far more than fell to the bag of Mr. Hartshorne, those I possess fall immeasurably short of the whole account of the erection of this great fortress. The town of Carnarvon embraced within the walls is the entire work of this great king, and to that town he promised a charter in the eleventh year of his reign. Now, the eleventh year of the reign commenced on the 16th of March, 1282, and the charter was promised in the eleventh year and confirmed in the twelfth. Mr. Hartshorne's paper goes on to say that there is now no means of ascertaining what portion of the building was first commenced. It then goes on to discredit the tradition that the castle was built in a year. Now I presume none but a believer in witchcraft would assert that all we now see and admire was the work of one year; but with all deference to those who readily ridicule the accepted tradition of a people, I unhesitatingly assert that the ridicule should fall upon those who, without inquiry, condemn what, upon every ground, I assert to be true. The mass of bills relating to this castle inform us within two or three years of the time it took to build. But that a sufficient portion to shelter a garrison was erected within a year I have no more doubt than I have of my own existence. To suppose that the energetic King Edward would not put up enough of this chief stronghold within a year to contain a garrison is to rob him of that pretence to which he is so fully entitled. After stating that there is now no means of ascertaining what portion of the castle was first commenced, Mr. Hartshorne's paper (as the result of discoveries of bills which, it is as clear to me as the sun at noonday, relate to the last parts of the castle built) goes on to say that "the castle was commenced at the north-east corner, and gradually went to the south-west, when a sharp curve indicates the beginning of fresh operations." The south-west is a distinct error of description. The wall described as the first portion erected is clearly the last, and

so far from the geological character of the stone, as asserted, proving anything of the kind, the only proof it affords is distinctly to the contrary. The paper informs us that certain covering stones used in the corridor of the Eagle Tower is of the size and geological character of stone agreed to be supplied by one Walter De Kank. I have a copy of the agreement, which is without date. I happen to be trustee of the property at Moelydon, where the quarry is said to be, and to have lived my life within two miles and a half of it, and my excellent mason in the castle, John Jones, an Anglesey man, who knows all the quarries whence the stone of the castle came, can confirm the fact that none of the Eagle Tower stone came from Moelydon, but from the quarries on Lord Anglesey's property, much lower down. So far from the covering stones in the Eagle Tower, as alleged in the paper, corresponding in size and number with the agreement with Walter De Kank, there is not a covering stone in the castle that does. The stones were clearly for a different purpose. This mistake arose through Mr. Hartshorne measuring the covering stones of the corridors as if they rested, as he tells us, only 3 in. on each side, on the corbel tables, whereas they rest beyond, on the walls themselves. It is much to be regretted that Mr. Hartshorne, during his short visit to Carnarvon, should have been grossly misled by persons evidently ignorant of the locality. For the purpose of identifying this quarry, we are told that it is the place where the tides coming over Carnarvon Bar and by Beaumaris meet; the fact actually being that this meeting of the waters is at a point near Beaumaris, some seven or eight miles further down the Straits. The wise informant, whoever he may be or have been, then performs a miracle, for he tells us, through Mr. Hartshorne, that the iron bolts to which Edward I. fastened his still to be seen on the Carnarvonshire side, about two yards under water at low water, which is considered a proof of the water of the Menai having risen about 6 ft. since Edward built his bridge. I can only say that as the chairman for nearly thirty years of that authority which exercises jurisdiction over these waters, and a member of that authority for thirty-seven years, I am quite unaware of these rings or this modern miracle of the permanent rising of the sea, which would of course have to be general on the whole Irish Channel or Sea, and, as an old sailor, I simply state that no bridge of boats could be held by mere rings put in rocks in such a place, and that anchors fore and aft, and strong trees, anchors, or posts ashore, must have been necessary to secure a number of vessels exposed to such winds and tides as frequently prevail there. To return to the castle, I have no doubt whatever that the outer circuit of wall was completed, with a portion of the town wall, up to a low elevation in the first year of possession, and that the king's ships effectually guarded the remaining portion. Mr. Hartshorne laboured under the disadvantage during his brief stay at Carnarvon of seeing it as it then was, and of not knowing how much of the sea has been embanked to the north and north-east, as well as to the south-west of the town. Had the king erected the wall next the town as described, he would have been simply building a useless inner wall with the kitchens and other entirely defenceless places exposed to incursion. He was wiser than to do that, and any military man will see at a glance that he had but to build the outer circuit of walling of the castle, and a very little of the town wall to a low elevation, as far as the East Gate, now the Guild Hall, to secure the land side, and his ships did the rest. I never doubted the fact that sailors did important service in this way, and I found among the bills in the Exchequer, 287, Miscellaneous, No. 16-7, Edward I., "Stipends of Mariners in the Fortification of Carnarvon and Criccieth" in the eleventh year, that is the year preceding the birth of Edward II. One, "paid by Hugh de Leominster, 40l. 10s. 7½d." I now come to the tradition that the Second Edward was born in Carnarvon Castle, and, unless I am totally incapable of comprehending evidence, I say, after due comparison of tradition with the architectural features of the castle, and the public records, that there is not a particle of evidence to the contrary. The late Sir Francis Palgrave, to whom all antiquaries are so much indebted for his compilation of the military writs of this interesting

period, during a visit to Carnarvon, a great many years ago, at once detected that the Eagle Tower had been built at two different dates. One (the lower portion) I have no doubt, by the First, the upper by the Second, Edward. In proof of this, I may say that I discovered a beam-hole of the original roof by ascending the inside of a chimney. I now come to the document to the discovery of which we are indebted for Mr. Hartshorne's paper, valuable for its research, though containing mistaken inferences, which I have no doubt he would have corrected had he possessed the advantages placed in my way. The document, which relates to the tenth year of Edward II., which I also found in the Record Office, is in Latin, and the following is a translation:

"Exchequer Miscellaneous: Treasury of Receipt.
Indenture No. 2.

No. 8-25.

This indenture made between Roger de Mortimer, Lord of Chirk, Justice of Wales, and Edmund de Dynastren, Chamberlain of our Lord the King, in the parts of North Wales, witnesseth that the lead and tin of the King found in the King's Castles, in the same parts of North Wales, received of Lord William le Doyau, his predecessor, Chamberlain there, and also purchased by the same Edmund, whilst he occupied the office of Chamberlain, from the first day of May, in the tenth year of the reign of King Edward, that now is to the 24th day of June, in the twelfth year of the same reign, by the particulars and terms by a certain account thereof, made in the presence of William de Shaldeford, Comptroller there for the King, in the name of the Justice and of Master Henry de Ellerton, master of the works of the King there, between the said Edmund and the clerks of the works of the King the said Castle by turns, namely William Meveler and William de Lye, and by the view and testimony of Hugh de Eglinton, under constable, and Henry, the plumber, surveyors of all the expenses incurred there within the time above said by the said Justice thereto deputed and sworn, the same Edmund expended in the works of the Castle of Carnarvon, of the aforesaid lead and tin, namely in the covering of the Eagle Tower, newly done and covered, and of divers other towers, and also in the repair and mending of divers gutters, and in making great leaden troughs for salting the meat in the King's store there, and putting therein meat, salt, and honey, as in the same particulars and account is more fully contained, and specified, 10 carats, as the said surveyors acknowledged and swore to before the aforesaid Justice and comptroller, as having been faithfully expended and used up in the works aforesaid during the same time. And of tin, 63 lb.

In witness whereof the aforesaid Justice affixed his seal to the part of this Indenture remaining in the hands of the aforesaid Chamberlain, and to the other part of the same Indenture remaining in the hands of the said Justice, the said Chamberlain affixed his seal.

Given at Beaumaris in the morrow of St. Marcus the Evangelist (April 28th), in the 12th year of the reign of the King aforesaid."

A very learned friend of mine, of ripe age, accustomed from his youth to translate ancient records, gives me the following opinion upon this document, which, as far as the belief that the roof only is meant by the *de novo*, corresponds exactly with the opinion I received some years ago from the learned chancellor of a diocese. My venerable friend just referred to expresses himself as follows, "As I read the Latin original, the sentence on which you ask my opinion, '*In co-opertura turris acule de novo facte et co-operti*,' which, whatever it may mean, is not strictly Latin. If the *e* at the end of *facte* is meant for a diphthong, the tower itself may be intended to be referred to *turris*, as well as *co-opertura*, being of the feminine gender. I do not, however, think that the tower is meant to be referred to, because *co-opertura* the covering *de novo* probably will lead instead of some former temporary covering of tin or other material had been used before. To have made the sentence plainer the words *facte et co-operti* should have been written *facta et co-operta*, in which case there had been no room left for doubt. When we find the doubts and difficulties daily experienced in the interpretation of agreements and documents of all sorts, about all Acts of Parliaments, who can take upon himself to assert that this in *co-opertura turris acule de novo facte et co-operti* means that the Eagle Tower was rebuilt when all architectural deduction proves that it has been built and raised upon? This I will show you by the beam-hole in question, by the adjoining curtain not being bonded up to the height it would have been had the tower been erected at one period to its present elevation. The paper under discussion says that all soldiers would have had to pass through the Queen's bedroom to the rampart of the wall on the town side. That wall was partly erected first and finished by King Edward II., and I will show you that when the latter completed it he closed up a window and cut a door to the ramparts. Having myself opened the moat, I have been able to verify the Welsh tradition as to Madoc's rising, that during a fair held across the harbour the insurgents at low water penetrated the moat below the Eagle Tower, where the broken wall

and the temporary substitute for it may still be seen. Tradition accurately stated that the insurgents got into the castle, and the place where the wall was repaired and raised afterwards, when a large body of masons were sent from England for the purpose, is still plainly visible. The damage done to the building was not great, thanks to its enormous strength. Some persons totally unacquainted with building operations have ventured to assert that there was no time to get any portion of the castle ready in time for the Queen's accouchement. Now, I reply to this with the brevity required, for want of time here, that being the author of the large quays erected of late years in the immediate vicinity, also of the restoration of the west gate of the town, which I converted into a yacht club-house, and of the repairs of the castle, I feel that I need no apology for declining to be led by such opinions. I repeat that no doubt exists in my mind that we have not got hold of the date of commencement of the building. I have many records relating "to our works in Wales" without these stating where. An important proof that the king was in possession of Carnarvon and the district long before the date assigned by Mr. Hartschorn will be found in the *Eschequer Record "Military Service, Wales,"* in the roll of wages of knights and esquires in the Welsh war for the tenth and eleventh years, that is, from November 10th, 1281, to November 15th, 1283. In the eleventh year Thomas de Maydenhach and his clerk being in the fortifications of Carnarvon, received by day 2s., and others were in the fortifications. Note the word "fortifications" is used up to Christmas, 1283; that is, the Christmas preceding the confinement of the Queen, up to which time he is merely alluded to as receiving wages amongst the knights, esquires, and men of various grades, and is actually in one place alluded to as porter of the door, this probably being an error of the accountant. Then in the twelfth year he becomes Constable of the castle, a castle which, according to the evidence I am rebutting, did not exist. I have no time here to notice great errors in the paper in the *Archæologia* by Mr. Hartschorn as to the erection of the town walls, which in one place are spoken of as being erected in a particular year, whereas they occupied several. A word now as to the smallness of the room in which I think there can be no doubt that the first Prince of Wales was born. I cannot conceive of any antiquary attaching the smallest importance to this. The Queen faithfully followed her husband in his wars, lived in tents, and encountered all sorts of discomfort. The Rhuddlan roll gives an account of the lime to plaster her chamber when she was there, the full account of the purchase of turves and shingles, broken casks, &c., for temporarily covering the hall and different buildings. Therefore, the apartment in the Eagle Tower, hung, as it probably was, with tapestry, would be a very good one for a building not a quarter of which was complete. It contained a fireplace, and closely adjoins the very large adjacent apartment, which contained an opening to an oratory for the confession, no doubt, of the Queen. I hardly feel called upon to notice the opinions of those who, without knowing when the castle was really commenced, and without any of that experience of large buildings which I have had, tell us there was no time to have erected sufficient sheltering for the Queen. Up to the height first erected there was plenty, and I feel little doubt that had the cardinals of lost records so unfortunately left at Carnarvon been forthcoming we should find that the preparations for erecting this castle were going on for a long previous time in Anglesey, whence large quantities of this stone came, and I have the record of the king's ships continually going with men to Anglesey in the 10th and 11th years from Rhuddlan, and there was plenty of hewn stone ready at Segontium which tradition says was also used, and this old town of Segontium is called in the bills I have found in the Record Office, "the Quarry at the end of the Town." It is the fashion erroneously to assume that we are more in advance of our ancestors in the erection of great works. If so: where is the modern building that surpasses Carnarvon Castle? Eminent engineers tell that as able engineers were to be found in former days as now, and that many greater works were executed prior to the Christian era than now. In 1377, about ninety years after the erection of Carnarvon Castle, the great bridge of Adda,

with a span of 237 ft. and a height of 68 ft., was built in Italy, and the largest modern stone bridge erected (one in America) is only 215 ft. span, or 22 ft. less than the one which preceded it by 500 years. So much for ancient work. Now, here is an ordinary proceeding in Liverpool,—a block of warehouses at Bootle, 372 ft. long, 110 ft. deep, with no fewer than eleven blocks of buildings all this depth, that is, each of the eleven blocks 110 ft. deep from front to back, each seven stories high, each story with 12 ft. head-room under the beams, the walls each being 90 ft. high, containing 242 windows, each set in an arch. The building was commenced in September, 1882, was finished and occupied on the 1st of September, 1883. Compared with the first portion of Carnarvon Castle, which is that clearly alluded to in the tradition, that it was built in a year, this Liverpool work is really gigantic, inasmuch as an outer wall to a low elevation was nearly all that was done at first in the castle,—enough in short, to hold a sufficient garrison; and when we reflect on the smallness of the numbers of the garrison in it, we seek and find a reason in the utter absence of implements in a pastoral country to attack fortifications,—in the entire possession by the king of the sea by means of his ships. As chairman for some years of H.M. Prison for Anglesey and Carnarvon, I have made some interesting discoveries in that building. It is close to the castle. A splendid sewer, the bills for making which I found years ago in the Record Office, passes through it from the castle. I also found the base of a tower in the prison of similar date to the castle. This fine sewer explained a great difficulty I previously had as to the well of the castle. I have lately dug out exactly what I expected to find, viz., the temporary wall on the town side, which preceded that erroneously mentioned by Mr. Hartschorn as the first part erected. I have shown you that the castle had a Constable in the twelfth year of the reign of the first Edward, therefore it is idle to assert that the inner wall erected years after is the first building, as in that case there was no castle to be Constable of. One word as to the position of the Eagle Tower. It was infinitely the more likely place and the only likely place for the Queen's confinement. Then the towers of the town walls were not built; I have the bills of later date. The whole length of fortifications from Queen Eleanor's Gate would have had to be fought and taken before an enemy got to the Eagle Tower, which was really the keep, and if the upper or east end was taken the Queen could have been shipped aloft at once, as my predecessors in the Harbour Trust had not then injured the navigation, creating large banks and silting of the channels, by building a wall which they grandiloquently called the Victoria Pier fifty years ago across the tide,—an excrescence which I have now removed, not without some obloquy from grumblers. At this period the sea actually reached to the foot of the walls. The late Mr. Joseph Burt, of the Record Office, from whom I received valuable aid, drew my especial attention to the ornamentation of the Eagle Tower, which was handsomely ornamented all over with figures, the rest of the castle being ornamented only with finials, and he contended that some special reason existed for this. I suggested it to be directly the result of the king, who was born in it, decorating that particular part, a suggestion that commended itself to Mr. Burt. To prove that it was erected temp. Edward II. Mr. Hartschorn has laid down that the ornaments are the bassinet and jupon temp. Edward II. That the upper story and the three turrets were erected temp. Edward II. is perfectly clear, as proved by the bill quoted temp. Edward II., and by the architectural features of the buildings; but the ornaments are not, as he says, confined to these particular ornaments, but are as varied as if in this day a castle were ornamented with a crown, the Queen's head with her crown, helmets, &c. The Roman Prætorian guard wall, I believe, be found there, three eagles, and numerous other devices.

As briefly mentioned in our last, the members of the Institute visited the Castle on the following day (Aug. 17), when Sir Llewelyn Turner spent several hours in conducting them over the various parts of the ruin, and was indefatigable in his efforts to add to the information of the visitors, and in pointing out the various pieces of evidence which go to confirm his view of the architectural history of the Castle. At various points he called attention to the admirable repairs done by the Castle mason, John

Jones, who, in his working dress, and with "all his blushing honours thick upon him," was introduced to the visitors. It should be added that Sir Llewelyn Turner has compiled a handy little "guide" to the Castle, which, though it might be furnished with a better and clearer plan, will be found very useful by visitors in conjunction with the admirable system of lettered reference labels which the Deputy-Constable has had affixed on light iron standards in front of the principal portions of the Castle ruins.

Before the visitors left the Castle, Mr. R. S. Ferguson said that he had been desired by Earl Percy, who had been obliged to leave, to move that the warmest thanks of the members of the Institute be tendered to Sir Llewelyn Turner for the very great trouble he had taken that afternoon, as well as for his paper read in Chester on the previous evening. It sometimes was their misfortune, in the course of their visits to many places, to come across ruins which had been shamefully and grossly neglected, and such neglect very often aroused feelings of deep indignation. Carnarvon Castle, however, had not been so neglected, and was happy in its possession of a Constable (Earl Carnarvon) who took an interest in archaeological pursuits,—a nobleman who himself had held the post of President of the Royal Archaeological Institute. The Castle was also happy in its possession of such an able and indefatigable Deputy-Constable as Sir Llewelyn Turner, who had made the castle the study of his life, and had grudgingly no trouble to put it in proper repair and order. Neither had he grudged any pains to make the visit of the party that day of a most interesting character, and to explain to them the fullest details with regard to the Castle. When the visitors saw the great care which had been taken, not only by the fixing of guide-posts, but also by repairing and restoring the battlements and towers, they would agree that Sir Llewelyn had set an example which it would be well for custodians of similar places to emulate. Mr. Ferguson also thanked Sir Llewelyn for the manner in which he had entertained them at luncheon.

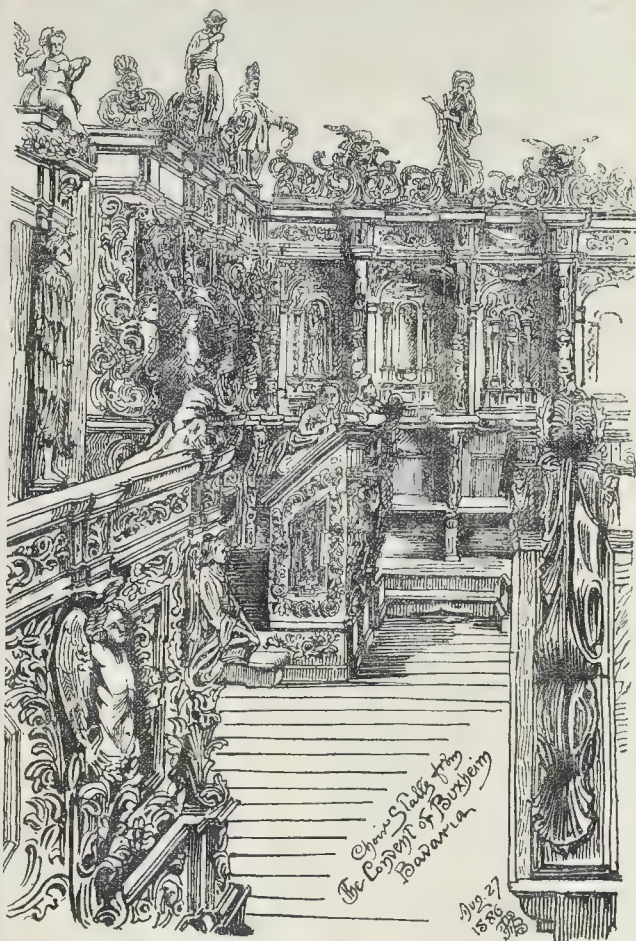
Mr. Pullan, in seconding the motion, said that undoubtedly Carnarvon Castle was one of the finest in existence, and he wished that every castle in the kingdom was possessed of such an able custodian as Sir Llewelyn Turner, and of such an admirable mason as their friend John Jones.

Mr. John Griffith, Chester, on behalf of the members of the Chester Natural Science Society, supported the motion, which was heartily adopted.

Sir Llewelyn Turner, in briefly replying, said that what he had done in connexion with the castle was purely a labour of love. Perhaps they would allow him to make a suggestion to the members of that learned society. He thought they could render incalculable services to all such buildings as that throughout the United Kingdom, if they would protest against the system of appointing as custodians persons who did not spend the money received as entrance fees from visitors upon the repair and maintenance of the places under their charge.

The Chester Meeting of the Royal Archaeological Institute.—In our last we inadvertently omitted to state that on the day of the excursion to Delamere Forest (on the 14th ult.) Mr. W. Thompson Watkin conducted the members to the junction of the Roman roads at Nettleford, and the remains at Organ's Dale and Lob Slack, of which places he at the same time gave a description.

Obituary.—We hear, with regret, of the death of Dr. James G. Wakley, editor of the *Lancet*, which took place at his residence, near Chertsey, on Monday. The deceased was the youngest son of the late Mr. Thomas Wakley, founder of the *Lancet*, Member of Parliament for Finsbury, and Coroner for Middlesex. He became a member of the Royal College of Surgeons of England in 1843, and graduated Doctor of Medicine at King's College, Aberdeen in 1852. At his father's death, in 1862, he became editor of the *Lancet*, the duties of which position he discharged for nearly twenty-five years. He was one of the founders of Hospital Sunday in London, and remained throughout one of its warmest supporters. Only a few days before his death the present and past members of his editorial staff presented him with an illuminated address expressive of sympathy and esteem.



Portion of Stall Work from Buxheim.—Sketches by Mr. F. D. Bedford.

CHOIR STALLS FROM THE CONVENT OF BUXHEIM, IN BAVARIA.

The sketch shows one angle of the choir woodwork of the Patriarch's Church of the ancient Carthusian Convent of Buxheim, in Bavaria, which, as we mentioned last week, has been on view in Messrs. Bonham's sale-room the last few days.

The whole choir consists of thirty-one elaborately carved stalls separated the one from the other by carved open-work brackets supporting the cornice, which again supports seventeen figures, subjects of the Old Testament. The entrance doors, a portion of which is shown in the sketch, are guarded on either side by the figure of an angel clothed in its wings. The hinges on the doors are original and very beautiful. The desks are carved with figures, heads, and wreaths of fruit and flowers.

The sale of the work on Wednesday, at Messrs. Bonham's attracted a large attendance, and bidding was started by Mr. Harry Hems at 1,500*l*. The work was finally knocked down to Mr. Gaselle at 2,900*l*. The ultimate destination of the work is uncertain, but it is understood that the authorities of a College in one of our Universities are in treaty for it.

Camborne School of Art.—The vacant Mastership of the Camborne School of Art has been filled by the appointment of Mr. F. J. Gardener, second master of the School of Science and Art, Swansea.

FURTHER NOTES AT THE LIVERPOOL EXHIBITION.

RESUMING our notes* on some of the contents of this large and interesting exhibition, taking the exhibits in the numerical order of the stands or spaces which they occupy, we have first to make mention of the exhibits of Messrs. Robert Boyle & Son (Stand 185), of London and Glasgow, who exhibit several varieties of their well-known ventilators for ships and buildings.

The National Health Society (Stand 266), exhibit a good assortment of their useful publications in the form of books, tracts, leaflets, and charts bearing on health and sanitary matters. These publications should be known to and distributed at discretion by every district visitor and city missionary; and even the recently rather fashionable pursuit of "slumming" could be carried on with better results by their aid.

The Liverpool Grain Storage Company (Stand 279), exhibit an interesting model of their Alexandria grain warehouses and elevators, Bootle. The model shows the method of storing the grain in bulk, and delivering it, by machinery.

At Stand 301 Messrs. Jeffrey & Co., of London, exhibit some wall-papers of good design.

At Stand 304, Messrs. George Elliott & Co. exhibit their patent wire-ropes and tubes, which have much to recommend them. Close by (Stand 306), Moule's patent earth-closets, as adapted for use on board ship, are exhibited.

Messrs. Homan & Rodgers, of Manchester

(Stand 310), exhibit a series of sections of their well-known and excellent systems of fireproof flooring, as applied in cotton and other mills, warehouses, and dwellings.

Messrs. Alfred Carter & Co., of Liverpool (Stand 324), exhibit tanks, baths, lavatory-tops, and other goods, all of slate.

Messrs. R. S. Newall & Co., of Gateshead (Stand 326), display their well-known wire-ropes for ships' rigging and for suspension bridges, and a strong hoist.

At Stand 347, Mr. Joseph Whiteley, of Salford, exhibits his patent grip treads, stair-nosings, and mats, which are very effective. The grip or foothold is obtained by the insertion of projecting studs of hard india-rubber in the surface of the treads or mats.

Messrs. W. Woollams & Co., of London (Stand 349), have a very good display of decorative material for ships' saloons or for dwelling-houses. These include some effective wall-papers and raised flocks (some painted and some unpainted), good in design and rich without being gaudy in effect. A useful material shown by these exhibitors is "tergorine," an imitation leather, embossed and lacquered. This firm is well known for its specialities in non-arsenical wall and ceiling papers.

At Stand 405 the Waterproof Paper and Canvas Co., of Willesden, exhibit their now well-known waterproof materials as applied to the construction of canoes, tents, &c.

Messrs. Musgrave & Co., of Belfast (Stand 509), have a very good exhibit of their excellent stable fittings, and some of their slow-combustion ventilating stoves.

At Stand 558 the "Harden Star Fire Grenade Company" exhibit their fire-extinguishing bottles or grenades, of which we have spoken on former occasions.

The Anglo-American Brush Electric Light Corporation (Stand 5614), exhibit dynamo-machines, commutators, regulators, and other apparatus, together with arc lights and incandescence lamps.

Stand 591 is tenanted by the Sanitary and Highway Appliances Company, Sheffield, who show Roberts's patent sand or shingle distributor and other appliances.

Messrs. James & Son, of Cheltenham (Stand 592), exhibit a street water-van of improved construction, with double valve and box distributor.

The New Ferry Brick Company (Stand 597) exhibit some good red bricks, and terra-cotta ridges, finials, &c.

Messrs. N. & W. Grazebrook, of Dudley (Stand 598), exhibit a patent cast-iron and wood door and frame, specially contrived for use in hot countries, and for "the exclusion of draughts." For the last-named purpose these doors would be an acquisition in many of the "suburban residences" of London, in lieu of the gaping and shrunken joinery which is so common.

Messrs. M. C. Duffy & Son, of Bermondsey (Stand 600), exhibit their "Immovable Acme Flooring," a "block" system which gives a firm, clean, and solid surface, admirably adapted for halls, schools, passages, basements, &c.

At Stand 639, The Bessbrook Granite Company show their material in various applications.

Messrs. Yates, Haywood, & Co., of Rotherham (Stand 640), exhibit a variety of stoves and ranges, mantel-pieces and over-mantels, together with gas-cooking stoves and appliances, tiled hearths, brass fenders, &c.

Mr. W. White, of Abergavenny (Stand 651), shows a piece of concrete wall rendered impervious to moisture by the application of his "Hygeian Rock Building Composition"; also specimen lintels of brickwork built with the material and weighted to show their great tensile strength.

At the next stand (652), Messrs. T. Cordingley & Sons, of Bradford, exhibit some figures and details in "Parianetic," as well as enrichments and panels in fibrous plaster and a specimen of granite-faced concrete flooring.

Mr. J. C. Edwards, of Ruabon (Stand 654), has an exceedingly good display of glazed and encaustic tiles, wall faience, and other architectural decorative work for internal and external use. The glazed bricks exhibited are very good in colour and shape, and the terra-cotta work is sharp and well modelled.

At Stand 655, Messrs. F. Braby & Co. show a well-executed zinc dormer; a portion of a Mansard roof, and a turret or pavilion in the same material, also exhibit good workmanship.

* See p. 321, ante.

Mr. J. Hamblet, of West Bromwich (Stand 656), shows some of his excellent Staffordshire paving blocks and blue bricks,—the latter being of the kind supplied by the exhibitor for lining the Mersey Tunnel.

At Stand 665 the Albo-Carbon Light Company exhibit their apparatus for increasing the illuminating power of ordinary coal-gas by superheating and the admixture of hydro-carbon vapour.

Mr. J. E. Ellison, of Leeds (Stand 671), exhibits his patent conical perforated air-bricks and "radiator" ventilators, of the merits of which we have often spoken.

Messrs. H. & C. Davis & Co., of London (Stand 673), are among the exhibitors of gas-cooking apparatus.

Messrs. Joseph Cliff & Sons, of Wortley, Leeds (Stand 692), exhibit a good representative selection of their glazed bricks and architectural faience, together with painted tiles, glazed fireclay baths, sinks and lavatories, sanitary stoneware, &c. The "Imperial" porcelain bath, shown at this stand, is made, in one form, to be used without the customary boxing-in or enclosure of joiners' work.

Messrs. Edward Smith & Co., of Coalville, Leicestershire (Stand 698), make a good display of terra-cotta plaques and panels, glazed floor and dado tiles, hearth tiles, and encaustic tiles, all good in quality and design. They also show a rich frieze,—in glass mosaic apparently, with very small tesserae and fine joints. Although the result, from a decorative point of view, is very rich, it is questionable whether, with such small tesserae, the characteristic and special effect of mosaic is not rather weakened. Taken as a whole, the exhibit is a very good one.

Messrs. Maw & Co., of Jackfield, Shropshire (Stand 695), exhibit a very good specimen of mosaic work, as well as some excellent encaustic tiles and glazed floor, wall, and hearth tiles.

The Sneyd Colliery and Brick Company, Burslem (Stand 699), have put up a small erection showing their excellent glazed bricks in various tints as applied to walls in dados, strings, &c.

At Stand 709 Messrs. Newton, Chambers, & Co., of Sheffield, exhibit the "Thorncliffe" cooking ranges and other of their specialities.

Messrs. Crossley Brothers, of Manchester (Stand 750a), exhibit the "Otto" gas engine in two forms, vertical and horizontal. One, of the vertical description, is employed to work a dynamo machine in connexion with electric accumulators or storage batteries for lighting purposes. Another and larger "Otto" engine is shown at Stand 879 driving some printing machinery.

Messrs. Walker Brothers, of Wigan (Stand 752), exhibit their patent ventilating-fans, as used for the ventilation of the Mersey Tunnel.

At Stand 757 Mr. E. S. Hindley, of Bourton, exhibits vertical and horizontal steam-engines, saw-benches, &c.

Messrs. A. Attwood & Co., of Ulverston (Stand 793), show their self-sustaining lifts and revolving shutters and partitions.

Messrs. Thomas Thomas & Co., of Cardiff (Stand 805), exhibit their self-sustaining cage elevators, warehouse and dinner lifts, sack-hoists, &c.

Stand 816 is that of the Blackman Air Propeller Ventilating Company, who exhibit the Blackman air-propellers in motion.

At Stand 850 Mr. H. J. Coles, of London, shows, by an excellent working model, his very effective grab-dredger, capable of being worked by any steam-crane.

The Hydraulic Engineering Company, of Chester (Stand 854), exhibit a balance for hydraulic lifts (Ellington's patent) and other appliances connected with hydraulic engineering.

Messrs. Robey & Co., of Lincoln (Stand 855), are exhibitors of steam-engines, some of which are specially adapted for driving dynamo machines for electric lighting.

Mr. H. G. Mumford, of Colchester (Stand 857), exhibits his efficient direct-acting donkey pumps.

Messrs. Clayton & Shuttleworth, of Lincoln (Stand 859a), show a very good portable engine.

The Coalbrookdale Company (Stand 862) have an exhibit mainly consisting of engines and machinery for use on shipboard and in connexion with electric lighting purposes.

Mr. George Jennings, of London (Stand 884), has a small but representative display of some of his well-known sanitary appliances.

At Stand 902 Messrs. C. Isler & Co. show tube-well boring plant and their registered turnstile.

Messrs. George Farniloe & Sons, of London (Stand 908), have a very good show of sanitary appliances, plumbers' brasswork, drawn lead traps, &c.

Messrs. Chubb & Sons, of London (Stand 933), exhibit iron and steel safes and doors, as well as locks, for use on board ship and on land.

Messrs. Dean & Co., of Manchester (Stand 1,050), exhibit some wall papers of good design, and the process of block-printing by hand is shown in operation.

At Stand 1,117 Messrs. T. G. Brown, West-head, Moore, & Co., exhibit some very good porcelain, earthenware, and majolica.

Messrs. Wilcock & Co., of Burmanthorpe, Leeds (Stand 1,118), have a very attractive display of their excellently moulded and coloured faience work, including a fountain and some large vases.

The Venice and Murano Glass and Mosaic Company (Stand 1,121) exhibit some panels and plaques of glass mosaic, besides making a good display of ornamental glass.

Dr. Salviati & Co. (Stand 1,128) have also a very good show of glass mosaic work.

At Stand 1,129 Messrs. Craven, Dunnill, & Co., of Ironbridge, exhibit tile hearths, marble and tile mosaic flooring, painted tiles, vitreous mosaic for wall panels, dados, &c.

What is numbered as 1,146 in the catalogue is "the African Court," which is stated to be a reproduction of the porch of the palace of the kings of Ashantee at Coomassie. The design of the Court has been furnished by Mr. Frederick Radcliffe, and is chiefly from photographs and from drawings in Bowditch's work on Ashantee. The Court has been constructed under the honorary superintendence of Messrs. Bleakley & Cubbon, architects, Birkenhead, by Messrs. Alex. Bleakley & Son, builders. The catalogue contains a detailed description of the structure.

Messrs. J. Smith & Sons, of Derby (Stand 1,164), exhibit a turret clock of good finish, striking the hours and chiming the quarters upon four bells.

Messrs. Jones & Willis, of Birmingham (Stand 1,184), exhibit church furniture and hangings in various materials, and suitable in design.

Mr. J. F. Ebner, of London (Stand 1,189), exhibits some of his excellent parquetry and mosaic work, with dados in oak and other woods.

The Lincrusta and General Decoration Company, of London (Stand 1,207), show two "fire-place ends" of rooms fitted with their patent "combination" mantelpieces, which are provided with a firegrate screen, removable at will.

Messrs. F. Sage & Co. (of London), Stand 1,211, show a "cash counter" as a specimen of their work as shopfitters.

Stand No. 1,212 is occupied by Messrs. W. Sugg & Co., of London, with a display of their well-known gas-burners and lanterns.

Mr. F. H. Schmidt, of London (Stand 1,217), has a good mantel-piece and some oak dadoing of excellent workmanship, but the cornice of the dado is surmounted by scrolls of somewhat eccentric design.

Messrs. Gillow & Co. (Stand 1,222) exhibit a good chimney-piece and sideboard of Italian design, and a stand with folding leaves showing specimens of their sound parquet-work.

At Stand 1,438 Messrs. John Bell & Son, of Southwark, London, exhibit various applications of that valuable material asbestos.

The approach to the large Concert Hall is under a screen, which spans the main avenue. It is of glazed faience, terra-cotta, and painted tiles, erected on a wooden framework. This is by Messrs. Doukton & Co. The design and execution are good.

The great organ, by Mitchell & Thynne, which stands in this hall, is blown by a 4-horsepower Otto gas engine by Crossley Bros., of Manchester. It is on a large scale, and is a very powerful instrument, but appeared somewhat hard in tone when we heard it; probably if placed in a larger building, which its volume is well capable of filling, this harshness would disappear; some of the lighter stops are melodious, even in tone, and distinct in character.

The Italian, French, Belgian, and other European Courts carry out the promise that they gave. Now that they are all filled up, the

display of statuary, carved wood-work, embroidery, tapestry, jewellery, &c., is very effective, and much of it of a high order.

In the grounds, at the north-west corner of the Exhibition Buildings stands a copy of the Eddystone Lighthouse; it is constructed of a wrought-iron skeleton frame, strongly cross-braced, and is covered with slabs of fibrous plaster, prepared by Messrs. Jones, Mount Pleasant, Liverpool, in form and size resembling stones, of which this material in texture and appearance is a good imitation. It is ascended by a lift occupying the centre of the shaft. The electric light which is exhibited from the lantern is very brilliant, giving three flashes, and an interval of darkness, at each revolution. The structure is 150 ft. high. It has been erected under the superintendence of Mr. J. Webster, C.E. The gallery round the lantern commands, on a clear day, a fine view of Liverpool and neighbourhood.

The grounds are upwards of thirty acres in extent, and have been laid out in walks and terraces, with a spacious orchestra for outdoor musical performances. Scattered over the grounds are a number of other buildings, including the Aylesbury Dairy, various restaurants and pavilions, and an "Indian village." They are brilliantly illuminated at night with Chinese lanterns and electric light. There is, perhaps, a little too much of the advertising element about some of these structures. Especially is this the case with a gigantic obelisk, coloured to represent somebody's "mottled soap"; if the inscription on it may be believed, there has been such a demand for that particular soap that the obelisk, big as it is, only represents a six-hundred-and-ninety-ninth part of the commodity supplied by the advertiser during the last quarter of a century, — a pleasing proof of the growth of habits of cleanliness among the people, and of the profit (we hope) accruing to soapmakers.

Locally, the wish has been expressed that arrangements may be made for the retention of these grounds as a permanent place of recreation for the public.

CITY OF BUENOS AYRES IMPROVEMENT WORKS.

The construction of these important works for draining and sewerage and supplying with water the City of Buenos Ayres, the capital of the Argentine Republic, has been pushed on with great vigour during the last three years, and will, in all probability, be completed in about twelve months' time.

They are designed by, and constructed under the direction of, Mr. J. F. La-Trobe Bateman, C.E., F.R.S.

Began in 1873 by Messrs. Newman & Medici, contractors, and suspended in 1876, they were recommenced in 1883 by Mr. Antonio Devoto, by whom there is every prospect of their being satisfactorily completed. They may be considered the largest works of the kind in progress in the world, and, when finished, Buenos Ayres will be or should be the healthiest city in South America.

The works are divided into three sections follows:—

1. The city portion, consisting of collecting intercepting, and main sewers, regulating chambers, pumping-stations, and storm-water conduits.

2. The main outfall sewer (high and low level), sewage pumping station, inverted siphon below the River Riachuelo, and outfall into the River Plate.

3. Water supply. Inlet tunnel, pumping stations, filters, and cast-iron piping in the city.

Of these sections, No. 1 is practically completed. It consists of some twenty-three districts or drainage areas, each district having its regulating-chamber for regulating the flow of sewage and storm water. The conduits and sewers consist of brick, concrete, and stone ware, and are collectively about 116 miles in length; there are also about 5,000 street gulleys, 650 sewer manholes, 26 underground chambers, and two pumping-stations. The largest conduit for storm water is 12 ft. high and 14 ft. wide, decreasing to 10 ft. diameter and is about 2½ miles long. The sewers are of the egg shape, except in a few cases, where they are of special section, the largest being 6 ft. 6 in. wide by 5 ft. high. Concrete, of the proportion of six of sand to one of Portland cement, faces

with brickwork, was employed on all conduits and large sewers, and for the smaller sewers concrete only, and stoneware invert blocks and side pieces. Block-eyes and junction-pipes were left in for each house, and provision made in all deep sewers to connect the house-drain by vertical pipes and T-pieces. The sewers were laid in straight lines from manhole to manhole, the soffits of the arches of the sewers being in nearly all cases level.

Manholes were 4 ft. in diameter, built with radiated bricks, purpose made, and provided with charcoal ventilator and circular manhole cover. The gullies were built of brickwork and under the footpath; the sediment pit was large, and the trap gave a 3-in. water-seal. Each gully was provided with a manhole cover. The regulating chambers before referred to were large underground buildings, provided with apparatus for regulating the quantities due to the conduits and to the sewers; in some cases their construction was of an intricate character on account of the number of passages, manholes, air shafts, &c.

Many difficulties were encountered by the engineers at the beginning of the works, owing to the want of experience in similar works on the part of the sub-contractors. Large and sudden rainfalls had to be dealt with to prevent works being washed away. The extreme narrowness of the streets (32 ft.) and the number of tramways traversing them rendered the work in the open cuttings difficult and sometimes dangerous. Some men had their fingers crushed or were otherwise injured by passing cars; many horses were killed by falling into the trenches. Another source of danger was the accumulation of coal gas in the sewers, originating in leaks from defective gas-pipes and in fractures made by the workmen in pipes exposed in the trenches. Many explosions occurred in manholes, gullies, and sewers, and people were injured; in one case about 300 ft. of 12-in. pipe was destroyed, and in another five gullies were more or less damaged.

The setting-out of the conduits, chambers, sewers, and gullies formed an important part of the work done by the engineers, as, under the circumstances, it was necessary to record on a diagram, lithographed for the purpose, the position and value of all line and level pegs, especially in regard to gullies, on account of the necessity of building them to suit the proposed alteration in levels of footpaths contemplated by the municipality, which included nearly all the streets in the city. Diagrams were also prepared by the engineers, for the contractors, showing the position of each house-drain junction. Altogether about 3,500 diagrams were required.

Mr. James G. Killey, Assoc. M.Inst. C.E., was the engineer in charge of this section, acting under Mr. Carl Nyströmer, M.Inst. C.E., Mr. Bateman's representative in Buenos Ayres.

The total cost of these works,—drainage, sewerage, and water supply,—will probably exceed 5,000,000. sterling.

About 25,000,000 bricks, made in Buenos Ayres, over 50,000 tons of Portland cement, and 350 miles of iron pipes have been used.

LAW COURT AND POLICE COURT PLANS.

SIR,—Seeing in the *Builder* several plans for the proposed Law Courts, at Birmingham, it occurs to me that it would be of service if the attention of architects and of the local authorities were called to the fact that a committee has been appointed by the Secretary of State to consider what conditions should be fulfilled in providing accommodation for prisoners awaiting trial in Courts of Justice.

The necessity for some such authoritative description of these requirements may be gathered from the reports of the Commissioners of Prisons, who have thought it their duty to bring to the notice of the Secretary of State the objectionable nature of the accommodation provided in many cases.

I cannot say what recommendations the Committee will make, but I shall be surprised if they do not assent to the propriety of prisoners under these conditions being supplied with a due amount of light, air, and warmth, and of their not being herded together to their mutual disadvantage.

I should be glad to take advantage of the opportunity, if you are good enough to insert this, of reminding any architects who may be

employed to furnish plans of police-stations, or to make alterations in them, that a book of plans and descriptions of police-stations of various sizes has been printed by the Home Office in order to illustrate the various conditions laid down with regard to them.

E. F. DU CANE,
Surveyor-General of Prisons.
Home Office, Whitehall,
August 30, 1886.

TEMPLE BAR.

SIR,—Will you be good enough to grant me space to mention that a committee is expeditionally being formed for the purpose of approaching the Corporation, and calling its attention to the sad condition of the Temple Bar masonry now lying at Farringdon-street, and of making several practical, reasonable, and suitable suggestions for the re-erection of the structure on a site which shall be worthy of its oldest associations, and save the generation from another of those miserable disgraces attending the demolition of old and cherished structures?

I shall be glad of any suitable suggestions for the reconstruction, and the names of gentlemen who will add their support to the movement.

JAMES R. MORGAN.
59, Chancery-lane, W.C.,
August 30th, 1886.

WREXHAM PARISH CHURCH.

SIR,—In your interesting account of the visit of the Royal Archaeological Institute to the above [p. 301, ante], you describe the apse as semi-octagonal.

I believe it to be semi-hexagonal. The difference where a chancel is narrow is considerable, for the octagonal arrangement leaves next to no room in the centre.

There are no saints on the south side of the tower, the simple severity of which may have been overlooked, as the approach is from the north.

The south aisle was lengthened westward when galleries were introduced.

There are joint over joint traces of a closed doorway under the sixth window, facing south, and inside decidedly outside work is recognizable.

The fragments of mullions of the demolished east window, now doing duty as chancel arch, lend themselves to a seven-light arrangement and to the emphasising of the second and fifth mullions. It would have been a subject for regret had these stalactitic excrescences been cut away.

It is doubtful if the extension eastward was ever intended for a chancel or anything but an east chapel.

H. W.

The Student's Column.

STONE QUARRIES.—X.

THE CHANNEL ISLANDS.

NEARLY all the quarries of Jersey and Guernsey are in syenitic rocks. There are districts, however, where hornblende granite is found; and dykes and veins of other igneous rocks are not uncommon.

Jersey.

Most of the stone now raised in this island is used for local purposes, although until recently it was sent in large quantities to England. One is forcibly reminded of this in some of the quarries where gantrees and steam-engines are lying idle. It was not because the quality of the stone in these quarries is inferior that they have been so neglected of late; on the contrary, we can state with much confidence that the syenites and hornblende granites of Jersey are generally of excellent quality. One has only to examine the old stone walls scattered throughout the island to be cognisant of the fact. We occasionally meet with books which inform us that the rocks of the Channel Islands are not more extensively used, because the stone does not occur in blocks of sufficient size. Now, however much this may be true of the other islands, it is certainly incorrect to apply the remark to Jersey. The quarries in the south-west part of this island have been worked a long way into the sides of the hills, and entire blocks may now be seen, both detached and *in situ*, which no machinery could conveniently shift. The upper parts of the quarries, as usual,

* It was Mr. Pullan's statement, reported by us.

† They form a bit of interesting history for modern archaeologists, no doubt; but they look very ugly, and they were probably left by the Medieval builders merely to save trouble, not for "historical" reasons at all.—Ed.

contain but comparatively small blocks, and people are apt to run away with the idea that these represent the largest size obtainable, when the workings are not on an extensive scale. As a rule, the blocks become larger as the rock is worked into.

We suspect that the reason why these large quarries have been almost abandoned is a purely commercial one. Although so near the sea, the nature of the coast forbids the approach of ships in which the stone could be loaded, except in the calmest of weather, and unless a harbour could be constructed close by,—a very expensive operation,—it is clear that the whole of it intended for shipment must be sent to St. Aubyn's or St. Helier's, a process which materially adds to its cost.

Notwithstanding the quantity of stone raised, we are informed that there are no polishing works in the island. We are quite prepared to believe this, as many of the polished slabs and columns in St. Helier's appear to be made of Peterhead granite and not of local stone. The absence of steam drills and other machinery of a like nature is very conspicuous, and the demand would have to be much greater than at present to enable such to be profitably used. We notice, too, that even some of the buildings at present being erected in that town are partly made of granite brought from France. This is a case somewhat analogous to taking coals to Newcastle.

We were rather surprised to find in some parts of the island that the granitic bosses had weathered so deeply, and this in close proximity to quarries containing good stone. It is usual to find some earth and decomposed rock in all districts where the stone is sheltered and contains very much felspar, but here the reddish earth, with loose quartz crystals sticking out from it, may be sometimes seen to a depth of from 30 ft. to 35 ft., a little way inland; and if this is taken to indicate,—as it is in some districts,—that the rock is easily decomposable, a wrong impression would certainly be created. It is a good proof that the island has not been raised out of the sea in recent times.

Engineers, who have not been to Jersey, should pay it a visit, if only to see another instance of the enormous power of the waves as exemplified in the abandoned works at the breakwater at St. Helier's. Some years ago, a gigantic scheme for extending the accommodation for shipping was begun here. It consisted in connecting several little islands by a broad wall made of pieces of broken granite and bound together in the form of concrete. The work was commenced and had proceeded to some distance when the sea made three successive breaches in the wall, the third one being of such a nature that the work had to be abandoned. Huge blocks of rough concrete may now be seen piled on each other, and these are shifted about every winter for short distances by the action of the sea. When one looks at the magnitude of this construction, it is perfectly marvellous that the waves should have been capable of making such havoc.

We may mention that a large wall at Grève de Lecq was breached in a similar manner, and stands a silent monument of the power of wind and water, and a caution to those who have to deal with marine works. It would be outside our province to give any reasons for the failure of these large undertakings, but we fancy that they are capable of explanation. At any rate, the use of concrete *versus* granite is one of the questions that might be profitably discussed in connexion with the problems presented.

Close to Grève de Lecq there is a quarry in hornblende granite. The stone somewhat varies in texture from very fine to medium grain, and is of dark and light grey colour, slightly tinted pink in places. Quartz occurs in small crystals, but in the coarser varieties it is sometimes distributed in such a manner as to show prominently. The mica is black, the hornblende dark green, and the felspars are exceedingly minute, being either white or light pink, according to the tint of the rock. The junction between the fine and medium grained granite is well seen in the quarry.

At Grosnez, the extreme north-west point of the island, the hornblende granite is rather coarse-grained, this being principally occasioned by the large size of the orthoclase felspars, many of which are twinned. Some of these are pink,—the general colour of the stone,—whilst the smaller crystals are almost white, or light red. The very little mica present is black, the

hornblende dark green, and the small quartz grains appear smoky.

Mont Mado Quarries.—These are in full working order and are situated in the north of the island. A steam crane lifts the detached blocks from the bottom of one of the quarries to the level of the workmen's shops. The stone is a fine-grained syenite, and not a "granite." Mica certainly is present, but not discernible until after a protracted search, and occurs in such minute quantities that it does not affect the main structure of the rock: so we prefer to describe it as an accessory mineral. The stone is of two colours, pink and dirty white, due, as usual, to the prevailing tint of the felspar. This mineral, although plentiful, occurs in small crystals. The quartz is in small rounded grains, and their shape gives the rock a peculiar granulated appearance, seldom seen in syenites. This is more particularly the case with the lighter coloured stone. Hornblende is dark green, although black in places. Magnetite is also present in small quantities.

Large blocks are raised from the Mont Mado Quarries, and the very even grain can be well seen in them. The rock is comparatively easily worked, and is largely used in Jersey for all kinds of building purposes, kerbs, &c.

La Porrique Quarries.—Although quite close to Mont Mado the syenite from these quarries is coarse-grained, due principally to the orthoclase felspar being large and porphyritic. Mica is in very small quantities as an accessory mineral, hornblende being very abundant, and the quartz transparent and in little grains. It is now mostly used for local purposes.

La Moye Quarries.—These very extensive quarries, in the south-western part of the island, are now not much used. The remains of past industry may be seen in the shape of enormous spaces of "opened up" rock, a gantree, and some steam-boilers and engines. The stone is a coarse-grained syenite, presenting all the appearances of ordinary granite, but the remark made respecting the mica in the Mont Mado stone applies equally to this. All the minerals are large and the complicated manner in which they are interlocked causes the material to look very compact. The colours are of various tints of pink and grey. The felspar ranges from vermilion to smoky white, these different tints being often seen in one piece of stone. In those parts of the quarries where the general colour of the mineral is pink or yellow, hornblende occurs in minute quantities. In the lighter kinds, it is very abundant, being dark green and frequently occurring in needle-shaped crystals: perhaps a little schorl is present.

A vein of fine-grained syenite of a dark green colour, and very much resembling the ordinary Guernsey road-metal, runs through part of these quarries, but is not sufficiently large to cause it to be worked, more than is necessary for clearing up the face of the stone.

La Moye stone may be seen in buildings in all parts of the island, and it has been used in the construction of Chatham Dockyard and other large engineering works in England.

Portlet Bay Quarries.—These are on the south side of the island, close to Noirmont Point. This syenite is similar in appearance to that of La Moye, the crystals not being at all well defined, and are so much mixed up that the rock looks compact. Here and there the orthoclase is twinned on the Carlsbad type.

Southill Quarry is close to St. Helier's, and is principally worked for road-metal. The syenite is very fine grained and of a pink colour, due to the tint of the felspar. If mica were present, it would look exactly like the hornblende granite of Mountsorel. Hornblende is abundant. A vein of dark coloured syenite, similar to the Guernsey stone before referred to, runs through the rocks on the shore up to this quarry, and if it could be easily got at, and were a little wider, the quarrying of it would form a profitable undertaking. A lava dyke also occurs not far from the head of the present workings.

There are, in addition to those mentioned, quarries in the central and eastern parts of the island.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,560, Fenders for Tile Hearths. S. B. Sutcliffe.

A number of tiles are bevelled at their edges to the desired angle, and placed with their faces downwards in a suitable mould to form the shape and

section of the fender. The mould at the back of the tiles is filled in with liquid cement and chippings of tile or pieces of slate, metal, or other suitable filling material, which is allowed to set hard. The fender thus made is effective in appearance, and of sufficient strength to resist all ordinary wear and tear.

11,230, Draught or Weather Boards for Doors. S. Farrar.

Near the bottom of the door a bar of wood is attached by being hung on pintles by staples or eyelets, so arranged that the bar can freely slide up and down on the rods or pintles. On the underside of the bar, near each end, are attached suitably-sized bowls or friction-pulleys, which rest upon the floor, and as the door is opened or closed the draught-excluder will rise and fall to any irregularities or unevenness in the floor. The draught-excluder is cheaper, and causes no scraping or friction upon the oilcloth or carpet, and it can be easily attached either to the inside or outside of doors, and when not required it can be easily lifted off the rods.

8,463, Latches for Doors and Gates. W. H. Horn.

Instead of being made of two working parts, viz. (1) a rising and falling catch, and (2) a lever for working the same. This has three working parts, (1) a short rising and falling catch, (2) a cross lever, and an additional finger lever with a turned-up end and a thumb-piece. This horizontal lever works on a pivot beneath the rising and falling catch, the other end reaching over and slightly beyond the handle so as to be operated therefrom by the thumb or finger, and being pressed down it lifts the catch out of a staple.

7,712, Window Fastener. H. H. Denne.

This fastener, instead of the ordinary method, substitutes a catch or box on one of the meeting rails, and on the other a lock which shoots a bolt therein, and which lock may be fastened with a key. Not only is the unpleasant rattling of the sash prevented, but the sash cannot be unfastened from outside or inside without the use of the key.

NEW APPLICATIONS FOR PATENTS.

August 20.—10,652, H. Provis, Self-Locking Coal-cellar Plate.—10,670, E. Edwards, Iron Girders for Buildings.—10,677, J. Hill, Bath-fittings.—10,682, P. Everitt, Water-closets, Lavatories, &c.—10,691, Stollwerck and Stollwerck, Stairs or Staircases.—10,693, C. Drake, Artificial Stone.

August 21.—10,701, H. Sutcliffe, Ventilators.—10,723, H. Ramsden, Stoves.

August 23.—10,769, E. Harding, Lavatory Appliances.

August 24.—10,788, A. Smith and J. Robertson, Manufacture of Portland Cement.—10,829, C. Dobbs, Scotia Paving Blocks.—10,834, C. Groombridge and J. Rickman, Door-bolt.—10,836, J. Stow, Screw Fasteners for Windows.

August 25.—10,853, A. Frey, Fire-place with Ventilating Arrangement.—10,854, E. Nunn, Bricks, &c.—10,876, J. Pawsy, Painting Brushes.

August 26.—10,887, B. Brand and W. Harper, Hinges.—10,915, H. Hadden, Parquetry.—10,917, D. Brown, Astragals for Roofs and Side Lights.—10,919, T. Bayliff, Chimney-tops, &c.—10,920, F. Henson, Door-bolts.

PROVISIONAL SPECIFICATIONS ACCEPTED.

3,274, F. Hamilton, Nail Screw.—8,958, J. Richardson, Band Saws and Files for same.—9,244, S. Yeates, Surveyors' Levels.—9,778, A. Black, Up-Current Ventilators.—9,997, H. Macklin, Cooking Ranges.—8,537, F. Lyte, White Pigments.—8,409, F. Martineau, Dewatering Apparatus.—9,507, J. Evans, Wood Moulding Machines.—9,859, H. Dean, Gullies and Grease Traps.—9,860, H. Dean, Drain and Ventilating Traps.—9,987, T. Whitaker, Pile-Driving Machines.—10,128, J. Daglish, Lime Kilns, &c.—10,219, P. Smyth, Fittings for Drains, Sewers, &c.—10,265, C. Webb, Automatic Dry Closet.—10,453, R. Eversed and N. Coleman, Flushing Cisterns.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

13,829, J. Baresford and W. Restall, Water-Closets.—3,928, A. Huxley and Others, Syphon Flushing Cisterns.—8,240, H. Knoble, Windmills for Cows, Ventilators, &c.—9,439, T. Kennedy, Testing Pipes.—12,839, G. Wickham, Flushing Cisterns and Water Waste Preventers.—12,908, S. Pitt, Manufacture of Lime, Cement, Mortars, Concrete, Artificial Stone, &c.—14,222, J. Taylor, Saw Spindles.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 24.

By DEBENHAM, TEWSON, & CO.
Finsbury—33, Finsbury Pavement, Freehold, £5,550
Finsbury Pavement—Fruit rental of 74s. 14s. term
13 years

By A. RICHARDS.

Enfield—Freehold house and premises, 1,400
Class Side—Two freehold cottages, 445
Hoe-lane—Seven cottages, term 422 years, no
ground-rent

Lavender Hill—Rose Cottages, freehold

A plot of freehold land

By W. HOLCOMBE.

Pimlico—107, Eaton-place, 35 years, no ground-rent

166 and 168, Ebury-street, 35 years, ground-rent 10s.

By F. FORT & CO.
Southend—The freehold residence, Shorefield, and 4 acres

Homerton—69 to 76 odd, Nubet-street, 84 years, ground-rent 10s. 10s.

Stepney—81, Jamaica-street, 23 years, ground-rent 4s.

By H. RUTLEY.
Walworth—Ground-rent of 63s., term 24 years

Horsey-road—9, Harvist Mews, 55 years, ground-rent 6s.

Kentish Town—112, Weedington-road, 64 years, ground-rent 6s.

AUGUST 25.
By RAYMOND & EASON.
Spitalfields—9 to 16, Ely-place, and 18 and 19, Finch-street, freehold

30, Church-street, freehold

Wandsworth-road—31 and 53, Dawlish-street, 23 years, ground-rent 8s.

By C. D. FIELD & SONS.
Old Kent-road—11 to 27 odd, Coburg-road, 34 years, ground-rent 38s.

33 to 40 even, Coburg-road, 28 years, ground-rent 30s. 4s.

24, Inville-road, 64 years, ground-rent 4s. 11s.

By B. BROWNE.
Poplar—45, Stainesby-road, freehold

Holloway—118, Cottenham-road, 68 years, ground-rent 6s. 14s.

AUGUST 26.
By NEWBORN & HADINGS.
Aldgate—Moiety of Nos. 3 and 5, Hutchison-street, and 14, 1, and 2, Hutchison-avenue, freehold

Stoke Newington—15, Kynaston-road, 88 years, ground-rent 6s.

St. Luke's—34, Ball's-street, freehold

By E. STRASSON.
Clapham—71, Plough-road, freehold

Camberwell—124, Boyson-road, 65 years, ground-rent 10s.

Walworth—145, 147, and 149, Hill-street, 13 years, ground-rent 10s. 10s.

167, 169, 181, and 173, Hill-street, 8 years, ground-rent 24s.

6, South-street, 75 years, ground-rent 7s.

34 to 40 even, Runham-street, 81 years, ground-rent 14s.

Lambeth—64 and 65, York-street, 18 years, ground-rent 16s.

Old Kent-road—1, Chumleigh-street, 66 years, ground-rent 6s. 15s.

Brixton—43, Tintern-street, 84 years, ground-rent 6s. 6s.

Kingland—16, Sandringham-road, 79 years, ground-rent 8s.

Beckenham, Mackenzie-road—A plot of freehold land

Blackfriars-road—The lease of 28, Cross-street, 4 years, ground-rent 7s.

By A. W. J. BUNDS.
Kingston—Ground-rents of 108s. a year, reversion in 82 years

AUGUST 27.
By FLOON & BORS.
Westbourne Park—69, Cornwall-road, 76 years, ground-rent 13s.

Miscellaneous.

Remains of an Ancient Church in Norway.—A discovery of the remains of one of the oldest churches in Norway has just been made at Thordtjenn. In making some excavations in the central part of the town, the workmen came upon several stone walls some 10 ft. in thickness, and a number of vaults, coffins, and human bones. The walls are believed to be the foundations of the second church built in Norway after the Reformation in that country, which was called St. Olave's Church. It was built towards the end of the eleventh century by King Magnus Barefoot, grandson of Harold Haardrade, who fell at Stamford Bridge, who wrested the Orkneys and Shetlands from Scotland (1066), and conquered the greater part of Ulster and Leinster, on which expedition he was slain (1103). The church was burned down in 1591, on the same occasion that the celebrated cathedral at Thordtjenn was destroyed by fire for the third time. The latter, the so-called Christ Church, was rebuilt, and is now under restoration, of the progress of which we have given an account on a previous occasion. In the thirteenth century the Church of St. Olave was still the parish church of the city of Nidaros, as it was then called, and in 1309 it became the church of the Franciscan order of monks, who emigrated from England to Norway. In the crypt of the church the remains of several Norse chieftains or Vikings are known to have been deposited, and it is doubtless these which have now come to light. The remains of the church which are as solid as concrete, must be about 800 years old.

A New East Window has been inserted in St. Dunstan's Church, Stepney, the design and work of Messrs. Lavers & Westlake. It is the gift of Mr. Spenser Charrington, M.P.

Union Infirmary, Newcastle-under-Lyme.—Important extensions have just been completed at the Union Workhouse. The new infirmary is built in one block on a site specially acquired for the purpose, and stands in the rear of and parallel with the workhouse. It is in a plain, simple, and economical style, built of dark bricked bricks relieved by bright red terra-cotta quoins and facings. The entire frontage is 199 ft. The building is connected with the present infirmary and workhouse by a covered way leading to the centre of the block. The accommodation comprises male and female wings to the left and right respectively, these being connected with an administrative central block by open staircases. Each wing possesses a day ward, general wards, and separation wards for special cases, and occupies a frontage of 81 ft. 6 in., while the administrative blocks and staircases cover a frontage of 36 ft. The wings have ground and first floors, and the central block is provided with an additional floor, which takes the form of children's wards. The infirmary affords accommodation for sixty adults, six children, and two nurses, with the requisite provision in the shape of surgery, stores, cellars, &c. A little distance to the rear a mortuary and other offices have been built. The wards are 20 ft. wide and 11 ft. high. The completion of the infirmary signifies the carrying out of the first contract. At the earliest possible moment the inmates of the old infirmary will be removed to their new quarters, and the second portion of the extensions and improvements at the Union Workhouse will be proceeded with. This contract includes the remodelling of the old infirmary for the accommodation of forty-eight beds, which will be devoted to the old and infirm inmates. The contractor for the building is Mr. Richard Bradbury, of Stoke, and the work throughout has been executed under the superintendence of the architect, Mr. John Blood. The cost of the structure, together with the roads, boundary-walls, railings, drainage, water-supply, gas-fittings, covered way, and other appurtenances, but exclusive of the furniture and site, is £4,260.

The Telephone of 1664.—A quotation, not much known, from the works of Robert Hooke, published in 1664, would seem to show that the telephone is not such a modern invention as is generally thought. Hooke says:—"And as glasses have highly promoted our seeing, so 'tis not improbable but that there may be found many mechanical inventors to improve our other senses of hearing, smelling, tasting, touching. 'Tis not impossible to hear a whisper a furlong's distance, it having been already done; and perhaps the nature of the thing would not make it more impossible, though that furlong should be ten times multiplied. And though some famous authors have affirmed it impossible to hear through the thinnest plate of Muscovy glass, yet I know a way by which it is easy enough to hear one speak through a wall a yard thick. It has not yet been thoroughly examined how far otcotations may be improved, nor what other ways there may be of quickening our hearing or conveying sound through other bodies than the air, for that is not the only medium. I can assure the reader that I have, by the help of a distended wire, propagated the sound to a very considerable distance in an instant, or with as seemingly quick a motion as that of light, at least, incomparably swifter than that which at the same time was propagated through the air, and this not only in a straight line, or direct, but in one bended in many angles."—Iron.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 5 0	7 0 0
Teak, K.I. ....load	9 0 0	14 0 0
Sequoia, U.S. ....foot cube	0 2 4	0 2 7
Ash, Canada ....load	2 10 0	4 0 0
Birch " " " " " "	3 10 0	4 10 0
Elm " " " " " "	1 10 0	4 0 0
Fr. Dautsio, &c. ....load	2 10 0	8 0 0
Oak " " " " " "	3 0 0	3 10 0
Canada " " " " " "	2 0 0	3 10 0
Pine, Canada red " " " "	2 5 0	4 0 0
Lath, Dautsio " " " "	3 0 0	5 0 0
St. Petersburg " " " "	4 0 0	5 10 0
Wainscot, Birs. ....log	2 15 0	4 0 0
" " " " " "	3 5 0	3 7 0
Odessa, crown " " " "	2 10 0	8 0 0
Doak, Finland, 2nd and 1st, s.d. 100	6 0 0	7 0 0
" " " " " "	5 10 0	7 0 0
St. Petersburg, lat yellow " " " "	8 0 0	14 0 0
Doak, " " " " " "	7 0 0	10 0 0
" " " " " "	8 0 0	15 0 0
Swedish " " " " " "	7 0 0	17 10 0
White Sea " " " " " "		

TIMBER (continued).

Deals—Canada Pine, 1st	£. s. d.	£. s. d.
" " " " " "	17 0 0	30 0 0
" " " " " "	13 0 0	17 0 0
" " " " " "	9 0 0	10 0 0
" " " " " "	8 0 0	11 0 0
" " " " " "	5 0 0	7 10 0
" " " " " "	5 0 0	7 0 0
" " " " " "	4 0 0	12 0 0
New Brunswick, &c. ....ton	0 9 0	0 13 0
Flooring Boards, sq. 1 in., Pre-	0 7 6	0 8 6
pared, first " " " " " "	0 5 0	0 7 0
Other qualities " " " " " "	0 0 3	0 0 3
Cedar, Cuba, " " " " " "	0 0 2	0 0 3
Honduras, &c. " " " " " "	0 0 2	0 0 3
Australian " " " " " "	0 0 4	0 0 7
Mahogany, Cuba " " " " " "	0 0 4	0 0 7
St. Domingo, cargo average " " " " " "	0 0 3	0 0 4
Mexican " " " " " "	0 0 3	0 0 4
Tobacco " " " " " "	0 0 4	0 0 6
Honduras " " " " " "	0 0 8	0 0 8
Maple, Bird's-eye " " " " " "	7 0 0	10 0 0
Bahia " " " " " "	6 0 0	10 0 0
Box, Turkey " " " " " "	5 0 0	17 0 0
Satin, St. Domingo " " " " " "	0 0 7	0 0 11
Porto Rico " " " " " "	0 0 8	1 2 0
Walnut, Italian " " " " " "	0 0 4	0 0 5

METALS.

IRON—Pig, in Scotland, ....ton	£. s. d.	£. s. d.
Bar, Welsh, in London,	4 7 6	4 15 0
" " " " " " " " " " " "	4 6 0	4 7 6
" " " " " " " " " " " "	5 10 0	6 0 0
Sheets, single, in London,	6 15 0	8 10 0
Hoops " " " " " " " " " "	5 8 0	7 0 0
Nail-roads " " " " " " " " "	5 10 0	6 10 0
COPPER—		
British, cake and ingot, ....ton	43 0 0	43 0 0
Best selected " " " " " "	42 10 0	43 10 0

METALS (continued).

COPPER—Sheets, strong	£. s. d.	£. s. d.
" " " " " "	47 0 0	48 0 0
" " " " " "	44 10 0	45 10 0
Australian " " " " " "	0 0 0	0 0 0
Chili, bars " " " " " "	39 7 8	39 15 0
Yarrow Metal, ....lb.	0 0 3	0 0 4
Lead " " " " " "		
Pig, Spanish " " " " " "	12 18 0	0 0 0
English, common brands,	13 5 0	13 7 6
Sheet, English " " " " " "	0 0 0	0 0 0
STAINLESS—		
Silesian, special " " " " " "	13 15 0	13 17 6
Ordinary brands " " " " " "	0 0 0	0 0 0
TIN—		
Banca " " " " " " " " " "	0 0 0	0 0 0
Billiton " " " " " " " " "	0 0 0	0 0 0
Straits " " " " " " " " "	98 17 6	99 10 0
Australian " " " " " " " " "	100 0 0	0 0 0
English ingots " " " " " "	102 0 0	0 0 0
ZINC—		
English sheet " " " " " " " "	13 0 0	18 5 0

OILS.

Linseed " " " " " " " " " "	£. s. d.	£. s. d.
Cocunut, Cochia " " " " " "	32 15 0	33 0 0
Ceylon " " " " " " " " "	25 10 0	25 10 0
Copra " " " " " " " " "	0 0 0	0 0 0
Palm, Lagos " " " " " " " "	23 0 0	23 10 0
Palm-kernel " " " " " " " "	22 0 0	23 5 0
Rapeseed, English pale " " " "	20 10 0	20 12 6
" " " " " " " " " " " "	19 10 0	20 13 6
Tallow and Oleine " " " " " "	25 0 0	45 0 0
Lubricating, U.S. " " " " " "	6 0 0	10 0 0
" " " " " " " " " " " "	8 0 0	13 0 0
TURPENTINE—		
American, in casks, ....cwt.	1 6 6	1 6 9
Tar—Stockholm " " " " " " "	0 15 0	0 15 6
Archangel " " " " " " " "	0 10 6	0 11 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
School Buildings	Sunderland School Bd.	50l., 20l., and 10l.	Sept. 25th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Exhibition Buildings, Newcastle-upon-Tyne.	Executive Council	W. Glover	Sept. 3rd	ii.
Granite and Ragstone	Regate Town Council.	do.	Sept. 7th	ii.
Building Boundary Wall.	Edmonton Union	T. E. Knightley	Sept. 8th	ix.
Iron Fencing, Roads, &c., of Cemetery	New Shoreham Burial Board	A. Loader	do.	ii.
New Coast Guard Station and Battery	Admiralty	do.	Sept. 10th	ii.
Painting and Repairs	City of London Union	do.	Sept. 13th	ii.
Broken Granite	East Ham Local Bd.	W. H. Savage	Sept. 14th	ii.
Erection of Dwelling-house, &c.	Com. of H.M. Works.	J. Colson & Son	Sept. 18th	ii.
Post-Office, Dumfries, N.B.	do.	do.	do.	ii.
New Schools, &c.	Wednesbury Sch. Bd.	E. Pincher	Sept. 20th	ii.
Erection of Prison, Peterhead	Prison Com. for Scotland	Official	do.	ii.
Road Repairs and Tar-Paving	Acton Local Board	C. N. Lalley	Sept. 21st	ii.
Paving Works	Vestry of St. George the Martyr, Southwark	Official	do.	ix.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Outdoor Superintendent	Stockton Corporation	104l.	Sept. 13th	xvi.

TENDERS.

BARKING.—For the erection of a dwelling-house and shop in East street, Barking, for Mr. Johnson Baker, Mr. C. J. Dawson, architect, Barking, Essex:—
R. Walters, Barking Side£1,238 8 0
R. Goodey1,178 0 0
J. Drake1,082 0 0
W. Pavitt, Aveley1,076 0 0
J. Cornell1,078 0 0
D. Argent1,085 0 0
C. Barnes, Hford1,087 0 0
W. Wood, Chelmsford1,064 0 0
H. Carter, Grays1,044 0 0
W. Watson, Hford1,022 0 0

BIRMINGHAM.—For the erection of a dwelling-house, &c., at Harborne, for the Birmingham Central Tramways Co., Limited, Mr. E. Pritchard, M.Inst. C.E., and Mr. J. Kincaid, M.Inst. C.E., engineers:—
James Moffatt, Moseley£5,187 0 0
G. Law, Kidderminster4,613 0 0
J. Fell, Leamington4,599 0 0
W. Robinson, Birmingham4,432 0 0
W. Bloore, Aston4,397 0 0
F. Rowbotham, Birmingham4,280 0 0
J. Biggs, Handsworth4,283 9 6
H. Hartley, Small Heath3,948 0 0
* Accepted.

BIRMINGHAM.—For the erection of a steam tramway depot at King's Heath, for the Birmingham Central Tramways Co., Limited, Mr. E. Pritchard, M.Inst. C.E., and Mr. W. Lytton Holt, C.E., engineers:—
James Moffatt, Moseley£5,512 0 0
W. Robinson, Birmingham6,160 0 0
G. Law, Kidderminster6,077 0 0
J. Biggs, Handsworth5,978 0 0
F. Rowbotham, Birmingham5,549 0 0
J. Hartley, Small Heath5,379 0 0
J. Fell, Leamington (accepted)5,163 0 0

CAMBERWELL.—For alterations and repairs to No. 271, Camberwell-road, for Mr. Richards, Mr. W. A. Murphy, architect:—
Ford & Son£263 0 0
Wood208 0 0
Ridley198 10 0
G. Parker (accepted)196 0 0

CHINGFORD.—For the Chingford Drainage Works.

for the Epping Rural Sanitary Authority:—
Nave£10,400 0 0
E. Wilson10,044 0 0
C. Dickinson9,990 0 0
J. Small & Sons8,514 15 2
F. & F. J. Wood9,441 0 0
W. Nichols9,196 15 0
J. Young9,138 0 0
J. Jackson8,708 0 0
W. Cunliffe8,755 0 0
J. J. Robson5,580 0 0
H. Potter8,603 0 0
J. Hayward8,385 0 0
W. Wood8,300 0 0
J. Ford & Co.8,249 0 0
H. Wells8,200 0 0
C. Kittingback7,905 0 0
W. French, Buckhurst Hill7,983 10 0
* Accepted.

CHESHAM (Bucks).—For the erection of new stores

and dwelling-house, in the Broadway, for the Co-operative Society, Chesham, Mr. G. H. Green, architect:—
E. Darvell & Son, Chesham£798 0 0
T. Honour & Son, Tring776 0 0
C. Mead, Alox, Boremoor710 0 0
W. G. Harding, Chesham708 0 0
A. Mead, Chesham697 0 0
Geo. Darlington, Amersham665 0 0
* Accepted.

CHESHAM (Bucks).—For the erection of two dwelling-houses and shoe factory, New Town's End-road, Chesham, for Messrs. Tins, Fulham & Sons, Queen's-road, Brighton. Mr. G. H. Green, architect, Chesham:—
 A. Mead, Chesham.....£1,480 0 0
 Geo. Neal, Chesham.....1,430 0 0
 Geo. Darlington, Amersham.....1,290 0 0
 Chas. Monk, Boxmoor.....1,280 0 0
 T. Honour & Son, Tring (accepted).....1,198 0 0

CLACTON-ON-SEA.—For works at Christ Church, Clacton-on-Sea. Mr. T. H. Baker, architect and surveyor, Clacton-on-Sea:—
 Capon.....£2,932 15 0
 Wood.....2,745 11 0
 Hook (too late).....2,743 0 0
 Mason & Sons.....2,726 11 0
 Allen.....2,683 4 10
 Leo.....2,618 18 8
 Saunders.....2,514 5 0
 Demald.....2,440 7 7
 Grimwood & Son.....2,365 4 0
 Everett & Son.....2,340 0 0

CLAPTON.—For alterations at the Priory Tavern, Elderfield-road, Lower Clapton, for Messrs. Smyth Bros. Mr. B. Elsom, architect:—
 Patrick & Sons.....£393 0 0
 Mower, Hackney.....389 10 0

COODEN (near Bexhill).—For the erection of a cottage home at Cooden, near Bexhill, for Lady Clinton. Mr. J. B. Wall, architect, Walbrook, London:—
 W. Dickinson, Paddington.....£1,620 0 0
 H. & F. Rodda, St. Leonards.....1,629 0 0
 Crutenden, St. Leonards.....1,584 0 0
 Alf. Dore & Son, Eastbourne.....1,578 0 0
 M. Martin, Eastbourne.....1,570 0 0
 P. Jenkins, St. Leonards.....1,570 0 0
 Cornwell & Sons, Eastbourne.....1,568 0 0
 D. H. Snow, Hastings.....1,498 10 0
 J. Cole, Bexhill.....1,486 10 0
 T. S. Todd, Bexhill.....1,397 0 0
 T. H. Hutchings, Bexhill.....1,298 10 0

DEPTFORD.—For rebuilding the Walter Arms, Addey-street, Deptford. Mr. W. T. Hunt, jun., architect:—
 H. Jennings, Brockley.....£300 0 0
 [No competition.]

EALING.—For alterations and additions to business premises in Broadway, Ealing, for Mr. J. Moon. Mr. G. Ashby Lean, architect and surveyor, Ealing:—
 Bailey.....£298 0 0
 Waters.....280 0 0
 Nye.....279 0 0
 H. & A. Jones.....246 0 0

FOREST GATE.—For the erection of dwelling-house, stables, &c., at Forest Gate. Messrs. J. & N. Sharpe, architects:—
 Beale.....£1,948 0 0
 Harler.....1,773 0 0
 Mower.....1,687 0 0
 Rippes.....1,662 0 0
 North Bros.....1,430 0 0
 Boulter & Lee.....1,385 0 0

HEREFORD.—For alterations and new shops, High-street, Hereford. Mr. W. W. Robinson, architect:—
 H. Welsh.....£2,059 0 0
 Beavan & Hodges.....825 0 0
 W. B. Partington.....824 0 0
 J. Hiles.....787 0 0
 T. Lewis.....780 0 0
 Wm. Bowers & Co., Hereford.....745 0 0
 * Accepted.

HEREFORD.—For the erection of a villa residence on the St. Elizabeth Estate, Hereford. Mr. W. W. Robinson, architect, King-street, Hereford:—
 H. Welsh.....£1,059 0 0
 Beavan & Hodges.....825 0 0
 W. B. Partington.....824 0 0
 J. Hiles.....787 0 0
 T. Lewis.....780 0 0
 Wm. Bowers & Co., Hereford.....745 0 0
 * Accepted.

HOXTON.—For three shops, Mintern-street, New North-road. Mr. Brett A. Elphicke, architect. No quantities:—
 Gould & Brand.....£387 0 0
 Ed. Porter.....970 0 0
 J. Fanthorpe.....948 0 0
 J. Jarvis, Tunbridge Wells.....945 0 0

LONDON.—For new sanitary arrangements and other improvements at 39, Wimpole-street, W. Mr. Mark H. Judge, architect:—
 H. Tuten & Sons (accepted).....£491 0 0

LONDON.—For alteration at 213, Oxford-street, for Mr. A. Gianella. Mr. Banister Fletcher, architect:—
 Eldon & Co.....£790 0 0
 J. O. Richardson.....632 0 0
 B. E. Nightingale.....615 0 0
 Jackson & Todd.....589 0 0
 H. J. Williams (accepted).....533 0 0

LONDON.—For alterations to 45 and 47, Monkwell-street, E.C. Messrs. W. E. & F. Brown, architects:—
 Trent Bros. (accepted).....£730 0 0

PIMLICO.—For alterations, shop front, and shop fittings, at 69, Buckingham Palace-road, for Mr. H. Headley:—
 W. Rendel (accepted).....£500 0 0

RICHMOND.—For alterations at Cambridge House, for Mr. E. J. D. Paul. Mr. William Clissold, Strand, architect:—
 Sweet & Loder, Richmond.....£2,069 0 0
 Geo. Drew, Chalford.....2,000 0 0
 T. J. Messon, Twickenham.....1,985 0 0
 Maple & Co., Tottenham Court-road.....1,886 0 0
 Goddard & Sons, Dorking.....1,730 0 0
 W. O. & E. Reading, Paddington.....1,075 0 0
 * Accepted.

ROTHERHAM.—For building house, Parfitt-road, Rotherhithe, for Mr. Francis. Mr. E. Thomas, architect:—

	Allow for	Total.
Parfitt.....	£795	£795
Almond.....	770	40.....730
A. White & Co.....	721	24.....697
Chafen (accepted).....	636	40.....696

SHOREDITCH.—For rebuilding No. 47, Curtain-road, Shoreditch, for Mr. A. F. Campbell. Mr. P. Watkins, architect, Ilford:—
 J. Smith.....£1,397 0 0
 Staines & Sons.....1,374 0 0
 Lawrence & Son.....1,371 0 0
 G. W. Beale.....1,360 0 0
 J. Sharman.....1,319 12 0
 Scrivener & Co.....1,272 0 0

WARLINGHAM.—For house at Warlingham, on the Duke's Hill Estate. Mr. George Baines, architect, Great Winchester-street, E.C.:—
 Hunter & Bryant, Whiteleaf.....£2,865 0 0
 Masters & Sons, Anerley, S.E.....2,867 0 0
 Sykes, Catford Bridge, S.E.....2,860 0 0
 Sergeant, Hackney.....2,749 0 0
 Roberts, South Norwood.....2,679 0 0
 J. & C. Hoyer, Warlingham, Surrey.....2,617 0 0
 J. & C. Hoyer, Upper Norwood.....2,630 0 0
 W. Marriage, Fenchurch-lane, E.C.....2,388 0 0
 W. Johnson, Wandsworth Common.....2,360 0 0
 Smith & Bullard, Croydon.....2,193 0 0
 Batley, Old Kent-road (accepted).....2,097 0 0

WYREBRIDGE.—For alterations to the Congregational Church and additions to schoolroom. Messrs. Peak, Lunn, & Peak, architects, Guildford:—
 Martin, Addlestone.....£250 0 0
 Faulkner, Walton.....652 0 0
 Ingram & Sons, Hoveham.....540 0 0
 King, Oatlands Park (accepted).....465 10 0

WOLVERHAMPTON.—For the erection of new class-room at St. Luke's Schools, Blakenhall, for the Rev. J. G. Addenbrooke, M.A. Mr. Joseph Lavender, architect, New Bank Buildings, Wolverhampton:—
 G. Sant.....£240 0 0
 H. Gough.....238 0 0
 T. Morris (accepted).....210 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

W. H.—S. & P.—P. T. W. G.—C. E. H. & Son.—T. D. S.—H. C. W.—C. L. H. B. (plan received—thanks).—J. H. W.—T. G. (drawings received).—C. H. (plan received).—P. E. M.—J. R. M.—H. B. H. C. (we fear your letter might involve us in both a personal and a theological controversy).
 All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.
 Note.—The responsibility of signed articles and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.
 Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT DESIRED.
 All communications regarding literary and artistic matters should be addressed to THE EDITOR. All communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND,
 Box Ground, Combe Down,
 Corsham Down, And Farleigh Down,
RANDELL, SAUNDERS, & CO., Limited,
 Corsham, Wilts. [Adv.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
 Box, Wilts. [Adv.]

Douling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Douling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to **CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.**—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [Adv.]

Douling Free Stone For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, **BLUE LIAS LIME** Stoke - under - Ham, (Ground or Lump), Ilminster. [Adv.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 39, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [Adv.]

Asphalte.
 Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
 Office:
 No. 90, Cannon-street, E.C. [Adv.]

MICHELMORE & REAP,

Manufacturers of
 CHARLES COLLINGS'S PATENT.

COLLINGS'S PATENT HINGES,
 LEVER, SCREW, & BARREL BOLTS,
 Self-Acting "FALL DOWN" GATE STOPS,
 and IMPROVED GATE FITTINGS of every Description
 36A, BOROUGH ROAD,
 DISCOUNT TO BUILDERS. LONDON, S.E.

BRABY'S PATENT GLAZING.

GLASS SET FEW.

ALLOWING EXPANSION AND CONTRACTION, AND PRECLUDING BREAKAGE.
 ABSOLUTELY WATERTIGHT. PAINTING AND PUTTY SUPERSEDED.
 OVER THREE MILLION FEET FIXED.

DRAWINGS AND PRICES ON APPLICATION.

- MODELS AND SECTIONS ON VIEW -

LONDON: 352 to 364, EUSTON ROAD.
LIVERPOOL: 6 and 8, HATTON GARDEN.
GLASGOW: 335, ARGYLE STREET.

ILLUSTRATIONS.

The Triumphal Arches of the Romans: The Arch at Orange.—From an Engraving by Baltard	378-379
The Triumphal Arches of the Romans: Arch of Trajan at Beneventum.—From an Engraving by Cunego	382-383
Proposed Restoration of Glenbucklet Castle, Aberdeenshire.—Mr. Reginald T. Blomfield, M.A., Architect	386
London and County Bank, Kensington.—Mr. Alfred Williams, Architect	387
The New Hatcham School for Girls, New Cross.—Mr. Henry Stock, F.R.I.B.A., Architect	390-391

CONTENTS.

A New Book on Geology.....	367	Competitions.....	376	The Trades Union Congress.....	398
A Sanitary Retrospect.....	368	London and County Bank (New Premises), Kensington.....	376	Architectural Association Saturday Visits.....	399
Workshops at Public and Private Schools.....	368	Glenbucklet Castle, Aberdeenshire.....	378	Case under the Metropolitan Building Act.....	399
Notes.....	369	Aske's Schools for Girls, Hatcham.....	382	The Royal Academy.....	399
The Westminster Hall "Restoration".....	371	Art Questions at the British Association Meeting.....	382	Gates and Triangles.....	399
The Triumphal Arches of the Ancient Romans.....	371	Health Questions at the British Association Meeting.....	393	The Student's Column: Stone Quarries.—XI.....	399
Further Notes on the Taphanes House (Illustrated).....	372	The Regulation of Wages.....	395	Recent Patents.....	400
The Epitaphical Heraldry of Ireland.....	374	Engineering Questions discussed at Birmingham.....	395	Recent Sales of Property.....	400
The Walls of Chester.....	375	Technical Education and the British Association.....	396	Miscellaneous.....	400
The Recent Earthquakes in America.....	375	The Colours of Metals and Alloys.....	397	Prices Current of Building Materials.....	401

A New Book on Geology.



HERE have been so many text-books of geology that it might well be doubted whether there were at present room for another; but the new volume by Professor Prest-

wich* may be said nevertheless to have filled a gap, by presenting us with a work written in a style that is clearly intelligible, not only to the scientist, but to the ordinary reader. More particularly is this the case when the author is dealing with questions of economic importance.

Several parts of the work are decidedly novel, dealing fully with subjects which in other text-books are only just touched upon. Its principal aim is to place before students the views of the Continental and American schools of geologists, who uphold the theory that the physical forces were more active and energetic in former geological periods than at the present time. In this country the theory of uniformity has been more generally held and taught; by which we mean, that there has, within certain limits, been uniformity of action in all times. There are important objections to the latter theory, one of which is well put by the author in the passage in which he observes (p. 285) that, "Whereas Continental elevation may take place with or without fracture, mountain elevation is always accompanied by powerful fracture and excessive lateral pressure. Both forms of upheaval are due to the operation of the same subterranean forces; but while we have knowledge, within our own experience, of the operation of the former, we have, within the same experience, no knowledge of the latter, and can only judge by inference from the facts of its mode of action." It cannot be denied that the inversion and contortion of several thousands of feet of strata in the formation of mountain chains form, at all events, one strong argument in favour of non-uniformity; and it may be observed that the tendency of recent scientific theory and investigation has been to support the idea, in regard to other branches of the physical history of our planet, of a great difference in the energy and action of some forces from that which we now see; as, for instance, in regard to ancient tidal action, about which such new and startling hypotheses have been lately brought forward. We can

hardly, however, agree with the author that the denudation of rocks has gone on at a more rapid rate in past geological periods than in the present (p. 61). We do not stretch our imagination in this respect back to the times when the Archæan or pre-Cambrian rocks were originally deposited, because none of us know enough about the actual conditions under which they were laid down, or of the chemical and physical forces of the time, to say anything which might be of any value in the determination of a point of this nature. But we would rather begin with the Cambrian rocks,—the earliest strata of Palæozoic age; and the evidence afforded by their entombed organic remains, together with that of their method of deposition, leads us to think that the condition of the atmosphere and the water at that remote period was very similar to that which now obtains; and, therefore, the rate of disintegration did not proceed more rapidly then than now; for, of course, the supposed period of violent and tremendous tidal action, when the moon was much nearer to the earth than now, must be relegated to a period far before that of the Palæozoic strata; and, if we go on thus admitting the existence of extreme forces in past geological times, we shall not be arguing from analogy of things as at present observed. We might stretch a point in this direction with regard to the elevation of mountain chains, as the evidence afforded by them seems to warrant it; but the contents of the stratified rocks forbid us to be so elastic with them.

To turn to some of the points which more directly concern our readers, we may observe that while all text-books of geology tell us something about underground waters, springs, and so forth, we have never seen one which deals so exhaustively with matters relating to water supply, as understood by practical men, as the work now before us. We must heartily congratulate the author on his method of dealing with this portion of his subject, and recommend its perusal to those of our readers who are interested in water-supply questions.

After explaining how rain is disposed of when it reaches the surface of the earth, the absorbent power of rocks, and their capacity for holding water, are dealt with. In regard to this, Professor Prestwich observes (p. 156) that the quantity of available water which the strata may contain has to be looked upon as distinct from that which a rock can imbibe. The one is the portion which the rock holds until it is lost by evaporation or is driven off by the heat, while the other is that which passes more or less freely through the strata. The latter is the condition which prevails when the strata are below the line of permanent saturation, and the former is that which obtains

when the rock is above the line of saturation. The one may be called the "water of saturation," and the other, which is held by capillary attraction, the "water of imbibition," or the "quarry water." Percolation is a property dependent on both conditions jointly.

Tables showing the amount of absorption of rocks of different natures are given, and the comments on the value of the experiments carried out, in arriving at the results, are exceedingly useful. The author remarks that the full absorbent power of a rock does not represent its value as a water-bearing stratum. Clay can absorb a large quantity of water, but transmits none. Chalk, again, absorbs freely, but transmits slowly and in small quantities. Laboratory experiments made on compact unfissured samples, which do not correctly represent the amount of water obtainable from their respective rocks when *in situ*, are shown to be of very little value; as in nature such rocks are traversed by joints and fissures, which hold and transmit water freely. The value of the beds, as water-bearing strata, is in direct ratio to their capacity of saturation, and in inverse ratio to their power of imbibition. Thus, although solid chalk and loose sands may hold the same quantity of water, the resistance to the free passage of it in the former is to the latter in the proportion of about 600 to 1.

The phenomena attendant on springs, and the conditions for the successful making of artesian wells, follow in due course. Speaking of London water-supply, the author states that, although the necessary conditions are present to cause water to rise above the surface in the lower grounds of the valley of the Thames, yet owing to the multiplicity of artesian wells, and to the drain upon the underground water, the inflow of the rain and surface-waters cannot keep pace with the quantity removed by pumping, and consequently the line of water-level has been lowered, and now stands under London about 100 ft. below the Thames level. Several good diagrams illustrate the more essential points connected with this subject, and there is also a coloured plate showing the underground water-level in different parts of the south-east of England,—vertical lines indicating the positions of important wells. We would particularly call attention to the fact that the majority of the sections which illustrate this and other portions of the work represent actual sections of ground; and are not drawn—as many such diagrams are—to show what is possible, but what actually occurs in nature, and what is found in practice.

The chapters treating of volcanoes and earthquakes, which have just become a painfully interesting subject, are written in an entertaining manner, and much new matter is

* Geology: Chemical, Physical, and Stratigraphical. By Joseph Prestwich, M.A., F.R.S., &c., Professor of Geology in the University of Oxford, Vol. I.—Chemical and Physical. Oxford: Clarendon Press, 1886.

added. An important point which is touched upon is, that though earthquake shocks (p. 221) are propagated with greater rapidity through solid rocks than through those which are soft and friable, yet the effects on buildings situated on the latter class of strata are far more disastrous than when they stand on hard and compact rocks. Evidence proving this is cited from the Jamaica, Tuscany, and Lisbon earthquakes. In the earthquake at the last-mentioned place, the buildings on clay were all destroyed; those on the slopes of the Almada sands and limestones suffered severely; whilst, on the contrary, all the buildings on the Hippurite limestone and the basaltic rocks escaped entirely; the line at which the force of the earthquake ceased to be destructive corresponding exactly with the boundary of the softer and less coherent Tertiary beds. The solid rock, we presume, like Wordsworth's cloud, moves altogether if it moves at all, and the ground does not shake under the shock to the same extent as on softer and more friable strata. In dealing with this part of the subject, more reference might have been made to the recent seismological researches in Japan.

The geological map of the world, which forms the frontispiece of the work, is, for its size, decidedly the best we have seen; the colours are remarkably clear. Other plates are given, showing the distribution of the active and recently extinct volcanoes, and of the areas affected by earthquake shocks, with approximate contours of ocean depths; maps of coral islands, reefs, &c.; sections across the coal-fields of Somerset, Liège, and Westphalia; and a section of Mount St. Gothard, as shown by the tunnel, &c.

The author states that much of the volume has been some time in print, and this may account for the work not being quite up to date in some respects. Students of the subject may look forward with considerable interest to the appearance of the second volume, which will deal principally with stratigraphy and historical geology. We are, of course, bound to consider the subject as it bears on practical studies, rather than from a purely scientific standpoint; but it may be added that, apart from the high intellectual interest of the subject, the architect who gives some attention to geology will be likely to find it assuming practical relation with his work at a good many unexpected points.

A SANITARY RETROSPECT.

(CONCLUDED.)

TWAS a matter of common knowledge that the sewage so freely poured into rivers contained valuable fertilising elements, and the first attempt to clear the rivers arose from the consideration of the value of the sewage, although the fouling of the river could be dealt with under the Nuisance Removal Act if any one would take the proper course; but it was one so uncertain of result that proceedings were seldom taken under it, and it could be dealt with by injunction of the Court of Chancery, and this proceeding has been frequently taken; but any willing action of town authorities to clear the rivers was taken chiefly to recover the value of the manure of the sewage before it passed into the river. It was supposed to be contained in the rich-looking mud, and it was the purpose of the town authorities to recover from the sewage its manurial value in the form of mud dried and made portable, the first proceeding being to construct tanks at the outfall in which the mud might settle, and to make them in two parts so that one might be filled while the other was being emptied. The subsidence of the mud was a slow process, and even after the sewage had stood for some time in the tanks the lighter particles of solid matter remained suspended in the liquid. This was caught before it could enter the river by passing the sewage through rough filters. To make filtering unnecessary the precipitation of the solid matter in the tank was hastened and made more perfect by mixing with the sewage a small quantity of lime, and after the sewage water had been run off the mud was taken out

and dried in the air, ready to be disposed of as manure. From 15 cwt. to 20 cwt. of lime, according to its quality and the greater or less quantity of solid matter in the sewage was used to each million gallons of sewage dealt with, or from twelve to sixteen grains of lime per gallon.

The action of the lime on the suspended matter soon made it fall to the bottom, and when the water had been run off the mud was spread out to dry within banks of earth or dried mud formed round the place to confine it. Out of each million gallons of sewage so dealt with, about twenty tons of this sludge would be got out of the tanks, which would be reduced to four tons by the time it had dried sufficiently to be removed; that is, reduced to the condition of stiff mud, which could be dug out and carted away. But farmers were not long in finding that it was of very little value as manure, and they would not take it away from the place at any price, unless something of real value was offered along with it, such as the sweepings of the streets and markets; and the sewage mud accumulated on the hands of the town authorities to a most inconvenient extent. They could no longer let it run into the rivers, having once made the attempt to take it out, and could not dispose of it in any other way. But chemists found from analyses of raw sewage that the chief part of its manurial value was contained in the liquid,—as much as six-sevenths of the whole,—and this information placed the question in a new light. Land had for many years been irrigated with river-water in various parts of the country,—in almost every county,—and the dirtier the water the better it was for this purpose. Where land was irrigated with river water, every effort was made by the owner and occupier to get into the watercourse as much sewage as possible, along with which would travel two tons of mud in every million gallons, if it did not settle in the watercourse on the way to the fields, and in this way the two tons of mud could be dealt with; whereas when it contained only two more tons of water in the form of portable mud at the sewage works, the four tons of so-called manure offered to the farmer was not worth fetching away. Farmers do not, as a rule, go much from home, and except in these isolated cases of land irrigation, they knew but little about it. They were, indeed, well acquainted with the use of the liquid manure of farmyards, carried about in a barrow, or iron tank, and did not find it pay the expenses attending its use in that way, and they did not readily fall in with suggestions to irrigate land with town sewage as a permanent thing, notwithstanding that chemists proved beyond doubt that it contained nearly all the manurial properties they so much wanted, and were paying high prices for in another form; and they were assisted in their objection to sewage utilisation by the artificial manure manufacturers and agents, and perhaps some chemists. Town authorities, then, having proof of the beneficial use of sewage on land by way of irrigation, desired to possess land for the purpose, either by purchase or lease. But this could not be done on any fair terms. They wanted an acre for every hundred head of population of the town; 100 acres for 10,000 people, and so on; but whether it were a large area or a small one it could not be had at its agricultural value. Almost the price of building land had to be paid for it a mile from the town. Land which had not been improved by any outlay of the owner or his predecessors in possession, but had become more valuable by the presence of the town population, must be paid for by those who had themselves increased its value, at a price which could not accrue as the true value for a century, on any reasonable calculation; and a lease of land for sewage irrigation was almost equally difficult to obtain. There was a prejudice against land irrigation with town sewage, a prejudice founded on no knowledge of the facts of the case. Sewage had been used for many years by farmers in the immediate neighbourhood of towns without the least nuisance being created,—omitting all reference to the so-called Craigenranny

"meadows," of which perhaps that could not be said,—so that, with respect to the chief objection, which was that the irrigation of land with sewage would create a nuisance in the neighbourhood, it was not founded on any sufficient grounds, and was merely introduced to enhance the price to be paid for the land if taken. The Sewage Utilisation Act of 1865 was passed chiefly to facilitate the acquisition of land for this purpose, and it offered some facilities for putting in force the Land Clauses Consolidation Act of 1845, whereby on giving certain notices lands may be taken otherwise than by agreement, either on a trial by jury or by arbitration; but that Act was never made for the taking of land for sewage irrigation; it was made for railways, canals, docks, and similar works, and chiefly had in contemplation the taking of land compulsorily for railways; also for waterworks, but in no case for the disposal of sewage; and the requirements of this are of a nature different to those of the other kind of works. There is no element of public necessity in a railway: convenient it may be; it is for the Parliamentary committees to inquire whether it will accommodate a sufficient number of persons to warrant its being made, or rather, as this point may almost safely be left to the consideration of the promoters, to inquire what interests of a public nature it might interfere with if made; and if nothing of this sort would take place a railway might be called a public convenience. But even on that very point it may be asked as a bye question, and not immediately connected with our present subject, whether, if a railway company, for no other reason than that of increasing its dividends, destroys the traffic of the canals—not by competition, but by their purchase for the purpose of closing them,—and even lets them go to decay so that the traffic would be difficult of revival, that railway can be said to be a public convenience, and also whether that railway company is honestly carrying out the powers given to it by its Act of Parliament. Those persons who are deprived of their wholeness of convenience of canal traffic, though it be but a moderate one, may well ask whether such a company really took from Parliament the powers it has exercised in this respect. Whatever justification there may be for depriving some persons of their accustomed privileges for the sake of increasing the convenience of others, it ought to be made known. Let the same argument be applied to the powers which a town authority has to take land for sewage irrigation. It may be said that a landowner is deprived of a part of his land for the benefit of the people of the neighbouring town, and that they ought to pay for it in the same manner and on the same scale as a railway company must do, with the exception of the claim for severance. The answer is,—or, at least, one answer is,—that the owner of any land adjoining a town shares in the prosperity of the town. If by the health and industry of a multitude of people the town grows in prosperity, the land immediately adjacent becomes more valuable, and, for building upon, a high price is readily offered for it. This, in all fairness, must be regarded as going some way towards compensation to the landowner. There ought to be a revaluation of all lands near towns, and where it is proved that the increased value arises from the proximity of the town population, a part of that increase ought to go towards providing land for the disposal of the town sewage. It is not wanted close to the town or to interfere in any way with building sites, or within any distance to which building land can be reasonably said to extend, and an offer of the agricultural value of as much land as is required for the disposal of the sewage a mile from the town ought to be accepted. In some cases the question of residential injury arises. Innocuous as the irrigation of land with town sewage is, with ordinary attention,—and this must be accepted on all hands as a *sine qua non*,—there has always been a sort of objection to it fancied by those who reside near the land before anything is done; but afterwards, and when nothing is seen but ordinary farming movements of horses and carts, the same

people forget there is any such thing as irrigated land near them.

The drift of the Sewage Utilisation Act of 1865 was pretty plain,—that it encouraged the disposal of town sewage by way of land irrigation; and it was followed in the next year by the Sanitary Act, which, amongst other provisions, entertained the possibility of the wilful default of a local authority in providing sewers and water supply, and in such a case made provision for these being carried out. The Act was passed in August, 1866. In October a Sewage Congress was held at Leamington, at which two chief questions were discussed; whether it were better to dispose of sewage by way of irrigation,—meaning that ordure of all kinds should be carried out of the town by water, as well as the refuse water used in houses for all purposes,—or whether the faeces and as much of the urine as was discharged with them should be dealt with separately by a “dry” system. There was the Town Clerk of Manchester, Mr. (now Sir) Joseph Heron, who supported the system which had always been and was then adopted in Manchester, which kept out of the sewers and the river Irwell as much as could be retained on the premises of houses, to be removed in carts in the night time, mixed with part of the ashes of the house fires, and sent into the country as manure, the difference between the charges for carriage and that received as the value of the manure being debited to the funds of the Corporation. It was admitted that this was but a rough-and-ready way of getting rid of the human ordure of the town, and that the details might be improved, but in principle the “dry” system was upheld. Dr. Alfred Carpenter and Mr. Baldwin Latham, on the other hand, supported the system of irrigation as the best in general, and it was resolved by the Congress, “That the system of irrigation, when carried out in a scientific manner, removes the difficulty which arises from the present noxious plan of polluting the rivers of England, but that no one system can be laid down which would be suitable to all towns,” the latter part being a rider imposed upon Dr. Carpenter’s resolution to appease those who opposed irrigation in the interest of large towns like Manchester, the difficulties of which in dealing with the sewage by way of irrigation are those only which are entailed as a consequence of covering too much ground without a break,—land again, every inch of which must be sold for as much as it will fetch. An outfall adopted for a prospective increase of population of 50 per cent., or even double, has been made use of for an extension of population to three times the number. Where it is asked with something like scorn, and with an evident assurance that the question cannot be answered, are the 3,000 or 4,000 acres of land required for irrigation? Having made the difficulty, not without some warnings against it, the large town appeals to its magnitude as a reason for letting it alone.

WORKSHOPS AT PUBLIC AND PRIVATE SCHOOLS.

A HEAD-MASTER, newly appointed to a public school, in his inaugural speech remarked to the assembled boys that one new thing he would promise them, and that was a workshop. This is an observation which we should like to see made by every head-master of every public and private school in England. In some schools workshops already exist, and it may be hoped that some day or other a workshop will be considered as necessary an appurtenance of a school as a sanatorium. It is not so very many years ago that the latter would not have been regarded as a necessity; now, in some form or other, such a place is part of every well-regulated school.

The advantage of having a workshop attached to a school is almost too obvious to need pointing out; but the fact that there are many schools which do not possess one, seems to show that the advantages, though obvious, are not so generally recognised as they should be. The usefulness of a knowledge of tools,

and of the way to apply them, is continually of benefit in after-life. No boy can tell in what way he may require them. It may be that, like Mr. T. Hughes’s nephews, whose letters he has published in “Gone to Texas,” he may have to leave school somewhat suddenly, and in no long time have to go to some new country to earn his livelihood. The advantage of having acquired even the smallest dexterity in the use of tools is then most clear. But every one who lives in the country, and also in the town, may every year save himself no inconsiderable sum of money by knowing how to handle tools. It gives him, too, a better opportunity of seeing that work is properly done in a house than is usually the case, when most heads of households give *carte blanche* to the neighbouring carpenter.

If a man likes to do more with them than simply make use of them, he at once has a capital amusement as a set off-against mental labours. There are some who in leisure hours will amuse themselves with their pencil; there would be many more who would take up the hammer and the chisel if they had been early taught how to use these and similar tools. Coming back, so to speak, to school-boy days, there is nothing better than to give boys the means in holiday time of making their leisure hours at once hours of rest, but not of mere idleness, or of absolute devotion to some athletic pursuit. If a boy has tools and a place to use them, and materials on which to employ them, the number of hours which may be thus healthily and usefully spent are considerable. Most persons have seen this fact; it is only to be regretted that it is not one which can be more universally recognised.

The primary cost of a workshop is not great, and there is no school which can be without the space in which one can be erected. The supply of tools may be of a twofold character. If the shop is of some size, and lathes and larger standing tools are required, they should be, so to say, part of the shop. It may be well also to have a general supply of some of the tools which are most commonly used, just as the school cricket club supplies a certain number of bats, pads, and gloves. But that should not prevent boys who desire it from having their private tools, just as they have their private bats or rackets. As, too, in every school there is a small subscription for the club, so there should be a small subscription for the workshop. But as the school body, or the proprietor of the school, if it be a private one, supplies the ground, so also should in the same way the workshop be supplied. There would never be any difficulty in having a man to superintend it; in a large school it would be a sufficient employment for him, and in most cases he would from time to time find work to do in the establishment itself. The workshop once being established, its development as regards size and work would depend on the size and character of the school. It might be a mere carpenter’s shop, or it might comprise much more elaborate work in wood and metal.

The use of the workshop would, of course, be confined to play-hours; but the space of time in which it would be available would then be considerable. There are in every school-boy’s day a number of odd half-hours which are generally wasted. These would be the special time for the workshop; but on half-holidays there would always be time, and on rest days in winter, or such occasions when football and the regular out-door games, which, after all, at that season of the year occupy little more than an hour a day, could not be played, the workshop would be available. It would be impossible for us here to work out the plan of its use with any minuteness. To do so would necessitate a knowledge of the school system of every public and private school in England. Our object here is to point out the advantages,—we would almost say the necessity,—of a workshop, and the fact that it is possible to establish one in a school without difficulty. The fact that in some schools workshops are already to be found is evidence enough that they can be both established and used. As regards those schools where they do

not exist, we would urge those in authority no longer to overlook their value or to delay in establishing them.

NOTES.

NO one has yet hinted at any possibility, present or future, of controlling the action of earthquakes, but the recent calamity in the States has led to the publication of various suggestions as to the possibility of estimating the periodicity of earthquakes or arriving at some idea of natural law in regard to their recurrence. The most striking of these is embodied in Mr. Jenkins’s letter in the *Times* of the 8th, giving facts and dates which go to indicate that there are tides in the internal fluids of the earth influenced by the moon in the same manner as those of the external fluid. Part of the letter is worth quoting:—

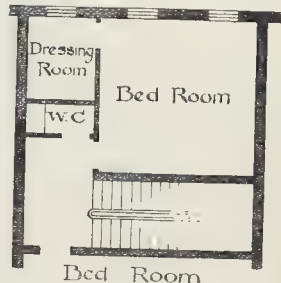
“Between August 26 and September 3, 1878, earthquakes and volcanic eruptions occurred in Germany, Holland, Belgium, and Italy, the centre of the disturbed area being in lat. 50° N., long. 10° E. At the same time earthquakes and volcanic eruptions occurred in the Aleutian Islands, which are situated on exactly the other side of the globe. The moon at the time was new and in perigee.

Between August 26 and September 3, 1886, earthquakes and volcanic eruptions occurred in Europe and America, both again in the same latitude, and both in the south-eastern direction from the areas affected in 1878. The moon at the time was new and in perigee.

The difference in time between these two sets of events is exactly eight years. But eight years is the time that the tides of the external fluid take to repeat themselves. Do not the above instances show that eight years is the time the tides of the internal fluid take to repeat themselves?”

It may be questioned, however, whether it is any particular consolation to have reason to think that earthquakes will recur at a certain time and quarter. If it would help us to deal with the earthquakes, well and good; but as we are helpless in that respect, and probably likely to remain so, scientific prediction seems a very doubtful consolation, except so far as this, that if it be shown as a reasonable probability that earthquakes are likely to become more frequent and to affect parts of the world hitherto (like our own island) little affected by them, the methods of building must be modified to meet the circumstances.

IF the time ever comes when Government, as has been proposed, takes a more active part than at present in overseeing the sanitary condition of houses, and when ubiquitous Sanitary Inspectors may have powers given them, of their own proper motion, and without waiting for complaints, to come down upon those malefactors who let unsanitary houses to the detriment of their fellow men, such officials will find glorious opportunities for a great sanitary crusade in the district which includes, as auctioneers phrase it, “all those very desirable” squares and streets lying between Holborn, Euston, Tottenham-court-road, and Gray’s Inn-road. The sanitary planning of a great proportion of these houses



is simply astounding. We give an example from the houses in one of the best and most popular of these squares. In the same houses the servants’ w.c. is an absolutely dark cavern, opening off the lower staircase. This is only one out of many such instances, and it may be

observed that some of the best of these squares in outward appearance and the style of the houses are the very worst in this matter of sanitary arrangement. In one case we found a central water-closet lighted by a window opening into a bedroom. In other cases dark closets under the stairs, offensively prominent in position, and without the smallest ventilation, or with "ventilating openings" on to the well of the staircase (!), are the only provisions in houses for which high rents are asked, and considerable premiums charged for entrance. It would be curious to know the medical history of some of the generations who have lived in these houses. Probably they suffered from many diseases which they resignedly attributed to "Providence." Persons taking houses in this neighbourhood now-a-days, however, will be wise to be less resigned, and to refuse to enter any such habitations until their interior arrangements have been thoroughly remodelled in accordance with modern sanitary knowledge.*

THE last new company that has been formed will, if successful, do more to advance the cause of domestic electric lighting than any other in that prolific field. The present undertaking is that of the Regent Portable Electric Lamp and Lighting Company, which dispenses with the difficulties and cost attending a dynamo and engine, by placing the primary battery within the pedestal of the lamp. According to Professor Fleming, we have here the essential parts of a domestic lamp, viz., great portability at small expense, freedom from complication of pipes and the circulation of fluid, a capability of being supplied with a ready-mixed exciting solution which is able to keep up the constancy of the battery to a remarkable degree, and absolute safety for servants and those who have to handle the lamp. If all these promised blessings are verified, a millennium is at hand for the British householder, who, in nine cases out of ten, enjoys a light of more or less noxious vapours, provided at a maximum of cost. For mining purposes, where there is danger from explosive gas, these Regent lamps should be simply invaluable, for even if the glass were broken, the vacuum would be destroyed, the carbon filament consumed, and the light extinguished.

THE Lartigue railway, about which a good deal has been said during the last two or three weeks, is only an inferior and more cumbersome application of the principle of the late Professor Fleeming Jenkin's invention of the telferage railway, a railway carrying the goods balanced panier-fashion from a single central rail above the centre of gravity; only that the Lartigue is intended for locomotive rather than for electrical working. The elevation above the ground of its one central rail is only about 3 ft. 6 in., the rail itself being supported by iron trestles, the feet of which are fastened to light iron sleepers. Steep gradients are provided for by a rack rail in addition to a central rail; and inequalities of surface, such as ravines, by heightening the trestles as required. Guide-rails are fixed to the sides of the trestles on each side, right and left, as an additional security. Both engine and carriages have horizontal pulleys, which work against their guide-rails, so that the normal balancing power is protected from disturbance by anything which might tend to throw it off its equilibrium. As a railway it may be worked by horse-power, electricity, or steam, the engine in the latter case being as rudimentary as possible, consisting of a vertical boiler on each side, and, together with the cylinders, hung on a couple of driving-wheels running on the central rail. On the experimental line at Westminster a gradient of one in ten is shown, with curves of 49 ft. radius, together with a long viaduct, which is supposed to be crossing a valley. There can be no question that the Lartigue railway presents a ready means of communication, in which a fair speed can be obtained at a very small cost; and, when we add that the system is portable, it is evident that its application for temporary purposes, military or agricultural, and its singular adaptability to any

* In Queen's street, we observe, this is being done to a considerable extent.

form of motor power will secure for it an extensive field of usefulness. The Lartigue railway has passed the theoretic stage, being in actual operation in Algeria and the south of France.

WE have noticed from time to time the disputes which have taken place at Bath in regard to the treatment of the Roman bath remains, in connexion with the proposed extension of the modern baths. It appears that the Committee of the Corporation of Bath who are concerned with the subject invited Mr. Penrose to visit and report upon the City Architect's plans in connexion with the Roman remains. Having carefully inspected the remains, and read the report of the City Architect, Mr. Penrose has reported decidedly in favour of the scheme of the latter. Being an architect as well as an archaeologist, and not an "anti-scrape" sentimentalist, Mr. Penrose took the practical view that "the primary duty of the Corporation is to make the healing waters of Bath available for those who require them; the secondary but still very important one is to see that in so doing no unnecessary destruction or loss should take place of the valuable and unique historical records of which they are the trustees." Mr. Penrose considers that the City Architect's plans have sufficiently provided for these two objects. None of the Roman walls, he says, are to be destroyed, and no parts essential for the understanding of the original plan are even to be lost to view. "The new walls are to be built upon the old, and so constructed that the ancient work, wherever any exist, can be easily identified by the archaeologist." There is no one whose judgment we could more safely accept than that of Mr. Penrose on such a subject, though we observe that (according to the *Bath Chronicle*) "an attempt is being made to depreciate the report by denying to its author antiquarian skill." Is there such a thing as a library in Bath? If so, the gentlemen who seem so much at sea as to Mr. Penrose's acquirements had better repair to it, and ask for his celebrated work on Greek architecture, and enlighten their minds a little.

IN a supplementary circular to the competitors, the Corporation of Edinburgh have stated that "it is their intention," if any one of the designs sent in be actually carried out, that the author of it should be employed to carry it out, but that the power of absolute decision on this point they reserve "unqualifiedly" in their own hands; and with that, we presume, competitors must remain content.

THE Richmond Vestry, though engaged in actively prosecuting the movement in favour of the purchase of the Buccleuch Estate, is not allowing its drainage scheme to be pushed out of view; and has entered on a course of diplomatic action which has, probably, removed the most formidable opposition to the scheme. The Duke of Devonshire and the Pullman Trustees are owners of land at Grove Park, on the Thames, opposite the proposed site of the sewage works at Mortlake. The representatives of the Duke and these Trustees purchased about half an acre each of land on the Mortlake side of the river and near the proposed site in order to give them a *locus standi* in opposing the scheme. The Richmond Vestry has bought these two half acres of land at 500*l.* each, both owners undertaking to withdraw their opposition to the scheme. 1,500*l.* is to be paid in addition to an extensive local market gardener who has agreed for this sum to plant an acre of his ground with trees so as to screen from his view the sewage works. The Vestry and the promoters generally of the scheme are sanguine that by this diplomatic arrangement the opposition to the scheme at the forthcoming inquiry of the Local Government Board will be of a comparatively harmless nature. We hope the Vestry will be equally successful in the matter of the Buccleuch estate.

FOR the present, at all events, and probably for some time to come, the vexed question of the establishment of a Convalescent Hospital for Smallpox cases at Darenth has been

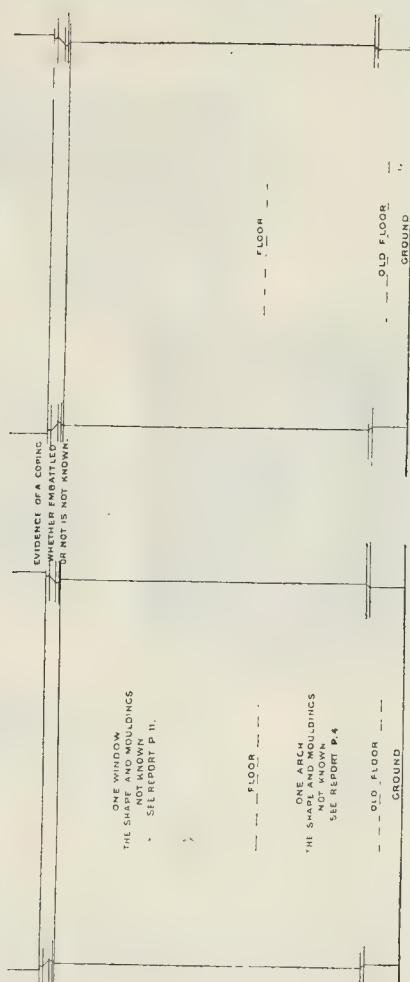
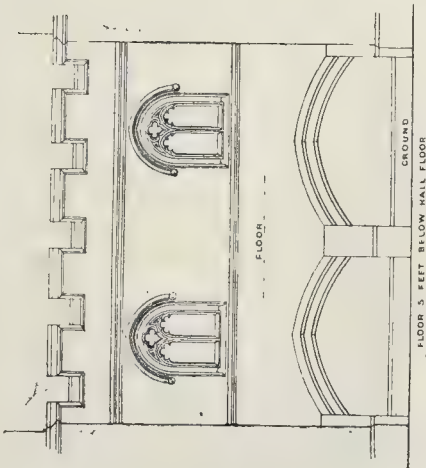
settled by the refusal of the Local Government Board to consent to the erection of permanent brick buildings. The Board prefers that the hospital should take the form of huts, remarking that there are already in the South Camp sufficient administrative buildings for 1,000 patients. There are also, as well as in the North Camp, wood huts and several wood platforms, capable of bearing tents, which would accommodate at least 800 patients. The sewage question, which under the Metropolitan Asylums Board's proposal would have been attended with considerable expense, is considered by the Local Government Board to be satisfactorily arranged for by earth closets, which will cost next to nothing, and will be attended with no inconvenience; while as to general expense, the Whitehall officials point out that the providing for 600 patients by the existing accommodation will equal the interest payable on the 116,000*l.*, the estimated outlay for the permanent hospital. Although the refusal was naturally not a *littera grata* to the Asylum Board, we are of opinion that Mr. Ritchie has made out an exceedingly good case for economy, for which the ratepayers ought to be duly thankful.

OUR attention has been drawn to a sewer gas destructor patented by Mr. Hartley Fawson, of Buckingham, the object of which is to draw the air from the sewer by a rotary pump and pass it through an electrical apparatus, by the action of which the noxious gases are decomposed and form fresh combinations, oxygen being liberated and ozone formed. The apparatus would, we have no doubt, perfectly purify any foul air drawn from a sewer and passed through it, and, therefore, it would answer the purpose as far as it would act at all, but as there are numerous openings along a sewer through which atmospheric air would pass to replace the air drawn out, the effect would be that instead of the foul air being drawn along the sewer for any considerable distance, as desired, the air which would pass through the apparatus would chiefly be drawn from the atmosphere through these openings right and left of it; and to have any practical effect in destroying the foul air of sewers the destructors would have to be very numerous. The invention must, we fear, be relegated to the large number of inventions which are very ingenious, but not calculated for practical application on an extended scale.

THE best point in Mr. Maddison's opening address at the Trades Union Congress was the suggestion that some of the at present waste land of the world should be occupied, under Government supervision, by those who were willing to work and could find no market for their labour, instead of emigration to the Colonies and consequent flooding of the labour market there. The practical difficulties of such enterprises would, no doubt, be very great, and would require Government aid to carry them out at all; but the results might be beneficial to the world at large. The address, unfortunately, was characterised by the same kind of false and delusive reasoning on other points which we are always sure to hear at these congresses. We have again the old argument for the eight hours labour movement, that it would give employment to half a million more people,—that is to say, that so much more labour and time would be expended in gaining the same results. If that is the argument, why does not Mr. Maddison propose a reduction of labour to four hours, which would throw open employment to so many millions more people?

IN another column we print a reproduction of the very pithy diagram put in by Mr. Micklethwaite as part of his evidence before the Westminster Hall "Restoration" Committee, showing side by side the restoration proposed, the documentary evidence for it, and the evidence on the walls themselves. Readers who have not seen the report of the Committee will thus be able to judge of the real nature of the "restoration" in favour of which it is proposed permanently to disfigure the interior of Westminster Hall, as described in our last.

RESTORED FROM EVIDENCE
SHOWN BY THE WALLS AND OLD PLANS
AS INTERPRETED IN THE REPORT.



A page from the evidence given before the Westminster Hall "Restoration" Committee, showing the true nature of the "Restoration."
From a Drawing by Mr. J. T. Mickelthwait, F.S.A., appended to the Report of the Committee.

THE TRIUMPHAL ARCHES OF THE ANCIENT ROMANS.*

THE following are the principal arches which now remain out of Rome. Of those in Italy we will first note some of the best preserved.

At Ancona is, perhaps, the most lofty triumphal arch remaining, the height from the base being about twice the width. It stands on the mole, and was erected in A.D. 115 in grateful recognition of the works undertaken at the harbour by the Emperor Trajan. It is dedicated to him and to his empress, Plotina, and his sister, Martiana. It is built of noble blocks of white marble, and is in very fair condition. The central arch is tall, with a fluted Corinthian column mounted on a high pedestal on each side. The entablature goes square from column to column, but it is broken around the pilasters, which are placed at the angles right and left. The spaces between the columns and pilasters are not pierced with side arches, but have tablets only. There is a lofty attic, which follows the plan of the lower stage. A flight of steps leads down beside the arch to the level of the harbour.

The Arch of Trajan at Beneventum (see illustration) is an admirable work. Erected at the best period of Roman art, the design is excellent and the execution perfect. In design the arch is very similar to that of Titus at Rome, there being but a single wide semicircular arch, the keystone being carved with a figure, and the spandrels being filled with figures of large size adapted to the positions. There are engaged composite fluted columns right and left. The angles have other engaged columns, and the spaces between the two are filled with four tiers of figures, two being large and two being small. The columns stand on a single solid pedestal instead of on two separate ones. The entablature breaks around the angle columns, but goes across from those in the centre. The frieze is filled with figures, and the cornice is composed entirely of enriched members. The attic is tall, and follows the plan of the entablature. It has the inscription in the portion over the central arch, the spaces left and right being filled with figures. There is sculpture on each side below the main arch, as in that of Titus, and the soffit is richly panelled.

The arch called that of Augustus, at Aosta, now consists of a broad semicircular arch of two rings of arch stones, with a label-like architrave above them. Two engaged Corinthian columns, unfluted, on each side, complete the composition, one being at the angle, and the other close to the arch, the space between being filled up by a square panel. The columns stand on a solid pedestal. The entablature goes from column to column, unbroken in the centre, but it is returned around the angle columns. The frieze has the peculiarity of having triglyphs somewhat similar to those of the Doric order. The whole of the attic is destroyed. The arch is detached from buildings, and now spans the roadway of one of the principal approaches into the modern town.

The Arch of Suza has a central opening, high for its width, with a semicircular arch, moulded and springing from plain pilasters with carved caps. At each angle is a fluted engaged Corinthian column, standing on a plinth, the entablature being carried across without any break. The frieze is filled on the faces with well-carved figures. The attic is very low, very much more so than in the other arches already referred to, but the inscription extends along the whole of it.

The Arch of Augustus at Rimini has a design peculiar to itself. There is a wide central opening into a low semicircular arch, having a moulded architrave and imposts. On each side is a fluted connexion column standing upon a pedestal of moderate height. The entablature is broken around the columns, and it does not extend left or right beyond them, but goes from column to column at the lesser projection. In the centre, over the arch, the cornice forms a pediment of no great elevation. The angles of the main composition are of plain masonry.

The spandrels of the archway are filled in with circles, and there is a keystone of quaint design with a head carried up into the architrave of the cornice. The attic has a cornice and moulded base, and it has the peculiarity of being of lesser width than the arch itself.

Varying as we have thus far seen the designs to be, there is yet another arch which differs

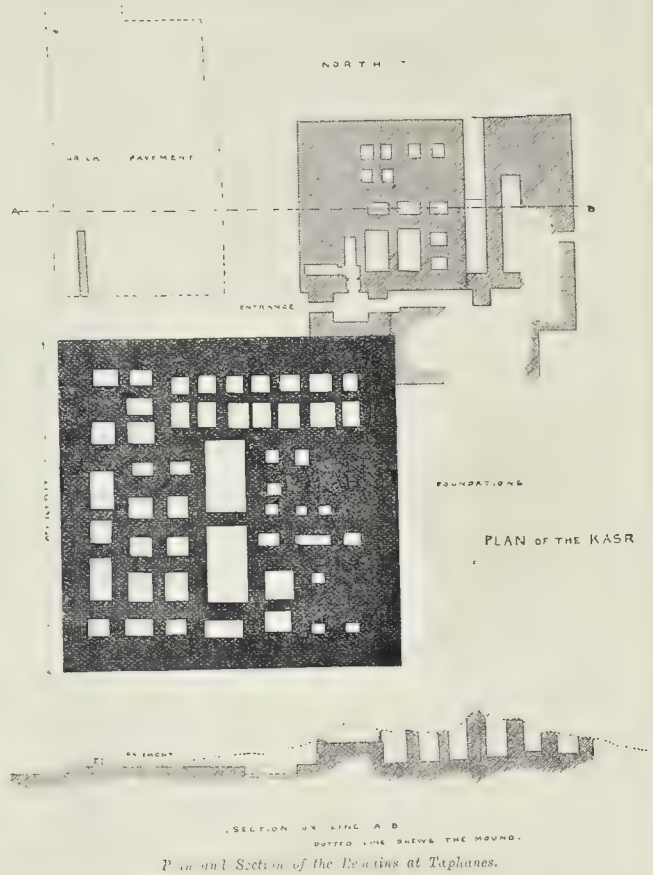
* See p. 333, ante.

from them all. The arch at Fano, erected in honour of the Emperor Constantine, consists of a plainly-moulded central arch springing from an impost, having a bull's head in the keystone. There are two plain side openings, the whole composition being a portion of a continuous wall. There is an entablature with a plain dentilled cornice, the inscription being on the frieze and architrave. Above the cornice are the remains of a colonnade, the columns being fluted and intermingled with pilasters for additional support.

The principles upon which the designs of these arches were prepared have not unfrequently been under consideration. This is but as might be expected, for these buildings being entirely of a monumental character, and not dictated by merely utilitarian requirements, it is but likely that they would afford good evidences of any such principles, if they had actually been used. Accordingly, there have been no small number of asserted discoveries of such principles ever since attention has been directed to our ancient buildings. These have been illustrated by systems of diagrams, with combinations of lines, squares, and triangles, more or less ingenious. Probably the best examples of these are by Mr. E. Cresy, in his chapter on proportion, to be found in an easy form for reference in Gwilt's "Encyclopædia of Architecture," edited by Mr. Papworth. It will be seen by these that the Arch of Augustus at Rimini is a single square in height, with the attic in addition. That at Aosta is a little less than a square with the attic as restored. The Arch of Sergius at Pola is a square in height, with the attic in addition, — a proportion not followed in the Arch of Titus and many others. That of Augustus at Susa agrees fairly well with the Pola arch, but some of the others referred to by Cresy require an elaborate system of lines to mark out the proportions; and the student will leave the consideration of the subject with the feeling that none of these systems of circles or squares would give him a definite rule to follow were he desirous of creating a design for a new arch. The point brought out most clearly is, that two diagonal lines drawn from the bases of the design to the extremities of the main cornice give at the crossing the centre for striking the main semicircular arch; but even this is not quite exactly so with the arches of Titus and Beneventum, while to make it apply to the arch of Pola, it is necessary to start the diagonals from below the necking of the plinths instead of from the bases. This rule does not apply at all to many of the arches now referred to. A proportion not unusually adopted for the height of the attic is undoubtedly obtained by striking an arc from the extremities of the main cornice upwards, having for the centre that of the main arch. This proportion occurs more or less exactly in the arches of Titus, Pola, Susa, Beneventum, and some others, there being only such small variations as the height of the cornice of the attic itself being either wholly included or partially excluded. At Pola the architect, not proposing to fill in the attic with panels or lengthy inscriptions, has subdivided it with horizontal lines and projecting piers, evidently to render its height less conspicuous, but nevertheless the general height is given by the proportion named. The inscriptions occur in a very subordinate manner on the faces of the piers and the interspaces, there being no panels to receive them.

The arches now referred to are, perhaps, the largest in number ever named at once; the consideration of their proportions leaves the impression that each one was set out on its own rule, and that there are, therefore, as many rules as there are arches. Did any formal rule exist? And are the diagrams of circles and squares much help to the architect in his work? A snowflake when it falls furnishes us with an elaborate system of geometrical lines, and an architectural design when produced by the genius and intuition of a true artist will undoubtedly bear proportions, one part to another, upon which a system of lines might be drawn after the event with curious results. Is the artist, however, conscious when he designs that these lines will result?

The construction of these arches has received the best skill that their builders had at command to bestow, and our estimate of their appliances must be a high one. The Arch of Titus is formed of blocks of enormous dimensions, the joints are very even and fine, and the engaged columns are of two stones only.



In the Arch of Severus the columns are each of a single block, the flutes and the entasis being worked very skilfully. Those of the arch of Constantine are in two stones, the jointings being arranged in many cases just below the finish of the reeded flutings which occur on the upper stone, so that the joints are strengthened by their terminations. Many of the other arches named are built of very large blocks, and in that of the Goldsmiths the entablature consists of a single stone.

It may be said with truth that out of Italy there is no country in which so many triumphal arches of real artistic merit remain as France. Their number is remarkable, and their interest with respect to the history of the art can hardly be over-estimated. Apart from the separate detached structures which fall immediately under our notice, there are several buildings of a very similar class, which appear to have been always the entrance-gates of cities or towns, and among these the foremost place must be given to the magnificent three-arched gate at Reims, now cleared from the surrounding walls and buildings. Other examples are at Autun and Nîmes, where there were two, and several others elsewhere. In England, while we cannot point, at present, even to the site of a triumphal arch, we can without much hesitation believe that the arches in the Jewry Wall, Leicester, belonged to a fine entrance-gate in the walls of the Roman city, Rata.

At Orange, in France, there is a stately building, the most beautiful arch in the country (see illustration), a work which is sufficient, were there no others, to show how pure and graceful was the old Roman art of Provence. There is a bold central arch, with two side arches, the spaces between being divided by elegant Corinthian columns, mounted on rather tall pedestals. The entablature is plain, with a pediment over the central arch, and there is a very high attic divided into two

horizontal compartments, and more or less filled with sculptured shields and trophies, standards with the wild boar, captives, arms, and other objects freely and boldly carved. There are four columns, and a large pediment to the return elevation. The proportion does not agree with anything yet referred to, the height of the attic being so unusually great. Many repairs have been effected in the structure, and there is now much modern work visible. The arch has a melancholy interest attached to it, since the guillotine was set up beneath it during the fury of the first French Revolution, and it was the scene of terrible butchery.

The remainder of the more important arches in France we will speak of in our next.

[We should mention that, by a mistake of the lithographers, the page of details of the arch of Septimius Severus, published in our last number, was described as "from an engraving by Rossini." Of course, any one who knows Rossini's engravings would see that it was not. The plate was reproduced, like the view of the arch, from Galihabaud's "Monuments Anciens et Modernes."]

FURTHER NOTES ON THE TAPHANES HOUSE.

DURING the past week a large number of visitors have inspected the collection of articles which are now on view on Tuesdays, Thursdays, and Saturdays at Oxford Mansions.

The amount of public interest shown in the discovery, and the unique nature of many of the articles exhibited, induces us again to refer to the exhibition, in the belief that some further details will be of interest to our readers.

That the site excavated by Mr. Flinders Petrie is, indeed, the Taphanes of Scriptural history appears to be decided by easy reasoning. The name Defenneh, by which the ruined

mounds are known to the modern Arabs, has a very strong resemblance in sound, the transposition of T to D being not uncommon even in the East, where names are continued through long ages with but little variation. The relation of the site to the narrative of Jeremiah, the flight of the daughters of the defeated King Zedekiah, and their being received with hospitality by the Egyptian Pharaoh, is, however, fixed by the local Arab name, "El Kasr el Bint el Yahudi,"—"the Castle of the Jew's daughter," which at once connects the tradition with the site. The unearthing of what was beneath the surface, revealing that the building was half palace, half fortress, also shows that it fulfilled the requirements of the narrative. The statement already made public, that this is the site of the Daphne of the Greek historians is also very likely to be exact. Not only is there the similarity of name, but the site accords well with what would be chosen as the permanent settlement of the Carian and Ionian mercenaries who were quartered there by Psammethichus I. The position, comparatively speaking but a little distance from the seashore, at the commencement, so to speak, of the Egyptian Delta, would have been a good site to select to prevent jealousy by the inhabitants at this foreign occupation. In addition, the excavations have shown that Psammethichus I. was actually the builder of the Kasr about B.C. 600, for his carlouches have been discovered among the foundation deposits, and the position of one of the camps of the mercenaries has been determined. Here were found the largest number of the bronze arrowheads, horses' bits, and such like, which are now included in the exhibited collection.

The general plan, too, indicates where might have been the position of the docks and other topographical features referred to by Herodotus.

We are enabled to publish a plan of the main building, which has been exposed by the pickaxe and spade of Mr. Petrie's Arab excavators. It is the Kasr proper, and will be seen to consist of a square mass of building divided into a series of small apartments. These formed the basement, wherein were the kitchens, cellars, &c., the walls being of very great thickness, formed entirely of sun-dried bricks, and the apartments have been arched over with the same material. Within these chambers were found a large proportion of the pottery shown in the collection, including the pot of resin, many of the unbroken amphore, and of the early Greek vases, which are painted with a great number of conventional patterns and arabesque figures. The fragments of carefully-worked scale armour were also found here. The position of these objects is of importance to notice, for their early date, all but contemporary with the building, is established by the evidence obtained elsewhere that the Kasr was taken and burned by Nebuchadnezzar according to the prophecy made by Jeremiah on this very spot.

The plan shows the position of other buildings to the north and east. These were, perhaps, of a little later date than the main buildings, but do not appear to have been later than Apries (591-570 B.C.), for nothing later than his reign has been found on the site. It was during this reign that the flight of the daughters of Zedekiah took place (B.C. 588). The entrance was from the north, and in the west face of the added buildings, immediately where it joins the huge square block of the Kasr, is the main entrance. The pavement of brick, over which access was obtained, is also shown on the plan. It would have been the paved portion of the court-yard in front of the entrance. It is to this portion of the site that the position of Jeremiah's prophecy of the destruction of the building appears to be so remarkably confirmed by the Old Testament narrative. Mr. Petrie was able by dint of excavations in many places to determine its general outline as shown. The section indicates how completely the huge pile of buildings has been overthrown, for the dotted line shows the outline of the tell or mound under which it was buried.* The height of the mound above the level of the arid waste of the deserted country renders it a conspicuous object for miles. In considering the nature of the site, deserted and far from roads or means of transit, no

small praise is due to Mr. Flinders Petrie, not only for his discovery, but for unearthing so many articles of interest, which were unknown and covered over with sand and mud six months ago, for overcoming all the difficulties of transit, and bringing them to England within the short space of time named.

In addition to the notice of the articles exhibited, already given, the following may be of interest. The excavations have revealed but few remains of an architectural members of the building. It leads to the supposition that whatever relief was given to the huge castle-like building was by woodwork, which would be, of course, consumed in the general destruction. A frieze of limestone, however, appears to have been inserted in the exterior walls, since some fragments have been met with. A sketch of one of these is given, the original having still some faint traces of blue and red colour.

The sketches indicate the great variety of forms of the pottery, and the fixing of the early date of the great bulk of these examples is of great importance, since so little has hitherto been known relative to Egyptian pottery in proportion to the large number of other articles which research has made known to us. Many of the vessels have the peculiarity of rounded rather than flat ends. The amphore have the usual pointed terminations for fixing in sand or loose earth; but the other vessels could only be kept upright by being placed in stands, made also of pottery, of which several examples have been found. Some of these vessels have doubtless been suspended by cords, which passed through small handles. The ornamented pottery is Greek in every essential particular. The form of one large standing vessel is, however, a well-known Egyptian one. The workmanship and the painting being Greek, it goes to prove the existence of potters on the spot; for a vessel of Egyptian form would never have been met with abroad had it been imported. The occurrence of the Greek lettering on other vessels, already referred to, on the clay, before baking, indicates beyond any doubt that the articles were made on the spot by Greeks. They are unglazed, inside and out, fawn or lightish red in colour, and made on a wheel. Only a single vessel is of red ware polished, although there are some smaller covers, &c., of this material.

There are some smaller articles of very great artistic beauty, of more usual Egyptian type, formed of the well-known greenish porcelain. We give sketches of some of the elegant patterns on the fragments found, and of a pretty little flat circular bottle, not unlike in form, although smaller than, the pilgrim's bottles of Medieval times. The glass beads and glass work are of great beauty from the extreme elegance of their patterns. A small stick of glass, about 3-16ths of an inch square, has a small face in colours worked all through its length, so that if cut through in sections the same pattern would be visible at any part.

The Egypt Exploration Fund, although established so few years, has already done a great amount of work, which deserves the warmest recognition. It is to be hoped that the great amount of interest taken in this discovery will result in accession of means whereby some other of the endless fields of discovery in Egypt may be opened, as well as support in other ways being given to this most hardworking society. It is proposed to divide the collection among several museums, as other finds have been already. Since, from the few past years so much has been found by the devoted explorers of this society, we consider it may be well for the scattering of the collection to be reconsidered. At the present rate of increase a few years will be sufficient for the accumulation of one of the most important of collections, if kept together. If divided into many parts, much that may be gained by comparison will be lost. The objects exhibited are only a portion of what has been found even after the claims of the Egyptian Government have been satisfied.

THE EPISCOPAL HERALDRY OF IRELAND.

The Cathedral of Armagh is a building of great historic interest, dating its foundation from the days of St. Patrick (its first bishop), and having held within its walls the "stone of fate," said to have been Jacob's pillow, and which has played such an important part in our annals, and now resting in Westminster Abbey.

The arms of the See so closely resemble those for Canterbury that, to a casual observer, there would appear no difference; they are blazoned "Azure: an archiepiscopal staff in pale argent, ensigned with a cross patée or, surmounted by a pall of the second, fimbriated and fringed gold, and charged with four crosses formées fitchée sable."

The heavenly blue is a favourite and appropriate colour in church heraldry, and the cross-surmounted staff and the pall are the special attributes of an archbishop, and altogether the "coat" is an expressive and befitting one for the purpose.

By some strange confusion, entirely opposed to the concise and even exacting spirit of armory, the shield of the See of Dublin stands charged with precisely the same devices and colours as the foregoing, but the same arrangement prevailed in England as regards York and Canterbury until the middle of the sixteenth century, and so the four chief archbishops of the sister islands exhibited a repetition in their arms that appears to show some want of originality.

We turn to the arms of the See of Limerick and find them recorded as—"Azure: two keys endorsed in saltire wards upwards; in the dexter chief a crozier, and in the sinister chief a mitre, all or." Here we have the emblem of Saint Peter in the keys, with the bishop's staff and mitre ecclesiastical throughout, and dignified, if not historic or particularly interesting. In the latter half of the seventeenth century the bishoprics of Ardfeil and Aghadoc were added to the See of Limerick, but they had no arms attached to them and those given above are for the latter alone, although the triple charges might suggest otherwise.

Meath ranks first amongst the Sees of Ireland, its bishops claiming precedence over their episcopal brethren and assuming the title of "Most Reverend" as a rule. The diocese is a union of the ancient Sees of Kells, Dulick, Clonard, and others of less note. The arms are, "Sable: three mitres, two and one argent, labelled or," and it is generally conjectured that these charges refer to the triple Sees above named.

The Sees of Ireland may be said to run in triplets as a general thing, and their coats of arms are usually of modern assumption, wanting in historic interest and lacking that spice of antiquity that might be looked for in the heraldic records appertaining to such venerable buildings.

Take Down, Connor, and Dromore as an instance of the foregoing remarks. The two first were founded as early as the fifth century, and became united a thousand years after (the latter was added to them in the reign of William IV. by Act of Parliament), and yet, even in the fifteenth century, a time when heraldry was at its height, no arms were used on the seals of any of the bishops of Ireland.

The arms are, "Quarterly: first and fourth azure, two keys endorsed in saltire or, surmounted by a lamb passant in fesse argent (for Down); second and third argent, two keys endorsed in saltire proper, surmounted by an open book of the last in fesse between two crosses fitchée in pale gules" (for Dromore).

Kilmore, Elphin, and Ardagh became united as one See in the year 1841. The two latter are of very ancient origin, having been founded as early as the fifth century by St. Patrick. Their arms are now emblazoned as "Per fesse in chief argent on a cross azure, a crozier surmounted by a mitre in pale (for Kilmore). In base per pale, on dexter side sable two croziers endorsed in saltire or, in base a lamb couchant argent (for Elphin); and on the sinister side argent a cross gules between twelve trefoils vert, and on a chief azure erect or (for Ardagh)."

We would just remind our non-heraldic readers that the trefoil vert is the shamrock of old Ireland, the other charges are of the truly ecclesiastical type.

In the Royal Irish Academy is deposited the seal of a sixteenth-century bishop of Elphin (Thomas, 1581), bearing the arms for the See as "Three mitres two and one," and is considered a work of great beauty.

The arms for Kilmore appear to have been changed by Bishop Godwin about the first quarter of the last century; they were, prior to that, "Argent: a cross gules, between twenty trefoils slipped vert."

Ware, in his "Irish Bishops," gives the arms of Ardagh with the cross azure, and only one trefoil in each quarter.

* We are able to reproduce these plans by Mr. Petrie's courtesy, but we have purposely omitted much of the detail, so that they may not unduly anticipate those to be published by the Society. The scale does not permit the enclosing wall of the courtyard to be shown.

We would just say that mitres are usually depicted in coats of arms of the lofty and convoluted type of the seventeenth century, being perhaps more imposing and grander in appearance than those of earlier date, but not so chaste as the simpler form that characterised the fifteenth century, and prior to that. We must not forget to mention the interesting fact of the trefoll or shamrock having been made use of by St. Patrick to illustrate the doctrine of the Trinity, which makes this national emblem all the dearer to the Irish people.

THE WALLS OF CHESTER.

SIR,—In 1849 the British Archeological Association held its sixth Congress at Chester. One of the results was the publication in the *Journal* of an illustrated report on the antiquities of Chester, including important portions of the walls, which were assigned to the Roman epoch. The walls were carefully examined, and a day was set apart for their especial study, with the assistance of the local Society, of which the late Rev. W. H. Massie, a sound antiquary, was secretary. It will be sufficient to glance at the names of those present to show that some of the best architectural antiquaries were present. Among them all there was not one dissentient as regards the report referred to; and, until the last two or three years, although general attention must have been directed to the walls, no one has questioned the *fact* of the Association.

Now, however, the Geological Society has produced a member who disputes all that the Association has asserted to. In his eyes the masonry of large stones without bonding-courses of tiles is Mediæval, and Late Mediæval; the ancient stones themselves were not quarried at a distance as asserted; and that they exhibit now no such difference in the lichens upon them as was obvious to the eyes of hundreds in 1849! The geologists and botanists who in 1849 assisted in the survey of the walls are now supposed to have been in error. Moreover, this new theory, if we may have read the newspapers correctly, has been recently brought before the Congress at Chester of the Royal Archeological Institute, and has received, if not a general sanction, at least a partial recognition.

Without at present analysing the arguments of Mr. Shrubsole, F.G.S., some of them may be questioned as to their validity. The old writers who have not written on the Roman character of portions of the walls may well be excused for the omission. Even the late Mr. Ormerod, accomplished as he was for general history, did not claim any special knowledge of the varieties of Roman masonry. Stukeley is not named. If he has given his opinion it would be of more value than that of the whole of the authors cited, for he had studied Roman masonry, and wherever he speaks of it he is usually very correct.

The difference in the architectural materials of the alleged Roman work from other Roman masonry found in Chester, as well as from other Roman walls, is a most unfortunate witness for the non-Roman theory. The small squared stones and bonding courses of tiles so common in Roman town walls in the south are by no means universal. While they appear at York they disappear in the important remains of *Jurium*, now Aldborough; and it would seem that they cease from this point in a northerly direction, and are wanting in all of the *castra*, as in the great wall itself.

It appears that it is not denied that the cornice which surmounts a portion of the supposed Roman work is really Roman, but it is suggested that it formed part of a temple and was used for repARATION, as being at hand. It is denied that Roman walls had cornices, but where are the upper portions of Roman walls to be found? There are proofs that external ornamentation was occasionally used. It does not seem to have been considered that the portion of the wall which bears this cornice flanks the core which carries a promenade. This promenade is not alluded to, nor is comparison drawn between it and the promenades upon the Roman walls of Colchester, Canterbury, and Chichester.

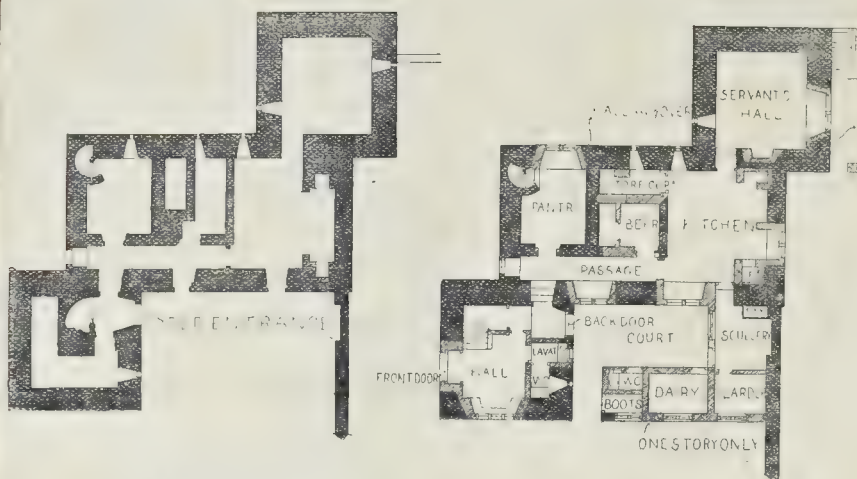
It is alleged that for some hundreds of yards laid open for repairs in recent times nothing was met with but loose stones and disjointed rubble. It is probable that this denoted Mediæval reparations. It would have been satisfactory if the line of the Roman circumvallation had been traced and laid open. It is not probable that it

can be destroyed; though, for an immense extent, nothing of it is apparent. F. S. A. September 4th, 1886.

THE RECENT EARTHQUAKES IN AMERICA.

MR. W. TOPLEY, F.G.S., President of the Geologists' Association, contributed to the Geological Section of the British Association meeting at Birmingham a very interesting and important paper containing "Some Notes on the recent Earthquake in the United States, including a Telegraphic Despatch from Major Powell, Director of the United States Geological Survey." The author drew attention to the earthquake disturbances which during the last few days had taken place over a very wide area of the earth's surface. On the night of August 27th there were shocks all over Greece, and in a smaller degree over all the East Mediterranean area. This earthquake wave apparently travelled from west to east. It was first felt in Malta, Calabria, and Naples, and thence it travelled eastwards as far as Alexandria. It did not appear to have been felt west of Southern Italy, probably because its westward area of propagation was there beneath the sea. Possibly it was only a coincidence, but if so, a very curious one, that the earliest important earthquake disturbances in the United States took place on Thursday, the 27th, and Friday, the 28th. There had been slight premonitory shocks for two or three days before, but the principal shock was that of Tuesday night, August 31st. This had, however, been succeeded by shocks, fortunately of less intensity, which had been felt over a still wider area. As late as Sunday night (Sept. 5) there were shocks at Charleston, South Carolina. The main shock was felt from the southern part of the New England States on the north-east to the western shores of Lake Michigan on the north-west. In the west it was recorded from St. Louis and Memphis, on the Mississippi, and from the coast of Florida in the south. Of the later shocks—and these had been very numerous—some were felt in Nevada and some in California. Examining the newspaper telegrams, Mr. Topley said it was probable that there was some error either in observation or in the telegraphing as regarded the time at New York, Springfield, and Albany. New York was 420 miles from Raleigh, and the wave was stated to have travelled in three minutes. Albany and Springfield were respectively 330 and 520 miles away, and the wave travelled to each in ten minutes. An important point in Major Powell's despatch, however, was the evidence of the rapid transmission of the main earthquake wave. Major Powell stated that it travelled over 900,000 square miles at from 25 to 65 miles per minute; but by comparing the times given in the telegram with the distances on a map, he (Mr. Topley) found that the velocity varied from 36 to 140 miles per minute. The shock originated in Central North Carolina, on Tuesday, Aug. 31, at 9.50 p.m., 75th meridian time, which is five hours in advance of Greenwich time. The time at Greenwich was therefore 2.50 a.m. on Wednesday. Although Charleston had experienced the maximum structural damage, this did not appear to have been the exact point of origin. The earliest shock was noted at Raleigh, 230 miles to the N.N.E.; here the time was 9.50. And if they took a scale of intensity with 5 at Charleston as a maximum, Raleigh was 4; Memphis (150 miles west, which the wave reached at 9.55) was also 4; Pittsburg (230 miles N.N.W.) which the wave reached at ten o'clock, also 4. The farthest points at which Major Powell recorded the scale of intensity were Milwaukee 3, at 10.6, and Cedar Keys, in Florida, 2, at 10.5. There did not seem to be any relation between the intensity and time and the surface distance from the area of origin. This last, indeed, they would not be expected to find. They would rather have looked for rapid transmissions along certain lines or through certain rock-masses. The last important earthquake of the Eastern United States, in August, 1854, was carefully investigated by Professor Carvill Lewis. This was found to range along the eastern side of the Appalachian Mountains, nearly along the line where the old earth movements had been greatest. The exact age of the greatest movement there was well known. It was post-carboniferous, for the coal measures had been violently entombed, and coal converted into anthracite as the effect of great thrusts

from the S.E. It was pre-Triassic, for the Trias lay upon the contorted and denuded edges of the older rocks. But along the same line, and parallel with it, there had been later earth movements. The Triassic beds had been faulted and invaded by basaltic dykes in pre-cretaceous time, for upon their denuded edges the cretaceous rocks were laid down. It was along the northern part of this line that the previous earthquake occurred: it was near the southern part of this line that the recent earthquake had originated. The area most affected by the recent earthquake was a vast plain of tertiary and cretaceous rocks. The older rocks underlay them unconformably but at unknown depths. It might, perhaps, be found that the transmission of the shock to distant parts had depended in part upon the range of the harder and older rocks beneath, as was very evidently the case with the East Anglian earthquake. In this earthquake the great structural damage was confined to a small area; the distant parts at which it was felt were in most cases upon or near to exposure of the Palæozoic rocks, and Birmingham was one of these distant parts. In other cases earthquakes were known to be related to lines of fault. The latter telegram stated that Mr. McGee had been sent by Major Powell to investigate the effects of the earthquake at Charleston, and that he found the local evidence, such as the direction of the fissures, contradictory and difficult of explanation. They need not wonder, therefore, at being yet unable to understand the wider question connected with its range and transmission. Passing to the local phenomena, Major Powell's telegram stated that the earthquake had been accompanied by land-slides and crevasses, but by no sea-wave. Fissures opened in the ground, some of which ranged north and south, others east and west. From these fissures mud and sand were ejected. Several telegrams spoke of stones falling from the air, and although there was plainly much exaggeration in these accounts, it was probable that some stones were ejected far into the air, and subsequently fell to the ground. Later telegrams spoke of an unusually high tide, which did some damage over the low lands of which Sullivan Island is composed, and there was probably some connexion between this and the earthquake, as the tides were then the neap tides. Accounts varied as to the direction in which the vibratory motion of the earth travelled near Charleston, but, as was often the case near the earthquake centre, there was evidence of a twisting movement. One interesting point in connection with earthquakes was the influence they had on wells and springs, and in these respects the American earthquakes had had important results. Water now stood where none occurred before, and in certain places springs had been dried. The strangest statement, however, on this point was that the Mayor of Belloplains, Iowa, had telegraphed to Iowa for an engineer to change the course of two gigantic rivers formed by a phenomenal water-burst, which were running at the rate of twelve miles an hour, causing much destruction of property. In boring a 4-inch artesian well at a depth of 180 ft. the water had been forced several hundred feet into the air, and the stream had increased until it was 16 in. in diameter, the upward force equalling that of dynamite. The natural gas wells of Pennsylvania had been affected, and at one town (Southside, Pittsburg) the factories had been left in darkness through the natural gas supply failing. The most interesting fact, however, was that stated in the newspapers about the Excelsior Geyser in the Yellowstone, which had been quiet for four years, but which had spouted violently since August 27th. Torrents of boiling water were thrown up 300 ft. into the air. The geyser was strongly affected long before the earthquake itself was apparent in the Western States, and when only slightly premonitory shocks were apparent in the Eastern States. In some telegrams which had been published, it was stated that Mr. McGee was inclined to regard the earthquake as due to gigantic slidings of part of the earth's crust towards the sea, but that his detailed observations of the fissures near Charleston presented some difficulties in the way of this explanation. If such an exceptional explanation were the correct one, some important changes of level would be expected near the coast; but this had not been the case. It was too early yet to theorise on this side of the Atlantic, but at present the earthquake seemed best explained by referring



GROUND PLAN AS AT PRESENT

Glenbucket Castle.

GROUND PLAN AS PROPOSED.

it to some widely-acting seismic disturbance, indications of which were previously given by the geyers, and by premonitory earthquakes in South Carolina. It would probably be found, however, that its range and local intensity had been controlled by the distribution of the rock masses, or by old lines of earth movement and earth weakness.

COMPETITIONS.

Public Buildings for Darlaston.—At a meeting of the Darlaston Local Board this week (Mr. J. Harper presiding), the plans and specifications of the proposed public buildings were submitted by Mr. J. A. Cossins, of Birmingham, and approved. The main buildings and offices were estimated to cost £3,800; library, £1,100; cottage, £350, and boundary walls and gates, £900, making a total of £5,350. The clerk was instructed to forward the plans to the Local Government Board for approval.

Proposed Board Schools, Smethwick.—At the monthly meeting of the School Board, held last Monday, it was reported that, in response to their advertisement to architects willing to submit designs for proposed schools to be built at "The Cape," eighteen sets had been received. Three of these were placed by the professional assessor, for the final selection of the Board, in the following order:—First, "Playground"; second, "Rex"; and third, "Experience." Upon opening the sealed envelopes it was found that the author of the successful design, "Playground," was Mr. George H. Cox, of Birmingham; of the design placed second, "Rex," Mr. Daniel Arkell, of Birmingham; and of the design placed third, "Experience," Mr. Fred. J. Gill, of Smethwick.

Illustrations.

LONDON AND COUNTY BANK (NEW PREMISES), KENSINGTON.

THIS building at Kensington Court, has been erected on the site formerly occupied by Colby House, which was taken down about fifteen years ago, and formed part of the site of Kensington House, built for Mr. Albert Grant, which has since been removed to make room for other buildings.

The ground-floor, with the basement under, is wholly devoted to the business of the bank; the upper floors are occupied as the manager's residence, with separate private entrance from the street under the adjoining house.

The elevation is built with red Mansfield stone, and Farnham red bricks, in narrow

courses. The ground-floor is in part constructed with brick arches, and in part with Portland cement concrete and iron girders. The floor of the banking-room is in part laid with marble mosaic, and in part with yellow deal wood blocks. The ceiling is formed of fibrous plaster, fixed to coke breeze and Portland cement concrete floors, between iron girders. The walls are lined with an American walnut moulded dado, with Belgian granite surbase moulding and plinth, and an under-dado of inlaid wood parquetry. The fittings throughout have been made to the architect's designs to harmonise with the building.

The building was designed by Mr. Alfred Williams, and carried out under his supervision by Messrs. T. Rider & Son. The carving was executed by Messrs. W. Seale & Son. Mr. Mackenzie acted as clerk of the works.

The drawing from which the illustration is taken was exhibited at the Royal Academy.

GLENBUCKET CASTLE, ABERDEENSHIRE.

GLENBUCKET CASTLE, about twenty miles from Alford, in Aberdeenshire, is a good example of the smaller Scottish castle of the seventeenth century. It stands on a wooded platform on the hillside, above the beautiful valley of the Don, on a site chosen as usual with consummate feeling for effect, though that is rather a result than a foreseen intention realised. The castle was built at the end of the sixteenth century by a certain Adam Gordon, whose inscription still remains on the lintel over the old entrance, "Adam Gordon and Helen Carnegie, Nought remains on earth but fame." After various fortunes the castle was finally abandoned about fifty years ago, and the whole building has been allowed to crumble away ever since; all that now remains are the extremely massive walls, with a few fragments of the original ashlar work sufficient to show the character of the whole.

The ground-floor seems originally to have been used for kitchen and offices, and is very rudely vaulted. A large newel staircase communicated with the first floor, and a smaller one from the offices, both opening into what would have been a hall, beyond which, say, was the dining-room, and a retiring-room in the wing beyond. This, however, is merely a conjectural account, for, in fact, the uses to which the first floor was put must have varied according to the number of the master's retainers, and the circumstances of his time. Two more newel staircases communicate between the first floor and the bedrooms, but the latter have disappeared, leaving no further evidence than the holes for the joists, and one or two

mouldering wall-plates. Only the corbelling of the original corner turrets remain. The fittings and mouldings left are seventeenth century section, and the whole building shows a transition from the castle to the living-house, but the castle still predominates, for the house is so arranged that the inmates could retreat from part to part, shutting themselves off as they went. Scotland was always about 10 years behind England in civilisation, and its architecture never emerged from a certain uncouthness and crudeness of style. While our Jacobean architects were making windows as large that a man could not know "where to look at to be out of the sun and wind," here was Adam Gordon making his narrow windows, and all with shot-holes under the sills.

The castle, with the Glenbucket Estate, recently came into the hands of a purchaser who proposed transforming the castle into a habitable house. The old hall and dining-room were to be made into one large dining-hall, with a screen at the staircase end. The flight of steps shown on the drawing was to serve as access to the lawn-tennis court and garden, the front door necessitating this addition by its unavoidable distance from the garden side. The work has not been executed owing to the death of the owner.

The drawing was exhibited at the Royal Academy this year.

REGINALD T. BLOMFIELD.

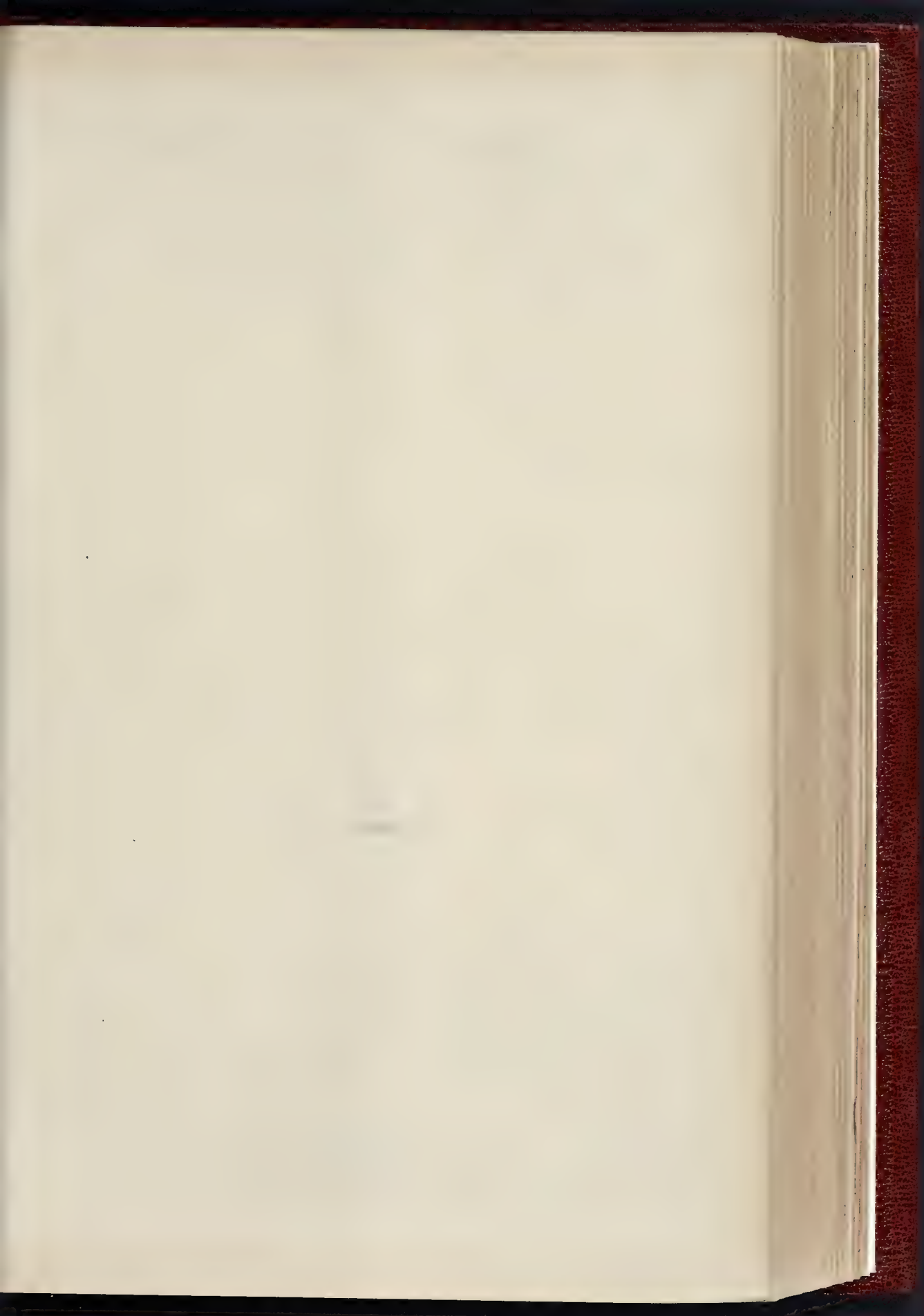
ASKE'S SCHOOLS FOR GIRLS, HATCHAM.

THIS school, to be erected for 400 pupils and capable of extension, will stand on the southern portion of about two acres of land, on the south side of New Cross-road, and nearly opposite the railway station.

The ground-floor will contain a dining-hall below the examination-hall, ample arrangements for cloak-rooms and lavatories, with kitchen and servants' offices, and covered playground with gymnasium. The principal floor is given on the sketch.

The first floor will contain several class-rooms, accommodation for the assistant teachers, a spacious studio, and a lecture-room, with attached laboratory for pupils.

In the roof are servants' rooms, and other accommodation, as well as a rarifying chamber for ventilation. The materials proposed are red brick facings, with York-stone dressings and plain-tile roofs. The whole of the building will be warmed by warm water in coils, and the total estimated cost, inclusive of the land, is £23,500. The architect is Mr. Henry Stock. The drawing was exhibited at the Royal Academy this year.





C F Kell Photo Lith

THE TRIUMPHAL

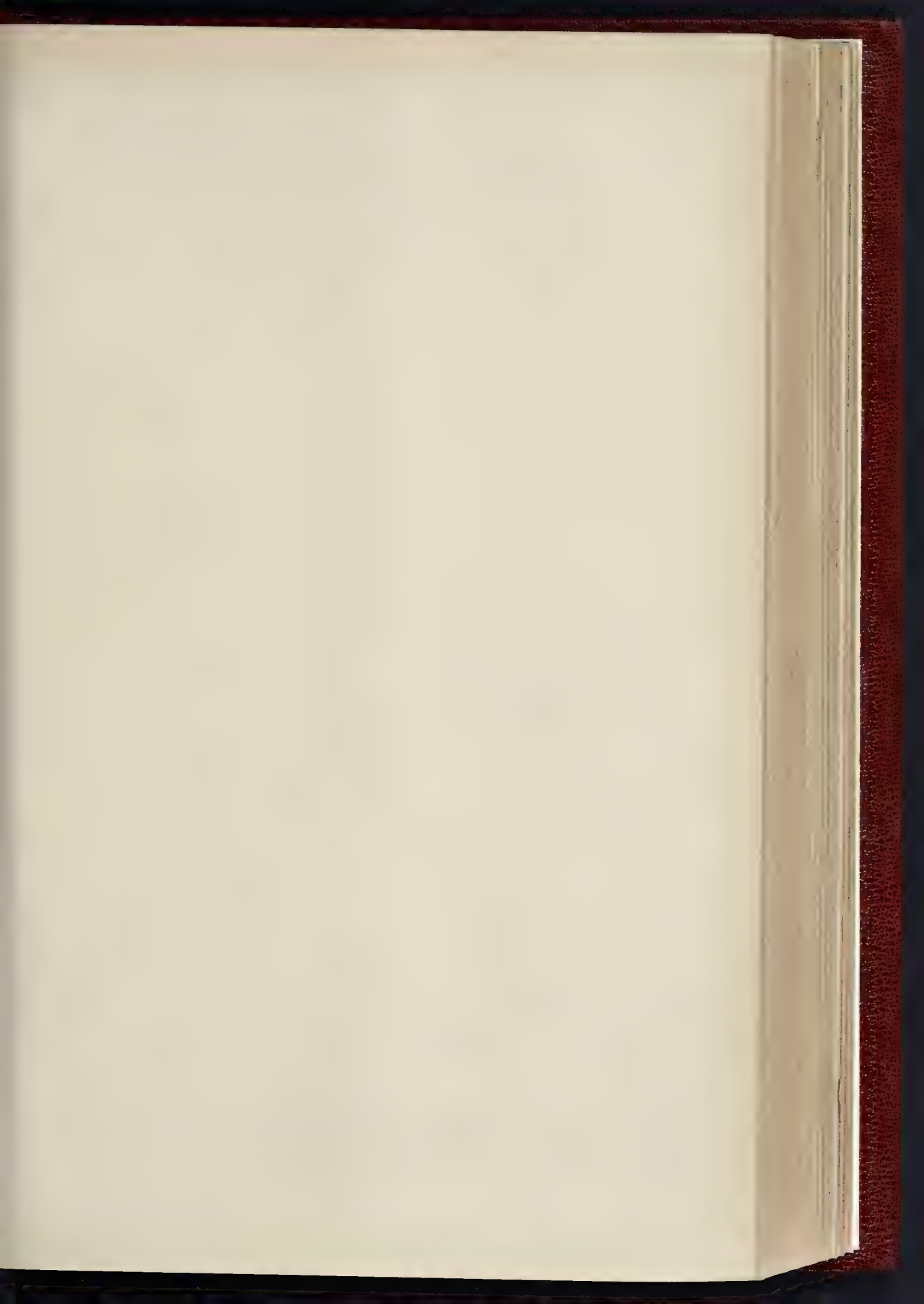
THE ARCH AT ORANGE



OF THE ROMANS,

8 Castle St. Holborn, London E.C.

an Engraving by Boltard.





THE TRIUMPHAL

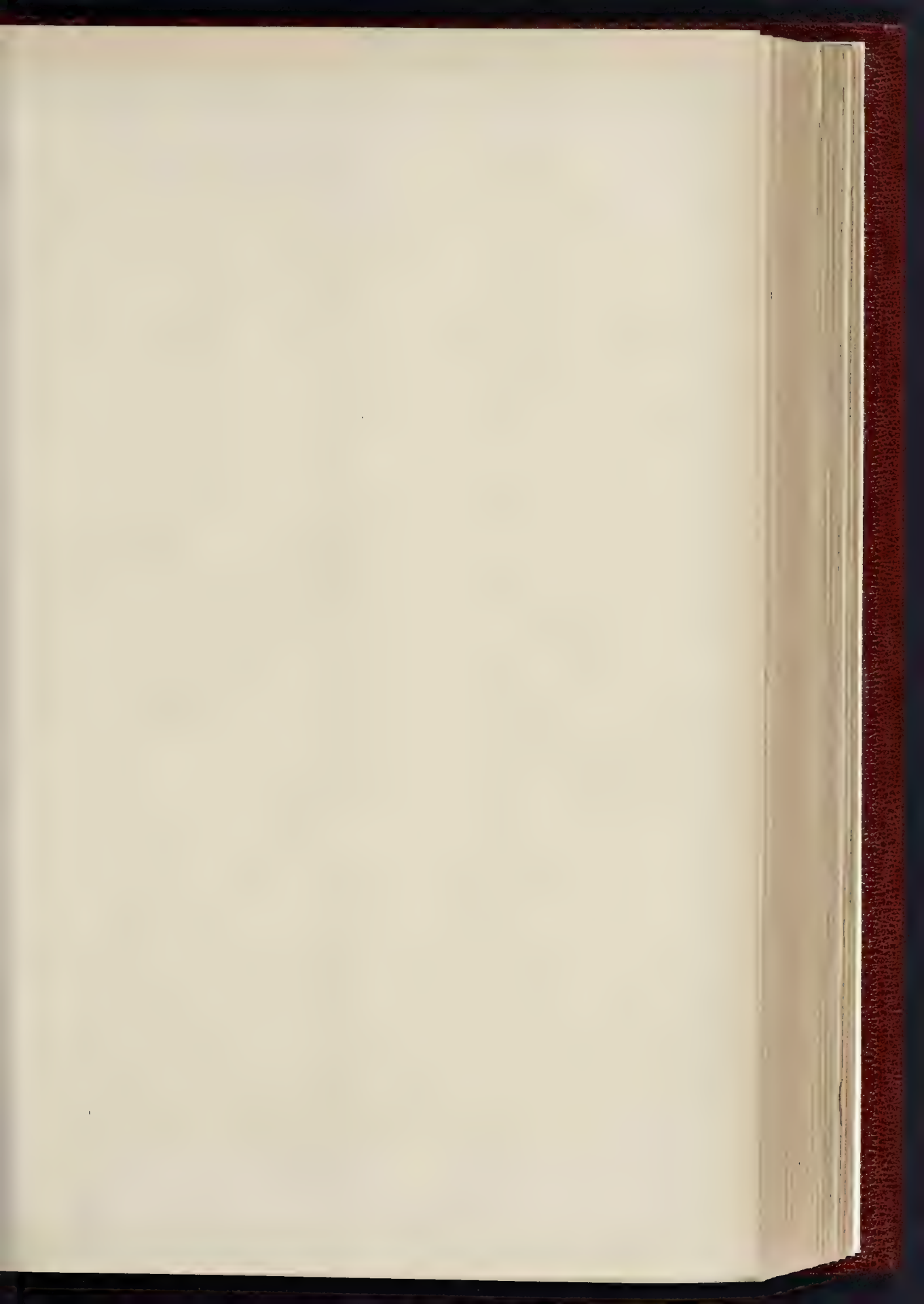
ARCH OF TRAJAN AT BENEVENTO



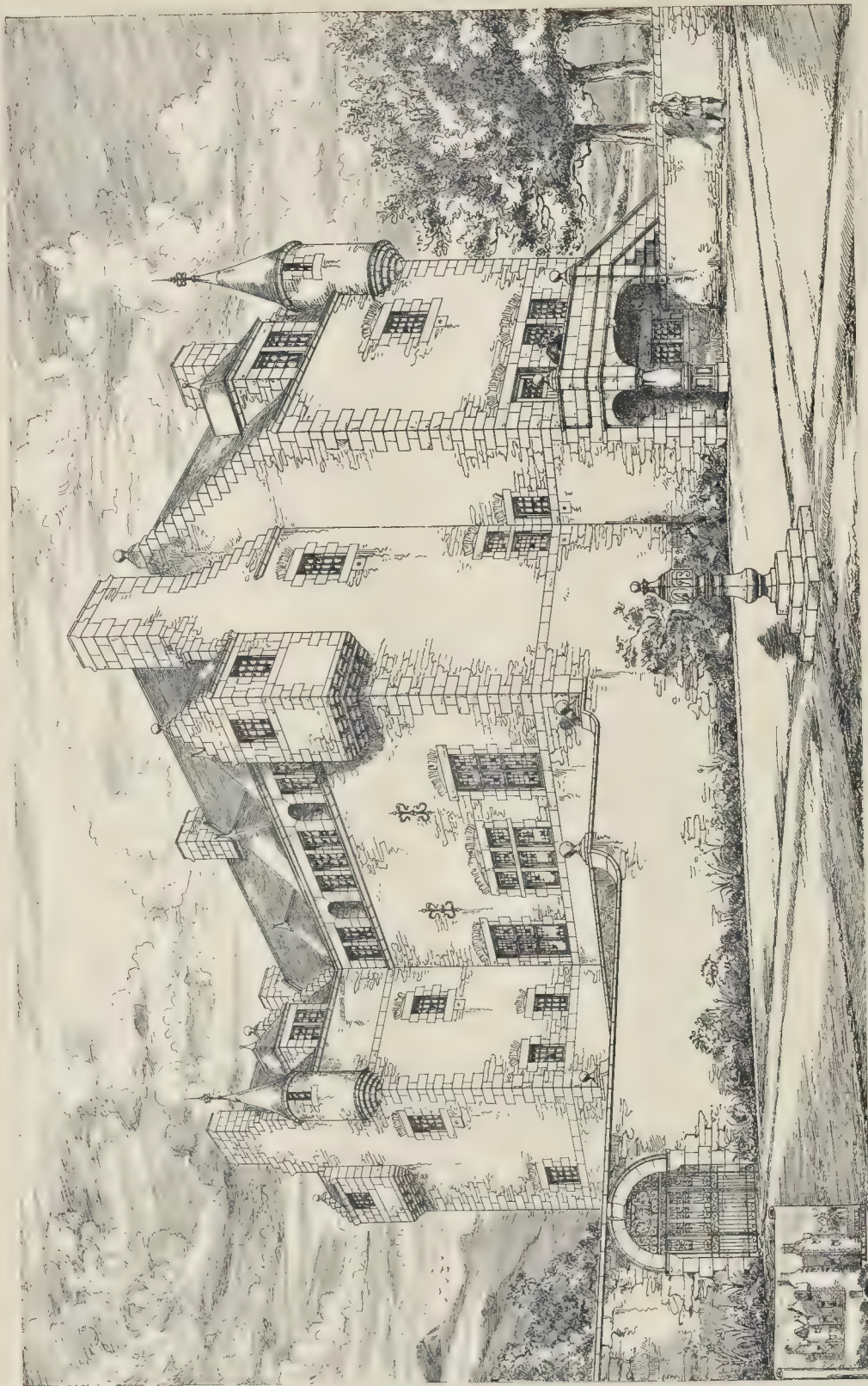
THE ROMANS.

© FURNIVALL, H. & CO. LONDON, E.C.

an Engraving by Cuneg.



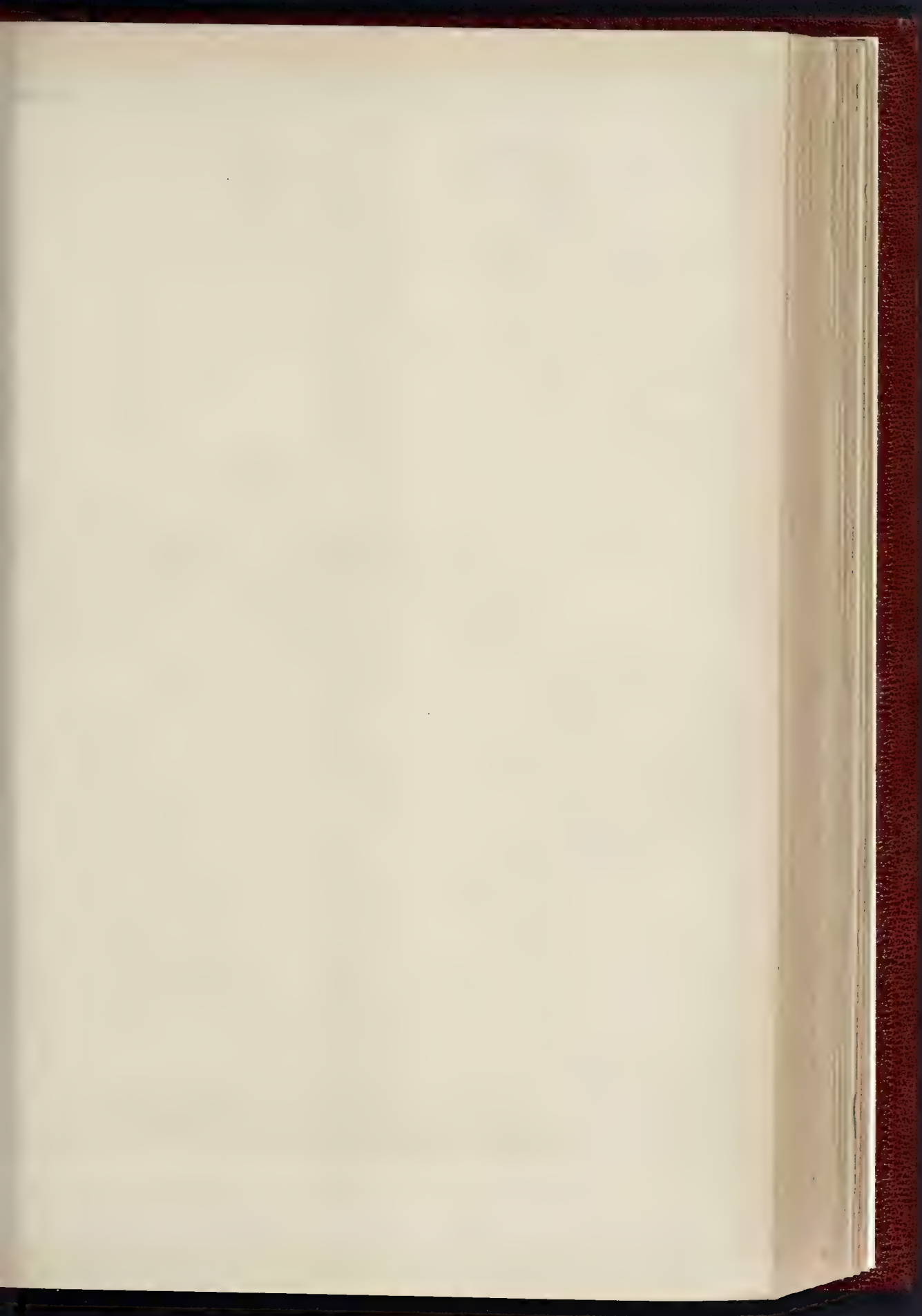
THE BUILDER SEPTEMBER 11, 1896.



PROPOSED RESTORATION OF GLENBUCKET CASTLE, ABERDEENSHIRE.

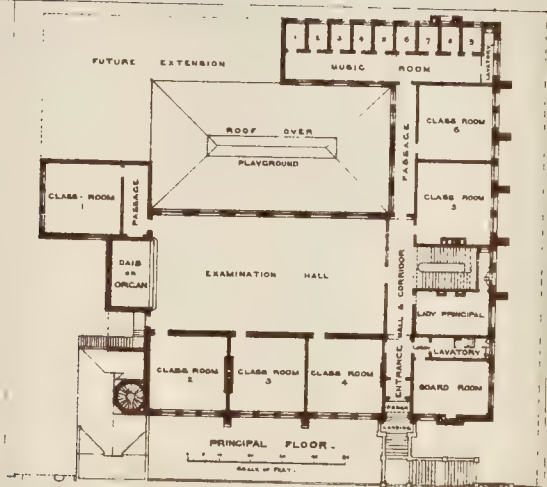


LONDON AND COUNTY BANK, KENSINGTON.—MR. ALFRED WILLIAMS, ARCHITECT.





THE NEW HATCHAM SCHOOL FOR GIRLS.



ART QUESTIONS AT THE BRITISH ASSOCIATION MEETING.

In the Anthropological Section of the Birmingham Congress of the British Association for the Advancement of Science, Professor Boyd Dawkins, M.A., F.R.S., F.S.A., read a paper on "The Celtic and Germanic Designs on Runic Crosses." He said it was very generally assumed by archaeologists that the early Irish MSS., the Book of Kells, and the illuminated gospels of St. Cuthbert and St. Chad, were of pure Irish art, and that consequently the interlacing "rope" or "basket" work pattern was distinctly Irish and Celtic. It was, however, an assumption which might be readily disposed of by an appeal to the designs on ornaments and monuments in the British Isles and in France, Scandinavia, and Germany. These he considered under two heads—viz., the scroll, spiral, and flamboyant work, consisting of graceful combinations of curves; and, secondly, the interlacing work, more or less square and angular, the "rope" or "basket." The first of these two styles first appeared in the British Isles, Scandinavia, France, and Germany in infinitely remote prehistoric times, in the Bronze Age, and subsequently became more and more elaborate in the prehistoric Iron Age, constituting the "late Celtic art" of Mr. Franks. This art was probably ultimately derived from the centres of civilisation in Southern Europe, principally Greek and Etruscan, and had been proved to have been introduced into France from Italy. From its prevalence among the Celts of the British Isles and of France, it was justly termed Celtic. The interlacing pattern of this, too, was conspicuous by its absence from Irish art until the days of early Irish Christianity. It might be traced far and wide over Europe, and among nations who owed nothing to Irish art. From certain facts, it might be concluded that it was distinctly Germanic and not Celtic, and still less "pure Irish." The assimilation of the Celtic, graceful, spiral, and flamboyant, with the German design, not only in the early Irish manuscripts, but in Irish chalices and ornaments, might readily be accounted for by the influence of the Germanic tribes (including Scandinavians), not only in Ireland in the eighth and following centuries, but in those parts of Europe traversed by the Irish missionary. The conclusion to which he arrived was that the Irish illuminated manuscripts could not be taken as the tests of pure Irish, or even of Celtic art, but that a large part of the ornament was due to contact with Germanic art.

The Chemical Section met on Saturday in the Lecture Theatre of Mason College, when Professor Hartley read a paper on "The Fading of Water Colours." Recently, he said, considerable correspondence had taken place in the columns of the *Times* in connexion with this subject, and an article had appeared in the *Nineteenth Century Magazine*. There have been two ideas brought forward,—one being that water-colour drawings fade on keeping, while others have contended that the tints increase in depth on ceasing for a length of time. Hence, on the one hand it has been recommended to keep water-colour drawings in the light, while others have suggested that darkness is preferable. The colours used are of two kinds, mineral and organic. Mineral colours are generally unalterable, except in special cases, such as lead. The tendency is for red light to act as an oxidising agent on such colours, while violet light exerts a reducing action. But in the case of organic colouring matters oxidation is promoted by light from either end of the spectrum. Acidity in any form is a great cause of the deterioration in water colours. The chief sources of acidity are the impurities in the atmosphere in presence of moisture, imperfectly prepared colours, and the acidity of the paper. The paper is always itself slightly acid, and the use of size or gum is a source of acidity, while the burning of coal and of gas in towns produces a sensible amount of sulphurous acid in the atmosphere. The author has carefully examined the effect of acids, of exposure to sunlight, of hydrogen peroxide, and of sulphurous acid in the case of sixteen common water-colours. As a result, he concludes that the character of the colours examined is very creditable to the manufacturer. Lakes are very permanent in pure air; while cases are known where indigo has remained unchanged for upwards of 1,800 years. Indigo,

is, however, liable to be attacked by acids. Generally the effect of chemical agents upon water-colours is what might have been expected from their chemical composition. Thus, yellows containing cadmium sulphide are bleached by oxidising agents. In some few cases, however, unexpected results were obtained. Ultramarine is very readily affected by dilute acids; no preparation of lead should be used as a pigment, either for oil or water-colour drawing. It is shown that many water-colour drawings have been exposed to light for fifty years or more in properly-arranged galleries, without appreciable deterioration. The tendency is to produce apparently darker tints, owing to the lighter tints being most liable to fade, while the brown colour developed in the paper itself tends to produce a similar effect. To preserve delicate sunlight effects the drawings should be kept in rooms imperfectly illuminated, and preferably with blinds transmitting a yellow or brown light. They should be carefully protected from the effects of an impure atmosphere, while paste or gum should not be used in affixing them. A slight wash of borax on the paper destroys its acid reaction, and makes the colours fix readily on the fibres. A small quantity of borax might be used in the water employed for mixing the colours. For illuminating galleries incandescent lamps are to be preferred to lighting by the electric arc, as the latter may be regarded as a sure means of destruction of the colours.

Mr. Crookes, after referring to the value of the paper to which the meeting had just listened, mentioned that a committee had been appointed by the Science and Art Department to work with artists and chemists, and from the labours of this committee much benefit might be anticipated.

HEALTH QUESTIONS AT THE BRITISH ASSOCIATION MEETING.

In the Chemical Section of the British Association meeting at Birmingham, Professor Carnelly read a paper on "The Air of Dwellings and Schools, and its Relation to Disease." The paper dealt with an elaborate series of experiments undertaken by Dr. Carnelly at Perth and Dundee, in connexion with the sanitary and school authorities, the object being to determine the relations between the composition of the air and the death-rate in houses and schools; and also the effect of various systems of ventilation. For this purpose the carbon dioxide, organic matter, and micro-organisms were determined, both in the outside air and in the room to be examined. In the air of the towns of Perth and Dundee a distinct increase of impurities could be detected in close parts of the towns as compared with the open spaces. In examining the dwelling-houses the experimenters had authority from the sanitary officers, and visited bed-rooms and similar places during all parts of the day or night, while actually occupied by the inhabitants. Houses are divided in the tables into one, two, and four roomed dwellings, and mention was made of some cases in single-roomed dwellings in which eight persons were found sleeping in a single bed, and in many cases no bed was found in the dwelling at all. The impurities in the air of such houses were naturally much greater than in those of a better class, and by a careful comparison of the chemical composition of the air with the death-rates from various causes in the various classes of houses it was shown that on an average the length of life in a one-roomed house was only twenty years, whilst that in better class houses is forty years. Hence a person born and living in a one-roomed house has a chance of living only half as long as those born and living in a four-roomed house. This depends naturally to a considerable extent on other causes than impure air supply. Some irregularity was observed in the cases of consumption, scarlet fever, and diphtheria, which is, however, quite capable of explanation. The influence of cubic space on the purity of the air in dwelling-rooms was somewhat unexpected, the best results being noticed when 1,000 cubic feet was allowed to each person. With larger rooms, owing to stagnation of the air, the result is not so good. Sixty-eight schools in Dundee were examined; of these twenty-six were mechanically ventilated, while the others were ventilated by means of windows. The advantages were distinctly in favour of mechanical ventilation, the micro-organism being one-seventh and the

carbon dioxide one-half of that in the other schools. Mechanical ventilation not only materially improves the quality of the air, but also has less influence in unduly reducing its temperature. On comparing together boys' and girls' schools the air is almost invariably less pure in boys' schools. The amount of carbon dioxide does not afford any indication of the amount of organic matter or micro-organism, except by taking the mean of a large number of experiments. Cleanliness of person has a comparatively small influence on the number of micro-organisms, but cleanliness of dwelling-rooms and schools has a most important effect. Hence the air of new schools is distinctly better than that of the older buildings. In conclusion, the author suggested that in many cases the evil said to be due to over-pressure in schools was doubtless due to imperfect ventilation, and that if Dundee may be fairly regarded as an example of a British town, then certainly our schools are most imperfectly ventilated; and that for improvement in this respect the advantage of mechanical ventilation should be strongly insisted upon.

Dr. Tidy gave a brief account of some elaborate experiments performed, in conjunction with Mr. Crookes and Dr. Odling, on "The Action of Drinking Water on Lead." The authors had examined the action of the waters of a large number of English towns on lead used for service-pipes, &c. It was found that the liability of soft water to act permanently on lead was not, as commonly supposed, proportionate to its softness. Again, the capability of soft water to act permanently on the lead services was not necessarily relative to the extent of its activity on clean and new lead. Thus, one supply, which on exposure to clean sheet lead for twenty-four hours was found to take up 1.17 grain per gallon of lead, was quite without action on the lead services; whereas other supplies which, after the same length of exposure to clean sheet lead, were found to have taken up only 0.78 and 0.71 grain per gallon of lead, were among the examples acting most strongly on the lead services. One curious fact, which had not up to this time been suspected, was clearly shown by the analyses,—namely, the relatively large proportion of silica in those waters where no lead was found in the supplies as compared with its amount in those waters in which lead was found. Thus, in the former series, the silica in the water averaged 0.53 grain per gallon, whilst in the latter it only averaged 0.21 grain, or constituted about two-fifths of that present in the former case. Moreover, in no single instance was a water with more than 0.5 grain per gallon of silica found to exert a solvent action on the services; and in no action was a water with less than 0.3 grain per gallon of silica found to be without such solvent action. This was the first link in a chain of evidence which led the authors to think that the true explanation of the circumstance why certain soft waters act on lead for a short period only was to be found in the larger proportion of dissolved silica present in these waters, and the consequent formation of an insoluble lead silicate as a coating in the pipe. A full account was given of the series of experiments, and the question was asked, What is the maximum quantity of lead permissible in a water used as a supply for potable purposes? So far as the authors knew, there was an absence of any direct evidence to show that water containing not more than 1.20th of a grain of lead per gallon has been productive of harmful effects. It is indisputable that considerable quantities of lead may be taken into the system by very many people without any injurious effects whatsoever manifesting themselves. In connection with this it is noticeable that in at least three towns, not including Huddersfield, of which the water supply came under examination, although the supplies delivered through the lead services would seem to contain habitually an appreciable proportion of dissolved lead, ranging from 0.05 to 0.50 grain per gallon, yet cases of reported or alleged lead-poisoning were of very rare occurrence in these towns, and for the most part not of a well-demonstrated character. Without doubt cases may and do occur which are unrecognised or are not attributed to their true source, because of their slow and insidious character. It was pointed out that if a lead water, containing 0.5 grain of lead per gallon, be used for making tea, the quantity of lead in the tea infusion may be reduced to less than 1-100th part of that in the original water, the

chief part of the lead being found in the tea-leaves; and that much the same abstraction, though to a somewhat less extent, occurs in the case of coffee. The authors considered it impracticable, even were it advisable, which was doubtful, to replace the lead pipes by iron pipes or pipes of tinned lead. Lead pipes possessed the advantage of cheapness, durability, flexibility, and the ease with which they could be wrought and repaired. The results of the experiments made both on a large and small scale warranted the authors of the paper in recommending with confidence the systematic and continuous filtration of the water, recourse being had to such modifications of the ordinary filter-bed as would ensure the efficient silication of the water. Efficient silication would, in their belief, minimise to the utmost, and practically altogether prevent, the action of the water on the lead surfaces, thereby effecting a real hygienic improvement, and allaying the justifiable apprehensions of consumers as to the possibility even of injury resulting to them from the lead-dissolving character of the water supply. Such filtration would, moreover, in a special manner improve the brightness and colour of the water, and would lessen the quantity of organic matter held in solution.

Mr. Durham asked if the silica was deposited when the lead dissolved.

Dr. Tidy said this point was at present not determined. The silica present had been estimated in the ordinary way.

Mr. A. H. Allen (Analyst to the Borough of Sheffield) said he had taken part in the work connected with the analysis of the water of Huddersfield, to which the author had referred, and he wished to congratulate the author on obtaining definite results. The idea that the amount of lead depended on the hardness of the water was not now accepted by analysts of experience, but was only to be found in our text-books. He thought that the work of Mr. Jarman showed that other acids than silicic might have an effect upon lead. In Sheffield after being some hours in water, and the fact that a number of spores were necessary to carry disease, he believed to be at the root of the difficulties to which he had referred.

Dr. Leeds suggested that organic matter present in soft water had a considerable influence on the power of dissolving lead.

Dr. Odling did not like to put altogether aside the question of hardness and softness. Exceptionally they knew hard water did act upon lead, but soft water generally did so. The results were also much affected by the amount of carbonic acid present, and the mechanical condition of the metal itself. When it was first proposed to bring Loch Katrine water to Glasgow, there was very much difference of opinion among chemists as to its probable influence on lead pipes. Some chemists even went so far to say that this water acted upon lead more than any water they had ever examined. As a matter of fact, however, Glasgow was not troubled in this way, the reason being that soft water often ceases to act upon lead after a very few days. In some cases, however, this action was persistent. Their experiments proved that in these cases the addition of silica arrested this action, half a grain per gallon being capable of producing this effect.

Mr. Jarman expressed an opinion, based upon his experiments with Huddersfield water, that the presence of any acid was capable of increasing the action upon lead.

Mr. McGregor suggested that the pipes might be protected, before being laid, by the use of a water which had only a temporary action. This would give a protecting coat on the inside.

Professor McLeod asked about the effect of water containing different amounts of carbon dioxide. He suggested that such solutions might contain a little silica dissolved from the glass vessels in which the solution was prepared.

Dr. Tidy, in reply, stated that the water which was most acid at Huddersfield was not supplied to the complainant in the action. The effect observed was the same whether the water was acid or not.

Dr. Odling, F.R.S., then gave a brief account of his researches on the "Micro-organisms in Drinking Water." It had, he said, often been alleged that zymotic diseases are largely caused by drinking water, but on examination of a large number of the cases cited, it has been found that

the evidence produced is altogether insufficient to support such a conclusion. Still, the speaker was of opinion that there were cases which had been carefully tested, and which proved beyond a doubt that water was capable of propagating zymotic diseases. But they also had the circumstance that large communities might drink badly-polluted water, and so be subject to many sources of infection without any appreciable effect being observed on the general health. Of this we have an example in the case of London, some twenty years ago, when its inhabitants were largely supplied with Thames water, into which many large towns, such as Windsor and Banbury, emptied their sewage, without any purification whatever. Yet it could not be shown that the persons who used such water suffered more severely from cholera or zymotic disease than other portions of the community. In what he had stated they had apparently two entirely opposite and contradictory statements. But he thought the explanation was found in some recent experiments which he had performed, and which showed that the vitality of bacilli was very small when present in water. He had employed the bacilli of splenic fever as an example which could be readily examined. This had been introduced into sterilised water, and the influence of the liquid determined by admixture with nutritive solutions. When the bacilli had been present in the water for not more than six hours propagation always ensued, but after twelve to eighteen hours the water was without action on the test solution. A very similar effect had been obtained when experimenting with various natural waters, and he believed this result afforded the explanation to the apparent difficulty to which he had drawn attention. Another fact to be borne in mind was that a single spore appeared to be incapable of propagating disease. An illustration of this was met with in the process of vaccination, where it was necessary to make several punctures, and to introduce a sensible quantity of lymph. The loss of vitality of the bacilli after being some hours in water, and the fact that a number of spores were necessary to carry disease, he believed to be at the root of the difficulties to which he had referred.

Dr. Tidy stated that an examination of the death-rates in the various parts of London for the last ten years showed that the deaths from zymotic diseases were much greater in the case of those who were supplied with deep well water from the chalk than in the case of those who were supplied with water from the river.

Two papers on sewage disposal were read before the Mechanical Science Section. The first, on the automatic pumping of sewage by high-pressure water, was by Mr. Baldwin Latham, M. Inst. C.E. The author shortly described a method of transmitting power from a central point, and using such power as a convenient mode for automatically raising sewage in any district. Two machines were placed vertically in one chamber, and so arranged by means of floats that when one machine was overpowered by the volume of sewage, the second machine would come into action. By this method, he stated, power could be transmitted more economically than by any other mode at present in use.

The second paper was on the Birmingham District Drainage Board, and was contributed by Mr. W. S. Till. Mr. Till stated that the Board was formed in 1877 by Provisional Order under the powers of the Public Health Act, 1875, the object being to unite certain of the various local authorities of Birmingham and its immediate neighbourhood for the purpose of sewage disposal, and to afford facilities to such authorities for the interception of sewage from the streams of the district and the conveyance of such sewage to outfall works. The district around Birmingham is situated near the summit of the watershed of the Trent, being drained by the river Tame, which, with its tributaries, discharges into the Trent, about midway between Burton and Tamworth. The natural water-courses being very small, great anxiety was felt by the various local authorities as to their pollution by the dense population along their banks; and this, together with the cost and difficulty of each individual authority establishing its own outfall works and conveying its sewage thereto, led to the formation of the drainage district. This district, which comprises the borough of Birmingham and ten other urban or rural sanitary districts, has an area of 47,275 acres, with a population of upwards of

600,000, and is governed by a board of twenty-four members, selected by the various constituent authorities. In accordance with the Provisional Order, the Board acquired from the Corporation of Birmingham the sewage works at Salfley, consisting of 262 acres of land, and the extensive system of tanks, plant, stock, &c.; and these works being situated at the natural outlet for about nine-tenths of the total population of the drainage district, arrangements were commenced as soon as the Drainage Board came into existence for placing the districts of the various constituent authorities in communication with the outfall works so acquired. Accordingly, in some instances, the existing sewers of one authority were allowed to be used by another authority on payment of an annual sum, and, in other cases, extensive systems of new intercepting sewers were constructed, so that at the present time nearly the whole of the populated areas of the drainage district are connected with the outfall works. Pending the completion of these intercepting arrangements the Board had been proceeding with the extension of the outfall works, having acquired such quantity of additional land adjacent to and eastwards of the Salfley farm as to raise the total area of farm land to 1,227 acres. This land has been drained, levelled, and laid out for irrigation, and is of such an altitude that the whole of it, and except about sixty acres, can be irrigated by gravitation. Extensive farm buildings have also been erected, and those originally existing improved. The principle of purification now adopted is partial precipitation in tanks, with subsequent irrigation. The volume of dry-weather sewage is about 16,000,000 gallons per day; about thirteen tons of lime are used per day for neutralising the acids contained in the sewage and assisting precipitation; and last year 135,476 cubic yards of mud were arrested in the tanks and dug into the land. The Board itself farms the land. Mangolds, swedes, kohlrabi, ryegrass, and market garden produce are the principal crops grown under sewage. The production and sale of milk is also an important item of the farming operations.

The section adjourned for the purpose of visiting the sewage farm. Vehicles were provided for the purpose, and the party on reaching Tyburn Farm was entertained at luncheon by Alderman Avery. In the course of their inspection of the farm they were first shown the liming station, where lime for neutralising the acids and assisting precipitation is mixed with the sewage. The latter, having passed through a series of tanks wherein the grosser impurities are arrested, is carried by conduits to various parts of the farm, and is distributed over the land, the effluent being conveyed by subsoil drains into the river. The scheme was discussed by the members, and made the subject of much favourable comment.

"London Reconstruction and Re-housing as a Business Enterprise" was the subject of a paper read by Mr. William Westgarth in the Section devoted to Economic Science and Statistics. He introduced his subject by alluding to the heritage of debt usually left to the ratepayers, as the result hitherto of urban sanitation and reconstruction undertaken by the municipality. He proposed to reconstruct the ill-conditioned areas of central London as a self-remunerative business; and he explained how the recoupment of cost was to be effected by what he called the "natural increment" of site value (using that term in place of the invariably so-called "unearned increment" of economists), besides the increase of value due to the improvement itself. He meant to do this by means of a Joint Stock Company or Trust, and there were certain facilities and privileges which the Trust would reasonably ask of the Government, in return for the sanitation and reconstruction the Trust contemplated, all of it cost free to the ratepayers. He then explained natural increment as simply the result of the increase of population, commerce and wealth upon and around sites or areas which were themselves inextensible. It was the feature in common of all progressive countries, and especially of their larger towns, and had been markedly the feature of London, and of central London particularly, whose natural increment during the last thirty years might have availed for an entire systematic reconstruction. Such a considerable term of years must be dealt with, because natural increment, like other things commercial, is subject to sub-waves of excitement and depression,

as illustrated by the excitement and site-value increase between 1870 and 1878, as compared with the eight subsequent years of depression or comparative depression. He went on to allude to the great Paris reconstruction, where, by the immediate re-sale in fee simple of the expropriations, after clearing, realignment, &c., all the natural increment had been abandoned to the private investors and speculators, leaving thereby an enormous debt upon the city. But so enormous also had been the subsequent value-increase, that he was warranted in saying that Paris could have been successfully reconstructed as a private enterprise by holding for an adequate term to the sites, much in the way he now proposed for London. Having stated principles, the author then passed to details. In the first place he must be helped by a special Act of Parliament, to enable the Government to deal with and authorise a Trust when of adequate resource and responsibility. Without this special facility no body of responsible and busy men would attempt such a work, and this Act, while they were about it, he should make general and not merely for London, so that public-spirited persons elsewhere might institute similar Trusts. The proposed Trust would have ten millions of capital to start with; but this could take the convenient form of a small paid-up, and a large liability, capital. The advantage of this form, as much successful experience had shown, was that, while a dividend might be large and satisfactory as compared with the paid capital, it yet weighted the concern with only a small charge as upon the whole capital. This plan answered well where there was confidence in the undertaking. And responsible shareholding would still be secured by making the shares of exceptionally large amount. But this form of the capital would involve large borrowing from the public, and in order to do this cheaply (for it was everything to tide over, at lowest cost, the considerable interval till natural increment became effective), the Trust would claim a contingent rating liability as additional security for its loan issues. The ratepayers, protected by the Trust's capital and judicious business procedure, would have only a nominal liability. Under this concession the Trust's dividends must be by agreement with the Government. Then followed conditions or limits to the full powers of action given to the Trust. No step could be taken without approval, or in face of the veto of Government or municipality. Hostility on their part was not to be even dreamed of in this beneficial work. The Board of Management would include a representative of the Government, of the Corporation, and of the Board of Works. A further condition would be that, in its possibly large expropriations, the Trust should, as far as practicable, offer siteholders, on fair agency terms, the option of co-operation instead of expropriation. This seems only fair, where the object is not such disturbing expropriation, but improvement. Finally, Mr. Westgarth, in commending his project to favourable attention, said that he was ambitious to invite the help of the very highest London names in forming his Board, and thus alike to inspire public confidence in an enterprise somewhat novel in character, and to do full justice to a project which contained all the possibilities of the grandest and most beneficial of business enterprises.

THE REGULATION OF WAGES.

The report of the committee appointed by the British Association to consider the question of the regulation of wages by means of sliding scales was read by Professor Munro at the Birmingham meeting. This stated that only a few replies had been received to the circular issued by the committee to associations of coal-owners and miners, asking for detailed answers on certain aspects of the sliding scales. They were, however, very valuable, as they clearly showed that each scale had special characteristics of its own, and that no comparison could be instituted between the various scales without taking into account the exact circumstances under which each scale was framed. In some districts special allowances in the way of a free house and coal were made to miners, whilst in other districts no such allowances were made. The replies tended to show that in the last-mentioned districts the non-allowance of a free house and coal was taken into

account when the standard rates of wages were fixed, and thus an apparent inequality in two scales was definitely explained. The original standards seemed all to have been fixed on a common principle, viz. to take the price of coal then realised and the wages then paid as representing a fair and equitable division of the produce between the mine-owner and the miner, and as giving as high a wage as the industry could then afford. Some districts adopted the price of all coal sold, other districts the price of all coal raised, as the standard price. The real economic difficulty in framing the scale began when it had to be determined what proportion of a rise or fall in prices should go to the men and what to the mine-owners. Both parties contemplated a rise rather than a fall in prices, and the changed conditions of the coal and iron industry had exposed the scales to some opposition, but their wise revision from time to time had maintained their influence with both masters and men. The difficulties in the way of basing a scale, not merely on the selling-price, but on variable elements in the cost of production, were universally admitted, but there was little doubt that where one trade depended on another, variations in the cost of the raw material would require to be taken into account in fixing wages. The coal trade had escaped the difficulty owing to royalties having been fixed for a considerable period of time. But were a sliding-scale adopted in other trades it might not be successful unless the price of raw materials were one of the elements on which the division of the produce were to depend. Further information on this important point was very desirable, and it was recommended that the committee be re-appointed.

ENGINEERING QUESTIONS DISCUSSED AT BIRMINGHAM.

In the Mechanical Science Section of the British Association Meeting at Birmingham, Mr. W. Shelford, C.E., and Mr. A. H. Shield, C.E., contributed a paper upon "Some Points for the Consideration of English Engineers with Reference to the Design of Girder Bridges." The writers affirmed that a general comparison of English, German, and American bridges, with especial reference to the class of work adapted to newly-developed countries, afforded sufficient grounds for the examination of the English practice. This examination was limited in the paper to bridges of moderate span, which, on account of their number, were of greater economic importance. The results of a comparison of typical designs for bridges of 140 ft. span were given, and it was stated that the difference between the weight of good designs of the same depth was comparatively small, while the principle that economy was obtained by increasing the depth obtained to an extent which, if recognised in theory by English engineers, had not hitherto found general expression in their practice. This was, however, partly due to external conditions, and it did not appear that there were essential national errors or prejudices in design which were likely to place English engineers at a disadvantage in colonial work. The difference between the position of the designer in America and England was investigated, with the result that, while the advantages of the English system in the interest of security were admitted, it was found to be attended with disadvantages with respect to economy, for which the publication of details of the comparative cost of different methods of construction and the adoption of standard sections for rolled iron were suggested as partial remedies. The scientific and commercial interests of engineering called for the abolition of the Board of Trade rules which determined fixed limits of working stress unless they could be brought into conformity with modern knowledge of the properties of materials and the laws of construction. The objections to their abolition, although it would open the investigation of the subject to private enterprise, were pointed out, and the construction of new rules was suggested; such rules, while preserving the freedom of the engineer in the choice of design and material, and leaving to him the estimation of all those effects of loading a structure which were capable of determination by known methods, should determine for his guidance by coefficients of safety the provision to be made separately for each of the effects which were usually understood to be covered by an arbitrary factor of safety. It was suggested

that the construction of such rules would be more worthy of the professional attainments of English engineers, and would be designed to raise the standard of professional knowledge by avoiding the use of fixed coefficients of which the origin and scope were not known to the user, and to encourage good workmanship and the use of materials of a high class by varying the working stress according to the quality of the materials employed. The revival of the Royal Commission of 1847, to effect for wrought iron and steel what was then done for cast iron, was indicated as the best means of obtaining the necessary data for the construction of rules with these objects.

A paper, written by Mr. T. C. Clark and Mr. Macdonald, upon "Louisville and New Albany Bridge," was next read. The paper dealt mainly with the novel features in the superstructure of this cantilever bridge, recently built over the Ohio River.

Mr. W. Anderson opened the discussion by remarking that, in his opinion, English bridge-builders were handicapped by not having any standard form to work to, and he suggested that something of the kind should be provided. It was also important that her Majesty's inspectors should fix a low limit of stress for girders made of steel.

Professor R. H. Smyth (Professor of Engineering at Mason's College) spoke of the difference between pin-joint and riveted-joint structures. Every one, he said, must at once concede greater facility for construction for pin-joints. If a bridge had to be erected in Germany, France, or England, facility of construction was not of such great importance as when it was to be erected in more out-of-the-way parts of the world, and this must be taken into account in any comparison between the two systems.

Mr. Jeremiah Head said he thought the papers were of a useful character. In times like the present, when they were suffering from the badness of the times, there was matter for serious reflection. He had often thought that a great deal more might be done by engineers in availing themselves of the experience which was to be got from contractors in their own workshops. Their greatest constructive experience and mechanical inventions had to a large extent grown up in the workshops throughout the country far more than in Great George-street or any other street in London. This ought to be recognised, and more ought to be done to encourage contractors and manufacturers and others to give engineers the full benefit of their experience and knowledge. The plan of asking contractors to give designs as well as tenders might be carried to the materials of which the things required were made. He did not see why the makers of materials should not be asked to state what tests they would guarantee.

Sir Fredk. Bramwell did not agree with the last speaker that manufacturers should be asked to state what they would supply rather than be asked to conform to specification. The requirements of the engineer being somewhat in excess of the easy production of the manufacturer was one of the best means of ensuring improvements in manufactures. He knew what the tests for steel for guns were at the outset, and he knew how they had been greatly varied. The variations had been largely due to certain conditions which the manufacturers had had forced upon them. The French were able to make a steel projectile which had accomplished in England that which no English projectile had accomplished. He could not help thinking that Mr. Head's suggestion, if carried out, would have the result of leaving them very much in a state of stagnation instead of in a state of progress.

Mr. Bayley Marshall suggested that, instead of placing the factor of safety on the limit stress of any material, they should have a factor of safety which depended on the elastic limit of the material. The means of estimating the elastic limit were now much easier than formerly. It would also be well for engineers to consider the question of the reduction of area at the point of fracture, which was still a vexed question with many manufacturers.

Mr. O. Reichenbach followed with a paper on "Freezing as an Aid to the Sinking of Foundations." The method of freezing the ground in sinking foundations was, he said, patented some years ago by Mr. F. Poetsch, a well having been sunk in this manner as early as 1862. It consisted in freezing the water

contained in the ground, and thus providing a water-tight lining, which enabled the necessary excavations to be carried out without difficulty. The paper gave an account of the manner in which the process was carried out, by passing a freezing liquid down numerous boreholes surrounding the ground to be excavated. After the freezing had been effected, the excavations were commenced, and secured in the ordinary manner, the space between the lining and the excavation being filled with charcoal, &c., to prevent setting fast by freezing. The system was readily applicable in bridge construction, and would at times obviate the necessity of using very large spans. Calculation showed that, to take an imaginary case, the freezing of the ground to sink a pier 60 metres below water level, and 40 metres below the river bed, and having a base 18 metres by 8 metres, would occupy 2,250 hours, and require a cooling effect equivalent to 2,230 cubic metres (or tons approximately) of ice. About 2,900 cubic metres of ground would be frozen in the operation.

"The Latitoe Process of Welding Metals" was dealt with in a paper by Mr. W. Anderson, C.E.

Professor Benton read a paper (before the Geological Section) on "The Surface Subsidence caused by Coal-mining." He pointed out that it is obviously impossible, with the annual output in Great Britain of about 160,000,000 tons of coal, to avoid surface subsidence. This subsidence might be permanently injurious to the agriculturist by destroying the drainage of his land, or even submerging it for a great part of the year under the overflow of the neighbouring streams or rivers. Again, the subsidence might cause permanent injury to buildings by destroying their verticality. These damages might result not only from the removal of the adjacent mineral, but also from the removal of the country provided that if the coal-owner should so use his property as to damage his neighbour's surface property he should fully compensate that damage; and it generally happened that the real damage was quadrupled in the compensation. In order to avoid such damage, direct and lateral support was given to the surface by leaving considerable areas of coal unworked. A small building, standing on an area of twenty yards, might require for its support a pillar of coal of 300 yards square, and 6 ft. thick, weighing about 180,000 tons. This weight of coal would provide lateral support from one seam only. In working four other seams of similar depth and thickness near the same building a total weight of more than 720,000 tons of coal might be left unworked. If it were borne in mind that there were between 2,000 and 3,000 distinct colliery enterprises in this country, it might be safely inferred that much coal was annually left unworked for the lateral support of the surface. This coal was sacrificed for ever, and was a loss to the owner and lessee of the colliery, and also to the nation. Having pointed out the arithmetical principles upon which an economic support might be given to an undermined surface, Professor Benton suggested that some alteration was needed in the common law with regard to the matter, for the sake alike of equity and of economy,—equity because both mineral and building property should have equal protection, whereas at present the mineral interests were sacrificed for the protection of building interests. This preferential protection was, moreover, abused in a variety of ways. For instance, all fractures of buildings due to defects in foundation and construction were attributed to mining operations in the locality. No compensation was allowed to the mineowner for mineral left for lateral support. A better plan would be that the mineowner should give notice to the owner of the building that the latter should put iron bands round the structure during the subsidence, and that the actual damage should afterwards be assessed by the Crown. Thus buildings would be saved, their owners compensated, and the nation enriched to the extent of the mineral rescued.

Professor Hull said that any proposal which tended to economise coal at this day should receive the most careful consideration. Our coalfields were being very rapidly exhausted. Mining enterprise was being accompanied by continually increasing expense, and in the Midland Counties very large quantities of coal were destroyed by being reserved for such pur-

poses as Professor Benton had referred to. Therefore he thought that the public, as well as the mining interest, should welcome any proposal which tended to lessen the amount of coal that was absolutely left in the mine, and which could not afterwards be recovered, or, if it was recovered, which could only be got in a very damaged condition, and with increased cost.

A paper on "The Manufacture of Metal Tubes," by Mr. J. Robertson, of Glasgow, was read (in the Mechanical Science Section) by Mr. Ralph Heaton. The paper described a process for making metal tubes in which a principle of the law relating to the frictional surface-contact of solid bodies being moved over each other is employed, not generally known as a mechanical means of doing work. The process has been in use for about six years in several of the larger tube manufacturing in this country, for making iron and steel welded tubes, and, as the author claimed, has had considerable advantages over processes for the same purpose previously in use. Recently it was introduced in the works of Messrs. Ralph Heaton & Sons, of Birmingham, and adapted to the manufacture of seamless copper tubes. The principle employed is one by which the friction of bodies in contact, which are being moved over each other in one direction, can be greatly reduced. As it is applied to tube mandrels the resistance to a bulb mandrel being passed straightforward through a tube can be reduced to about one-sixtieth by revolving it. Most saving in power seems to be effected when the cross motion is about equal to the longitudinal traverse. The result of the application of this principle to the making of cold-drawn tubes is that they can be made at less cost than by any mode of casting them. The paper went on to describe in detail the process of making the tubes in accordance with the principle referred to. A number of tubes in various stages of manufacture were exhibited to the audience. Described briefly, the process is as follows:—Round bars or "billets" of metal are fixed firmly in a matrix. The "billet" is then pierced to the required diameter by the mandrel which revolves, and is pressed forward with great force. This is accomplished without taking any metal out of the "billet," the metal being laved or spun aside by the mandrel as it forces its way through. This necessarily elongates the metal, and at one thrust a "billet" 2 ft. 3 in. long, is transformed into a "shell tube" 4 ft. long. In this state the shell may be taken to the ordinary draw-benches, and finished into tubes of required diameter.

The President of the Section (Sir James N. Douglass) spoke very highly of the paper, and described the invention as of great value, both from an economical and mechanical point of view.

Several practical mechanicians also spoke highly of the invention.

Dr. R. H. Mill read, in the Geographical Section, a paper on "River Entrances." He said that the want of a proper geographical definition of a river led to considerable difficulty in some cases, when it was of importance to know exactly where the river ended and the sea began. That definition might be supplied by considering the physical conditions of the water. A preliminary classification of river entrances divided them into those connected with inland seas, e.g., the Caspian; those connected with tideless enclosed seas, e.g., the Mediterranean; those connected with tidal seas. River entrances of the third kind were of most interest in this country. A typical river system of the third class comprised a river gradually widening and deepening as it merged into a funnel-shaped sea inlet. Some rivers had no firth, others had neither firth nor estuary; the size, position, and character of each region depending on the ratio between the volume and velocity of fresh water in the river to the size and configuration of the sea-inlet into which it fell, and also to some extent on the weather and on tides. The only British river-system which had been pretty fully investigated physically was that of the Forth. The Clyde, Tay, and Spey had been examined in a preliminary manner; and the Thames, the Bristol Channel, the Wash, and the mouths of the Mersey, Ribble, Humber, and Shannon were worthy of special study. The observations required in such researches as carried on by the Scottish Marine Survey were temperature at surface, bottom, and intermediate depths; den-

sity of the water as a measure of salinity at the same places; amount of suspended matter and transparency; and alkalinity as a measure of dissolved calcium carbonate.

Dr. Mill also read a short paper on "Configuration of the Clyde Water System," in which he gave a topographical description of the natural divisions of the district, and of the true relations in it of land and water.

General F. H. Randall, C.S.I., R.E., read a paper (in the same section) on "The River Systems of South India." He gave an account of the physical features of the peninsula, describing its several mountain ranges and plateaux, its general meteorological phenomena, and the effect which its peculiar configuration had on the quantity of rainfall and its distribution, and then enumerated the principal river basins which served to carry off the rainfall, distinguishing them in their respective types, indicating their relative positions, specifying their respective tributaries, and detailing particulars as to their areas, length of course, prevailing geological formation, and special characteristics. After explaining that the four great delta river systems occupied about five-sixths of the eastern drainage area, General Randall entered on a detailed description of those rivers throughout their respective courses, the phenomena attending their floods, the measures adopted for keeping them under control in the lower or deltaic portions, the character of the estuaries, the formation of the delta, and the great systems of irrigation and navigation which had been constructed therein. In conclusion, he noticed the value of water in India generally, and in South India particularly, both for irrigation and navigation purposes, and enumerated the measures which had been adopted by the Indian Government for the promotion of such works, giving an outline of what had already been accomplished, and of what still remained to be done.

General Sir Henry Thunellier commended the paper of General Randall to all interested in the geography of India, and it was unanimously decided by the Section that the Royal Geographical Society should be asked to publish the paper in their Proceedings.

A paper by Mr. F. de Lesseps, on "The Panama Canal," was read in the Geographical Section by Mr. A. S. White. The author glanced briefly at the geographical features of the Isthmus of Panama, and then referred to the apparent necessity of a means of communication between some of the projects which were entertained from the early part of the sixteenth century, when the geography of the isthmus was only imperfectly known, to the year 1875, when, at the Geographical Congress in Paris, it was decided to begin entirely anew a study of the isthmus, and of the various plans for creating a way of communication from ocean to ocean. As a result of that Conference two naval officers, MM. Reclus and Wyse, were despatched to make a survey and draw up a report. After three years' incessant labour they returned to Paris. A new Congress met in 1879, and decided by a majority of seventy-eight that the canal should be constructed between Aspinwall and Panama, without tunnels or locks, from ocean to ocean. The route of the new waterway would be from the east side of Limon Bay, on the Atlantic side, then by the valley of the Chagres and Rio Grande, towards the Bay of Panama, joining the Pacific near the islands Naos and Glamenca. Its entire length would be seventy-three kilometres, or forty-five miles, and it would be constructed like the Suez Canal, without any obstructions. On the Pacific coast, however, a tidal lock would be built, so as to be independent of the tides. The average depth of the canal would be nine metres below the main level of the ocean. A dam would be constructed at Gabor to regulate the waters of the Chagres. M. de Lesseps anticipated no difficulties in cutting the canal. Two ports would be created, one at Aspinwall or Colon, and the other at Panama. The former was nearly completed, and the latter presented no difficulties. In the work of the canal from 15,000 to 20,000 workmen were engaged, and M. de Lesseps believed that it would be finished by the end of 1889. He then entered into the consideration of the importance of the canal for the commerce of the world in general, and expressed an opinion that vessels aggregating ten millions of tonnage would pass through the canal, paying dues at the rate of 15 francs per ton.

TECHNICAL EDUCATION AND THE
BRITISH ASSOCIATION.

In the Section of Economic Science and Statistics, at the British Association meeting, Birmingham, Sir Philip Magnus read a paper on "Manual Training," a subject which, he said, had been carefully considered by a committee appointed to continue inquiries relating to the teaching of science in elementary schools. They had reported to the Council of the Association that it was desirable to make representations to the Education Department, and suggested that the encouragement for the teaching of handicraft work might take the form recommended by the Commission on Technical Instruction, so that the use of tools in boys' schools might be placed in the same position as practical cookery in girls' schools. It could not be too often repeated that the object of workshop practice, as a part of general education, was not to teach a boy a trade, but to develop his faculties, and give him manual skill, and to familiarise the pupil with the properties of such common substances as wood and iron, to teach the hand and eye to work in unison, to accustom the pupil to exact measurement, and to enable him, by the use of tools, to produce actual things from drawings that represented them. Sir Philip pointed out the collateral instruction that could be given in connexion with the teaching of handicrafts, and showed that while the faculties of the children were being usefully exercised, and the area of their knowledge was being extended, they were at the same time acquiring manual skill which could not fail to be useful to them in every trade. Experiments of introducing workshops in elementary schools had been tried in this country, with results sufficiently encouraging to justify the extension of the system; and on the Continent and in the United States much was done in technical teaching. An enthusiasm was spreading among Americans in favour of workshop instruction, which was likely to have an important influence on the industrial progress of that eminently practical and inventive people. As a general rule, Sir Philip Magnus suggested that children should be required to have passed the fifth standard before being admitted into the workshop. He estimated that not more than 30,000 boys would be ready to receive workshop instruction in this country, and the additional Government grants might be 5,000l. For this comparatively small expenditure about 30,000 boys might be annually sent out into the world from elementary schools with practical skill at their finger ends, and imbued with an aptitude and taste for the real work of their life. The importance of practical teaching, of studying things before words, had been many times urged, but as yet, such had been the inertia of school authorities and teachers, and such the force of tradition, that we were only now beginning to employ the methods of instruction that had been reached for years by the most eminent educational reformers. It was hoped that the committee of the Association would persevere in the representations it had already made on this important subject, and that the labours of the Royal Commission might result in making our elementary school teaching more practical, less verbal, and less mechanical. They asked that in the new Code it might be provided—(1) that the subject be duly recognised, so that no part of the attendance grant be lost in consequence of the time devoted to it; (2) that School Boards be empowered to erect and equip workshops in or near elementary schools for the instruction of children who had passed the fifth or qualifying standard; (3) that grants be paid by the Government on the number of children receiving instruction and making the required number of attendances.

Mr. W. Ripper read a paper on "Technical Instruction in Elementary Schools." Experimental science was almost unknown in our schools, and, as a consequence, the children went out into the workshops and factories crammed with information about moods and fancies, but absolutely ignorant of the elementary principles which would enable them to reason intelligently upon the physical facts and phenomena by which they would be continually surrounded. Systematic science instruction was being given in the Board schools of Birmingham and Liverpool, and with excellent results. The children were interested in their school work; they acquired information which no amount of mere book-reading would give

them; and the advantage of such instruction would be reaped, not by the children alone, but by the whole community. The idea in the minds of many people had been that education was going to save their children from hard work, and the present system of instruction was still in danger of encouraging this notion, and of creating habits and tastes which may unfit the mind for the work before it, instead of fitting and aiding it. There could be no greater fallacy than to imagine that any boy was too good for the workshop. The workshop urgently needed these very boys, and if the public elementary school was not helping to enlist its best talent on the side of skilled labour, we were not on the right course. A more practical system of instruction was destined to grow and to occupy an important place in our educational methods of the future, the aim of which would be, while sacrificing none of the present advantages, to enable the schools to render more efficient help than in the past, to the nation's industrial progress.

The Rev. H. Solly read a paper on "Technical Education," in which he urged that the apprenticeship system having for the most part broken down, the practical training of the workshop must be supplemented by the combined practical and scientific teaching which can be given only in the class-room. Systematic and scientific instruction in the principles which underlie all manual industries, and the application of those principles to the material of each handicraft, is essential for thorough technical training, and can be given only by class teaching, not in the workshop. At present it is apparently no one's interest, nor legally any one's duty, and certainly no one is in general qualified to give this instruction to apprentices or youths; while it too often appears to be the employer's interest to keep the lads in particular grooves of work, from which they learn nothing but very limited routine dexterity. Other nations have long since acted on a wiser system, and we are feeling the consequences. The remedy is to secure systematic and thorough technical training for the rising generation of artificers, by referring to a regular system of "indentured apprenticeships," whereby the employers, if they take lads at all into their workshops, shall be bound to see that they attend technical training classes for a certain number of hours in the week during the first three years of their apprenticeship. The increased value of the services of the apprentice during the remainder of his term, and in some cases money premiums, should recoup the employer.

A paper on the "Economic Value of Art in Manufacture," by Mr. Edward R. Taylor, was read for him in his absence. The lack of beauty in many English manufactures arose not so much from bad taste on the part of the purchaser as from the producer's want of artistic culture. In that case supply must precede demand. Manufacturers too often ignorantly regarded art as an adjunct, instead of an essential, to their wares. Art, on the contrary, should be studied with as much daily care as the other branches of the manufactory. Facts were adduced to show that it is only when such care had been devoted that the work would live and be most peculiarly profitable; and the attention which on former times was given in this direction was contrasted with the comparatively small amount of thought now, in several instances, devoted thereto. Artistic manufactures might be advanced: (1) By the encouragement of all hand manufactures and decoration; (2) by counteracting the apparently natural tendency of machinery and other inventions to vulgarise art by the inordinate use of ornament of a poor character; and (3) by making the training of the eye and (by the use of tools) of the hand an essential part of education from the beginning of school life.

A discussion followed, in which Mr. Fellows, Mr. G. Hurst, Mr. W. Botley, Mr. Spratling, and Dr. Gladstone took part, and objection was expressed by some speakers to any increased grant for purposes of technical education.

Sir P. Magnus, in replying, said having regard to the system of elementary education they had adopted, unless the Government took up the subject of manual training it was not likely to be dealt with. He had desired to point out in his paper at how small a cost this could be done.

THE COLOURS OF METALS AND
ALLOYS.

In connexion with the Birmingham meeting of the British Association, on Saturday evening last Professor W. C. Roberts-Austen, of the Royal Mint, delivered, in the Town-hall, to a very large audience of working people, a lecture on the "Colours of Metals and Alloys." Sir W. Dawson, C.M.G., President of the British Association, occupied the chair.

Professor Roberts-Austen stated that under the title of the lecture he intended to include the consideration of the principal facts connected with the colours of metals and alloys, whether natural to them or produced by metallurgical art, as well as a brief examination of the kind of influence which the colours of metals appear to have exerted on the history of chemical science. With reference to the recognition of colours of metals by the ancients, he referred to the view expressed some years ago by Mr. Gladstone, "that the starting point is absolute blindness to colour in the primitive man," and he urged that, if this be true, it is strange that in the metal-work or fabrics of savage nations, the arrangement of such colours as they can obtain should be so thoroughly "understood," and the colours themselves so discriminately employed. Allusion was then made to the ancient belief that the seven metals known to the early chemists were specially connected, as regards colour, with the seven principal planets; to the persistence with which this belief survived, and to the fact that Sir Isaac Newton did not escape the charge of leaning towards mysticism when he stated that seven colours resulted from the decomposition of light by the prism. In relation to the influence of the colour of metals on the history of science, it was pointed out that from the third to the seventeenth century the colour of gold appeared to haunt men, and induced the alchemists to make the strangest sacrifices, even of life itself, in the attempt to produce it. The alchemists were sustained by the knowledge that the colour of metals could be destroyed by small traces of impurity, and an appeal was made to the argument of even the "sceptical chemist," Robert Boyle, in the seventeenth century, that transmutation of base to precious metals is possible, because he destroyed the colour of gold, and believed that he had degraded gold to a base metal by the addition of a small quantity of a substance "given him by a stranger," "it being," as Boyle said, "no small thing to have removed the bounds which nature has industriously set to the alteration of things." In illustration of the apparent degradation of gold by the presence of a small quantity of certain other metals, Professor Roberts-Austen melted 200l. of sovereigns, added a tiny shot of lead, and proved that the bar into which the metal was cast was very brittle, and entirely different in colour from the original gold. The dependence of the colours of metals on their physical state of aggregation was then illustrated by some beautiful experiments with leaf-gold and with Faraday's finely-divided gold of bright ruby colour. The lecturer then passed to the effect of colour produced by alloying metals by melting them together. He incidentally said that he had many inducements to speak about brass, in particular he would have liked to dwell upon the beauty of such work as that of the great craftsman (William Austen) who, in 1460, made the magnificent monument in brass to Richard Beauchamp, Earl of Warwick, and he was glad to remember that the first patent for the manufacture of brass in England had been granted to W. Humphries, an assay-master of the Mint, and a predecessor in the office he (Professor Roberts-Austen) was privileged to hold, but he did not, he said, intend to say much in Birmingham of the coloured alloy of zinc and copper which was its staple industry. His object was to claim the attention of the metal-workers of Birmingham to the coloured alloys of copper with which they were less familiar, and he referred at length to the alloys which had been used for centuries by Japanese art metal-workers, the images of typical specimens of whose handicraft were projected on a screen. Special reference was made to a large plaque of copper inlaid with foliage, which in colour suggested the glories of a Canadian autumn, and it was stated that the addition of small quantities of gold, antimony, and cobalt to metallic copper enabled the Japanese to

secure each beautiful shade of colour of purple, golden browns, and reds, for which their art metal-work is so remarkable. In illustration of the effect of various "pickling" solutions on copper, Professor Austen had himself prepared a trophy, 7 ft. high, of richly-coloured leaves. Attention was then directed to the singular banded alloy known as moku-me, the manufacture of which, now almost abandoned by the Japanese, Professor Austen is anxious to see introduced into this country, and he projected on the screen the image of a dagger-hilt of old Japanese native workmanship, in which, as a *tour de force*, the artist has reproduced the purple and brown markings of a "scarlet runner" bean. A brief reference was made to the fact that the electro-metal-lurgist has at command, in the power of being able to deposit coloured alloys, an equivalent of the varied palette of the decorator, and admirable specimens of coloured alloys, deposited by Messrs. Elkington's well-known firm, were exhibited. It was incidentally stated that one firm deposited annually six tons of silver in thin films which, if continuous, would, it had been calculated, cover an area of 140 acres. Professor Roberts-Austen then showed experimentally, by projection on the screen, the formation of coloured films by heating lead in air, and he claimed that the formation of a coloured calx of lead by heating the metal in air had been more frequently appealed to in support of various sets of views than any other fact in the history of science, from the time of Geber in the eighth century to that of Priestley in the eighteenth. This experiment was of special interest to Birmingham, because, performed in a rougher way, it had directly led Priestley to the discovery of oxygen, and had removed his doubts as to the aerial source of the oxygen he obtained from other substances. Professor Roberts-Austen concluded with a sentence from Mr. Ruskin's "Modern Painters" as to the right enjoyment of colour, and with a plea for the more careful study and extended adoption of coloured metals and alloys in objects intended for daily use, and for the restricted employment of gold and silver to their legitimate purpose of enriching metallic ornament.

THE TRADES' UNION CONGRESS.

THE nineteenth annual Trades' Union Congress was commenced on Monday last at Hull. The retiring President (Mr. Maudsley) received the delegates, who were also formally welcomed to the town by Mr. H. H. Biggs, the Sheriff of Hull (acting for the Mayor, who was absent through indisposition).

Mr. Maudsley, in addressing the Congress, said, with regard to the condition of the labour market, that affairs were about in the same state as at the close of the last Congress held at Southport. Seeing that the wealth of the world, absolutely and relatively to the population, was as great as ever, they ought to address themselves to the consideration of some remedy for the great lack of employment now existing. In his opinion, working men were at the present time working too many hours,—not that they were producing too much, but that the production was by the hands of too few people. They could not have too much production, but the result of the present system was that many men, being excluded from a share of the labour in the market, were unable to purchase their share in the produce of the world. Too few people were in the position of producers. If the many people could not purchase the products of those at work, they became a double drag upon the employed, as well as unable to secure that self-respect due to British workmen. Having stated that the Congress was willing to assist struggling trade unions, and to help respectable workpeople to form labour unions, he said that, in view of the condition of the labour market, the present Congress was the most important held since the first held in 1868. He had the honour of being present at the recent International Trade Congress in Paris, and was glad to find that the revolutionary ideas formerly somewhat prevalent were giving place to trades-unionist ideas. The younger class of French artisans were forming organisations on the British system, and it seemed to him that united action on the part of European workmen was now nearer at hand than before.

The following officers were elected:—President, Mr. F. Maddison, Hull; vice president,

Mr. J. Judge, Leeds; secretary of Congress, Mr. K. G. Wilkinson, Hull; auditors, Mr. Elvidge, Hull, and Mr. Pickard, M.P., Barnsley. Standing Orders Committee: Messrs. J. Wilson, Durham; J. Battersby, Glasgow; J. Swift, T. R. Threlfall, Southport; and C. J. Drummmond, London.

Mr. George Shipton, secretary *pro tem.* of the Parliamentary Committee, presented its annual report. In this the committee regretted that, owing to the unprecedented political vicissitudes of the past year, they were unable to place before the Congress that record of Parliamentary successes which, under more placid conditions, might have been possible. Workpeople had been pressed by difficulties on all sides. The continued depression in almost every industry had had its serious effect in reducing their funds, testing seriously the allegiance of members, as well as the solidity of their organisations. It might, however, be truly said that in proportion to the severity of the trial had the self-reliance and value of the institutions been demonstrated. The committee proceeded to state what had been done in relation to the resolutions passed at the last Congress. First, with respect to the Employers' Liability Act, which would lapse in 1887, the Select Committee appointed by the House of Commons had presented a report which contained very valuable, although probably inadequate, recommendations as to what the future Employers' Liability Act should be. It was satisfactory to note their resolution that the Act should, with its amendments, be permanent. The committee urged the expediency of reintroducing Mr. Burt's Bill to prevent workmen contracting out of the Act. They regarded it as an imperative duty to call, through the Congress, the attention of the industrial population of the country to the great benefits they had in so many cases derived from this one measure. In the first instance there had been great caution exercised by employers in consequence of responsibility, and this had resulted in greater protection to the lives and limbs of those they employed. The number of cases tried in County Courts during the five years 1881-5 had been 882, and the amount awarded 34,362*l.* The number of cases removed to higher courts was twenty-one, and the number of cases settled out of court 249. In regard to factory and workshops inspectors, it was remarked that, should the expediency of workmen appointments not receive due attention, it would be necessary to continue the strongest pressure in the right quarter in order that the law might be made a living reality, and not a dead enactment. The resolution requesting the committee to induce the Government to make eight hours the maximum working day in all their departments and workshops had received the best attention of the committee. The immediate realisation of this request, however, they found would be hopeless. The whole question was involved in complications. There was no doubt, however, that under the present system a pernicious process of systematic overtime was frequently brought into operation in the dockyards and arsenals, and that about every four men employed shut out by working overtime a fifth, who was thus denied the opportunity to live by his industry. After expressing satisfaction at the recent appointment of workmen to the magisterial bench, the committee referred to the newly-established Bureau of Labour Statistics, and congratulated the Congress on the choice of Mr. John Burnett as official correspondent. A number of other subjects were referred to as having occupied the attention of the committee, though no progress was chronicled during the past year. They closed by an expression of alarm that, owing to unlimited competition, nationally as well as internationally, intensified power of production, and a rapidly-increasing population, the power to live by labour was becoming, under existing conditions, more difficult year by year. Trades' unions had only begun their work. They must in future endeavour to be equal to the several necessities and aspirations of the workers, or they would not be exempt from the law of supersession and decay which attended even empires when their industrial populations were allowed to fall into want and misery.

The reading of this report having been concluded, the Congress adjourned.

On Tuesday morning there was a full attendance of delegates, who, it was reported,

numbered 143, representing trade unions with an aggregate membership of 643,000. Amongst them were several female delegates.

The President (Mr. F. Maddison), in his address, said they were met at a time when thinking men of all classes were looking into the questions which affected the well-being of the people. Amidst this activity it was essential that the working classes of this country should have leaders able to guide them into the paths of safety and prosperity, and secure for them those rights which had too long been withheld. In his opinion, nobody had such a claim to be the leaders of the workers of this country as the Trades' Union Congress. It stood as the only representative of British Trades Unions in the aggregate. To perfect its mode of operation, and make it still more effective for the good of the toilers, were objects worthy of their best energies. He trusted that in the future the trades of the kingdom might even to a greater extent unite with the Congress. Splendid as had been the records of Unionism in the past, and in spite of the benefits conferred by its influence on the skilled workers of the country during the last twenty or thirty years, they must, nevertheless, as candid men, admit that the condition of the workers generally was far from satisfactory. Discontent was general. Political economists might say what they liked, but it could not be the will of Providence that the labourer should be doomed to toil that others might enjoy the products of his industry. He thought that one of the first steps taken by the Congress should be in the direction of the eight-hours movement. While there were large numbers of their fellow-workmen unable to find employment, it became them to see whether the number of hours worked could not be so shortened as to secure them work. The adoption of the eight-hours system would lead to the employment of probably half a million more people. Additional employment would also be available if a stop were put to systematic overtime. As for foreign competition, that must be prevented by more missionary work on the Continent on the part of English trades unions, and by increased means of technical education here. Much of the existing congestion in the labour market he traced to the tendency, so marked of late years, of our agricultural population to crowd into the large centres of industry, because they could not live in the country. To remedy this, the land laws should be amended, if not entirely remodelled, in the direction of land nationalisation. As for emigration, that ought only to be promoted if there was a reasonable prospect of the emigrants benefiting themselves, and not congesting the labour markets of the colonies. He regarded co-operation as a legitimate development of trade unionism, and urged that everything possible should be done to encourage and establish the system. He desired also to see the federation of trades carried further, and labour more directly represented in Parliament.

The Employers' Liability Act.

Mr. J. S. Murchie (Manchester) moved: "That this Congress bails with satisfaction the prospect of the Employers' Liability Act receiving the attention of Parliament at an early date. It nevertheless urges the Parliamentary Committee to persevere with the matter until a perfectly satisfactory measure is secured, which must contain the principle of Mr. Burt's Bill, rendering any contract out of the Act no bar to action for recovery of compensation for injury."

Mr. W. Hey (London Ironfounders), who seconded the resolution, complained that employers, by insuring themselves against claims made under the Act, lessened the motives for carefulness, and avoided the low costs which the workmen had to face in these cases.

Mr. Holmes (Leicester) adduced reasons why the Act should be made obligatory.

Mr. C. Bloor (Burslem) represented that insurance against the liabilities of the Act was unavoidable in the cases of small employers.

Mr. Drummmond thought the Parliamentary Committee of the Congress might be empowered to afford workmen legal assistance in claims under the Act.

Mr. Mosses (Glasgow) was opposed to the Act being made compulsory. The number of men who had obtained compensation under it was small compared with the number who had sued their employers, and the comparatively few who had actually obtained compensation were

little to be envied, after the costs, delays, and uncertainties of the law. A well-considered scheme of insurance, contributed to by both workmen and employers, would be much preferable. He believed that 90 per cent. of the accidents were attributable to the negligence of the workmen themselves.

Mr. Benjamin Pickard, M.P. (Barnsley), protested against this last allegation. While he had no objection to insurance schemes against accidents, he held that the Employers' Liability Act should be made compulsory. If the Act was necessary at all, everybody should get the benefit of it. It was mainly valuable in its tendency to prevent accidents, and not for the money compensation it provided for the sufferers.

The resolution was carried unanimously. We may have more to note about the proceedings of the Congress in our next.

ARCHITECTURAL ASSOCIATION SATURDAY VISITS.

The Architectural Association on Saturday, the 3rd inst., made an afternoon visit to Kent Hatch, Westerham. This house was built three years ago from the designs of Mr. M. Macartney, who met the members, and conducted them over the house.

The general arrangement consists of a long corridor or gallery, out of which lead the drawing and dining rooms, the staircase being at the opposite end to the drawing-room, and the entrance-hall in front of the staircase. The dining-room is a very picturesque room, with plain oak ceiling, and tapestry-covered walls, the fireplace being arranged in an angle nook, and one end of the room having a raised floor, with an oak arcade and balustrade. From this raised platform, a door leads to the wine-cellar staircase and small room at the back of the fireplace. The drawing-room has a magnificent view across the Weald of Kent. The staircase, which is of oak, is separated from the gallery by an oak arcade. On the half-span is the billiard-room, with separate staircase to the entrance-hall; and on the first floor are a studio and bedrooms. The general treatment of the elevation, with half-timber work—the timbers being of oak, and some of the walls weather-tiled—is a very clever rendering of the type of Kentish homestead.

After leaving Kent Hatch the church at Westerham was visited. The whole of the work of the church is Late Perpendicular, with very poor detail. The nave arcades have very wide arches at the east end, and they, springing from a lower level than the western arcades, have pushed the columns out of the perpendicular, and have a very awkward effect. There are a few interesting monuments in the church, one to General Wolfe, who was born in Quebec House. This house, which is close to the church, and which can be best seen from the churchyard, is a picturesque mass of gables. The interior was not visited.

CASE UNDER THE METROPOLITAN BUILDING ACT.

At the Hammersmith Police-court, a summons was heard before Mr. Paget, on the 3rd inst., taken by Mr. T. E. Knightley, District Surveyor for Hammersmith, against Mr. H. McCowan, of West Hampstead, for having resumed and carried on works to four blocks of artisans' dwellings in the parish of Hammersmith, which had been abandoned by a builder named Scott, without giving notice as directed by sec. 38 of the Act.

Mr. Knightley stated that he had twice asked for the notice, but without effect. The buildings were carcasses at the time they were resumed by defendant; the doors and window-frames remained to be fixed, hearths to be laid, and brickwork to be built to coppers and sleeper walls. There were errors in the work, and he could not proceed for amendment until notice had been given by defendant.

A Barrister appeared for the defence, and alleged that the work above referred to was "internal decorations," and called witnesses to show that no structural work remained to be done by Mr. McCowan, who had done nothing which brought him within the Act; but Mr. Paget, after a long hearing, said that the works named by Mr. Knightley were clearly such as required notice. It was an obstinate and determined attempt not to obey the law. He fined the defendant 10*l.* penalty and 20*s.* costs.

THE ROYAL ACADEMY.

SIR,—Mr. W. H. White's letter in the *Times* of the 30th ult. expressed his personal views only, and was written without the authority or knowledge of the Royal Institute of British Architects.

G. AITCHISON.

GATES AND TRICYCLES.

SIR,—I beg to make a suggestion as to gates, the following out of which would often enable an owner of house property to let his house in preference to others in the neighbourhood, with equal advantages in other respects.

So many householders own tricycles now that a wide gate has become almost a necessity, say, not less than 45 in. Room should also be given in the same manner at the side of the house, in order to allow the tricycle to be taken into the back premises.

THE ANGLO-DUTCHMAN.

The Student's Column.

STONE QUARRIES.—XI.

THE CHANNEL ISLANDS (CONTINUED).

Guernsey.

THE quarries here were first extensively worked about fifty years ago. Nearly all of them are situated in the northern half of the island. The stone obtained is described by some as being all granite, and by others as all syenite. As a matter of fact, although syenite is quarried, yet by far the greater quantity of stone raised is hornblende granite. It is, however, of quite different appearance from the hornblende granites of Jersey or Leicestershire, being either a dark green or grey colour.

In examining a large collection of Guernsey stones, one is often met with the difficulty of discriminating the difference between the syenites and the hornblende granites, owing to the variable occurrence of the mica. Sometimes it is a very distinctive feature in the rocks, and at others, is so rare as to rank only as an accessory mineral. From this it will be seen that the quality of the stone is also variable, a fact that should be borne in mind by those who habitually regard Guernsey "granite" as of one quality only. There can be no doubt that the road-metal and kerbstones obtained from this island are, generally speaking, first-rate; but uniform quality must not be expected, even from such a limited area as that now under consideration.

Then, again, the grain of the rock differs considerably in some cases, even in that obtained from the same quarry. The hornblende ranges in size from mere microscopic specks up to crystals half an inch or more in length, and often so predominates as to cause the stone to be made almost wholly of that mineral, which has a high specific gravity. We notice that several veins of hornblende rock occur in the island, and in one large quarry crystals of hornblende and schorl were distributed in the ground mass, in a very conspicuous manner. Quartz never occurs here in large crystals, and the mica is generally represented by very little flakes. The felspar appears to be mostly triclinic, of white or light green, and exceedingly minute; orthoclase is found in the rocks from the western side of the island. Iron pyrites is often seen in the coarser varieties, and in the schorloseous veins just alluded to, it occurs in lumps an inch or two in diameter.

The finer-grained rocks all agree in being very tough and compact, especially when mica is rare or absent, and this is why they are so eminently suitable for road-metal. The "crushing weight" of Guernsey granite is occasionally quoted on this side of the water as though all the stone were obtained from one quarry, of uniform structure, and capable of bearing exactly the same stress, neither more nor less. As the student will see, this is a great mistake, and the sooner it is acknowledged the better. The resistance to crushing in rocks of such variable structure must vary considerably, and many more experiments will have to be made before anything like satisfactory conclusions can be drawn in regard to their strength. Until that time arrives, those engineers and surveyors who have not made up their minds that the number of recorded experiments is wholly inadequate to express the practical utility of much of the stone, may safely arrive at that determination. Probably, that time

will never come, and, as regards the material obtained from quarries exclusively worked for road-metal, we do not think that such experiments are needed (see *ante*, p. 147).

"Granite" is the chief export of the island, and its magnitude and importance may be seen on going to St. Sampson's Harbour, a place about two miles north of St. Peter Port. Here is a magnificent harbour, in which ships are being filled with granite, stupendous stacks of pitching and kerb stones, and huge heaps of broken stuff being in readiness for shipment. We are informed, on good authority, that the total amount of stone annually exported from the island is not less than 220,000 tons. In the year 1885 it was as follows:—

	Tons.
From St. Sampson's Harbour ...	197,000
From St. Peter Port	17,782

214,782

Of this, Guernsey vessels alone took 120,000 tons. It is sent principally to London and to towns in the south of England and Wales.

In describing granite areas, we have hitherto given the names of the quarries and the particular kinds of stone obtained therefrom, but if this were attempted to be done with Guernsey, we should not only present the student with a long list of French names, which would be decidedly unprofitable, but considerable tautology would be inevitable in the description of the rocks. To get an idea of the great number of quarries here, one has only to look round on all sides at the multitude of windmills, so close together. These windmills, as a rule, mark the existence of quarries, for they are used to pump the water up from the bottom of the workings.

Large quarries, such as the Juss and Baudigny, have powerful steam cranes at work, which are used to lift carts from the road at the top of the quarry, to the floor of the workings, where they are filled, and lifted up again to places where horses are in waiting to take them away. This saves a considerable amount of labour. It is a curious sight to see the carts hitched on, swung round, and suspended in mid air over a deep precipice, down which the men at work look like dwarfs. There is an incessant din created by the noise of the hammers, chisels, and crowbars of the workmen, reverberating against the solid walls of the wide gulf.

Both powder and dynamite are used in blasting the stone, but we saw no rock-drills at work, and were informed that they are not used in the island. Surely they might be advantageously employed.

Herm.

The stone obtained from Herm is very similar in appearance to that of Guernsey. It usually contains mica, in addition to the other three minerals, and most of it might be described as hornblende granite. It is used chiefly for paving.

ABERDEENSHIRE GRANITES.

The granite quarries in this part of Scotland are unquestionably amongst the most important in the United Kingdom, and stone from some of them has been sent into the market for the last century.

Aberdeen granite is known, not only in Great Britain, but in many foreign countries, even as far as the antipodes. The quarries are situated on two distinct masses of granite, which differ from each other in a marked manner. Those on small and isolated patches we shall refer, as usual, to the nearest main mass with which they appear to be related. The two principal masses we shall designate (1) the Aberdeen district, and (2) the Peterhead district. Generally speaking, the Aberdeen granite is of a grey or light blue colour, and the Peterhead pink or red. There are exceptions, however, to these rules.

The rock of the former district in some places shows a rough tendency to foliation, and would, perhaps, more correctly be called granitoid gneiss. It presents the appearance of rock that has undergone extreme metamorphism. It is incorrect to allude to this foliation under the term stratification (as is very often done, even by those in the quarries), with which it does not necessarily bear any relation whatever. Foliation is that structure, generally independent of stratification, in which the rock mass is formed of thin laminae or folia, each of them consisting of separate mineral layers or crystals, arranged in parallel bands, and with their longer axes placed lengthways, coincident with the laminae. The cause of

foliation, like cleavage, is apparently connected with pressure.

As we have previously pointed out, true granite is an igneous rock, produced in some cases by excessive metamorphism of both sedimentary and igneous rocks, and in others we have no evidence that it has resulted from the alteration of other rocks, but may, perhaps, originally have been of igneous origin.

We desire to dwell a little on this point, as it affects Aberdeen granites particularly. When, by reason of superincumbent pressure or otherwise, sedimentary and stratified rocks are highly heated, they gradually begin to change their form, being assisted in the process by very hot water, which thus has its power to do chemical work increased. Clay is turned into slate; sand and sandstone into quartzite; and limestone becomes highly crystalline. When these rocks, not being wholly free from foreign matter, are subjected to still greater pressure, all traces of former planes of stratification are lost, according to the degree of alteration induced. Now, if we take the roughly-foliated Aberdeen rock alluded to, it will be seen that pressure has altered this rock still farther even than gneiss; in other words, it is gneiss just on the point of melting, and if it had proceeded a little longer, when consolidation set in, it would have become true granite. As it is, however, it is neither one nor the other. That part of the mass which has undergone such complete metamorphism as to have become true granite, often has small masses of gneissose and schistose rock in it.

Dr. James Geikie, in a paper on the metamorphic origin of granite, states that in the grey granite of the southern uplands of Scotland, he finds "nests" of altered rock, consisting of dark fine-grained or semi-crystalline rock, often showing traces of lamination. Sometimes, there is a sharp line between the granite and the included fragments; at other times, the passage is gradual. They may be remnants of thin bands or beds of shale interleaved in the original strata, from which the granite has been derived by metamorphic action; for, if they were fragments broken off, they should be more abundant near the junction, which they are not. He concludes that these granites have resulted from the alteration *in situ* of certain bedded deposits.*

There is, no doubt, much truth in this, and the roughly-foliated masses of Aberdeen granite may be looked upon in a great measure as the remains of metamorphic rocks, they having withstood the action which caused other rocks in the vicinity to become true granite.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,150, Paperhangings. W. Scott.

The paper is prepared with starch or paste; and mica or talc which has been calcined is caused to adhere to it. The paper is also printed with designs in the ordinary way, and is passed through hot calendaring rolls, which operation gives it a silky appearance. It is also washable, or at least may be cleaned by simply rubbing with a flannel or cloth.

8,314, Copings and Gutters. S. Watson.

This invention is designed to obviate the dripping of water from the copings as ordinarily made, by making a kind of coping and gutter combined, which is fixed in the usual way to the top of the wall. The central portion of each block is made of such a shape that the rain-water will flow therefrom to the sides of the block, which are made in the form of gutters, the ends of each overlapping, and the water being led away as in a fixed gutter.

7,675 and 7,676, Cements. H. Mathey.

The first of these specifications relates to the manufacture of cements, and claims to effect an improvement by first crushing the natural cement stone to a suitable degree of fineness, then thoroughly mixing crushed clay with the stone, and burning these elements together, and adding, separately to form an oxide, and finally pulverising the stone, clay, and oxide together. The second specification refers to a method of colouring cement. A dark-coloured cement is usually preferred, as this indicates an excess of sand. Light-coloured rock cement may be improved and darkened as well by adding oxide of iron before the pulverising, when it is added throughout the cement, which then takes a homogeneous tint.

4,331, Pavements. W. C. and E. F. Mardock, Washington, U.S.A.

Paving blocks or tiles are bevelled outwards from top to bottom on two opposite sides, and in the

opposite direction on the other sides. When the blocks or tiles are moulded, wedges or wedge pieces are fitted into grooves in the mould, which allows the block to be taken out. The idea seems to be the dovetailing of one edge of the tile into that of the next in position.

5,122, Domestic Fireplaces. J. Bonny.

The improvement is simply connecting open domestic fireplaces with the chimney by a short pipe, contracted in the centre to produce a quick draught.

4,795, Flushing Drains, &c. S. H. Adams.

The drain is dashed intermittently and automatically by a tank and syphon. Any grease or sediment is intercepted by a trap before reaching the tank.

NEW APPLICATIONS FOR PATENTS.

August 27.—10,944, J. Starley, Screws and Screw-drivers.—10,954, W. Copping, Stay for Casement and other Windows and Doors.—10,950, M. Benedict, Removing old Paint.

August 28.—10,977, J. Royle, Gas Brackets, Chandeliers, &c.—10,983, W. Moseley, Electric Bells.

August 30.—11,023, F. Wicks, Paving, Flooring, or Building Material.—11,027, J. Sutherland, Ornamentation of Walls, Ceilings, &c.—11,030, F. Northall, Hinges.

August 31.—11,062, W. Johnson, Hinging, Raising, or Lowering Window-sashes.—11,076, J. Morson, jun., Locks for Doors, Windows, &c.—11,086, J. Goschbauer, Portable Buildings.—11,091, J. Anderson, Bricks, Tiles, &c.—11,092, F. Garon, Securing Door-knobs to Spindles.

Sept. 1.—11,121, H. Harris, Automatically Securing Windows.—11,151, E. Harris, Casement Windows and Metal Frames for same.

Sept. 2.—11,170, J. Watson, Ventilators.—11,171, C. Mapleson and W. Rolls, Monumental Slabs.—11,183, C. Snell, Shovel.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,747, J. Aniello and Others, Anti-fouling and Preservative Paint or Varnish. 9,395, T. Wood, Controlling the Opening and Shutting of Doors.—9,829, J. Tucker, Window-fastener.—9,881, H. Johnson and T. Bessant, Fastener for Window-Sashes, Doors, &c.—9,935, J. Annandale, Stoves, Fire-grates, Kitchen Ranges, &c.—10,167, P. Fezerich, Artificial Asphalte.—10,207, J. Garrio, jun., Excavators.—6,235, W. Pringle, Cutting, Mitring, and Cramping up Mitres of Mouldings.—10,130, C. Wharton, Automatic Window Sash-fastener.—10,168, H. Haddan, Door and other Hinges.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,347, G. Blake, Sash-fastener.—10,378, G. Atkins, Furnace for Burning Stained or Painted Glass.—12,620, F. Morris and J. Fox, Securing Sliding Sashes.—13,115, J. Haylor and Others, Manufacture of White Lead.—13,159, J. Pinton, Anti-fouling and Anti-corrosive Paints or Compositions.—13,891, J. Freeman, White Pigment.—12,164, R. Johnson, Combination Ladder and Steps.—13,130, J. Deeley, Water-closet and Urinal Basins or Pans.—13,327, J. Green, Dry Closets.—13,354, E. Aldous, Water-closets, Baths, Sinks, &c.—13,428, G. Kennedy, Coupling Ladders.—14,981, W. Reid, Pneumatic Chimney Cowl and Ventilator.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUGUST 31.

By VIDLER, SON, & CREMITS.
Shortlands, near to The freehold residence known as "The Valley," and 10a. 3r. 36p. £3,500

By COLLYER & COLLYER.
Notting Hill—6½, six acres, 77 years, ground-rent 7l. 10s. 300

SEPTEMBER 2.

By WORSFOLD & HAYWARD.
Kent, near Dover—Aucledure (land, 7a. 1r 15p., freehold), 1,603
Freehold farm house, adjoining 700
Three freehold cottages 400
"Bay Cottage" and "Lavinia Cottage," freehold 650
"Bridge Cottage," and four plots of land, freehold 900

SEPTEMBER 3.

By F. CHERTLEY.
South Hackney—34, Auctioned, 20 years, ground-rent 3d. 250

Science Classes in South London.—For the especial advantage of the working-men of South London science classes are about to recommence at the Royal Victoria Hall, Waterloo-road. The fees are very low, merely nominal, in fact, so as to place them within the means even of the poorest. Classes will recommence in the first week in October in mathematics, geometry, arithmetic, drawing (including machine construction), electricity and magnetism, chemistry, animal physiology, and political economy; that is, provided sufficient students are found to join for each class. Intending students should give in their names at once.

Miscellaneous.

Puddling Clay.—It is stated in the *Aberdeen Free Press* that Mr. Thomas Fraser, of King-street, Aberdeen, has discovered a new method of preparing clay for preventing leakage in reservoirs, water tanks, &c., and has taken the necessary steps to have his invention patented. Hitherto it has been the general practice, when clay has been used in connexion with the construction of waterworks, and for other similar purposes, to apply it in a thoroughly wet and plastic condition. From a series of scientifically-conducted experiments, Mr. Fraser has come to the conclusion that far better results can be obtained by drying the clay, and reducing it to a fine powder, before applying it to the bed of a reservoir or to anything which it is desired to render watertight. A long connexion with the brick and tile business led him to study closely the properties of clay, especially when used as a preparation out of which a variety of articles had to be manufactured. He learned from observation that in a wet state clay had reached its extreme point of expansion, and that water would then filter through it. Having ascertained this fact, he concluded that if clay were used for puddling in a dry compressed state it would absorb a certain percentage of water, expansion naturally following, and rendering the layer water-tight. The greater the pressure of water the more satisfactory the results are said to be. Mr. Fraser began his experiments by selecting his clay from a special bed, out of which he cut a square. The specimen was carefully measured and weighed. After it was thoroughly dried, its dimensions and weight were again taken, when it was found that the clay had lost 25 per cent. in weight, while the shrinkage was 10 per cent. Clay in this dry state is extremely hard and compact, and if put into water and not allowed to expand, it would require a long time before water would penetrate to the centre of a 3-in. tube. Another specimen of clay, from the same bed as the former one, was dried, and reduced to a fine powder. In this loose condition it absorbed about 75 per cent. of the water, which filtered through it. When the clay was prevented from expanding, it was found to absorb 50 per cent. of water, which filtered a little. Powdered clay to the depth of 6 in. was pressed into a tube, 8 ft. long by 3 in. in diameter, and having 2 in. of perforated zinc at the bottom. The tube was then filled with water, with the result that the clay absorbed 35 per cent., but there were no traces of filtration. Mr. Fraser is confident that the method he has hit upon, besides being more efficient, is also more economical in every way than the manner of using puddled clay now in vogue. He is sanguine that it could be beneficially applied in covering arches, in preparing a perfect bed for street casewaying, or, in fact, for the prevention of leakage in any description of work that has to be made waterproof from internal or external pressure.

A New Watrving-Place and Building Estate in Essex.—The county of Essex is about to have another sea-side resort added to those which it already possesses, and a preliminary step in the promotion of building on the estate took place on Monday last. The Marine and General Land Company have recently purchased a freehold estate at Priton, known as Priton Haven. It is situated between Clacton-on-Sea and Walton-on-the-Naze, about three miles distance from the former and a mile and a half from the latter place. The estate covers an area of between 300 and 400 acres, and stands upon elevated ground, about 60 ft. above the sea level, having a commanding view over the German ocean. Several roads, upwards of twenty in number, are at present in course of formation on the estate. Of these roads, Harold, Cromwell, Holland, Kirby, Handford, and Idlesleigh roads have already been constructed, together with Station-road, which is intended to be the principal business artery in the place. In this road a range of about twenty houses and shops is now in course of erection, also an hotel facing the sea, at the corner of the Marine Parade and Cromwell-road, whilst several houses are likewise in progress of building on other portions of the estate. The esplanade and marine drive facing the sea stretch from east to west to the length of about a mile and a half. Amongst the works about to be carried

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Door Superintendent.....	Stockton Corporation.	10M.	Sept. 13th	xvi.
Clerks of the Works	Manchester Jubilee Ex.	Not stated	Sept. 14th	xvi.
Work of Works	Civil Service Com.	do.	October 7th	xvi.

Indoor Superintendent.....	Stockton Corporation .	10M.	Sept. 13th	xvi.
No Clerks of the Works	Manchester Jubilee Ex.	Not stated	Sept. 14th	xvi.
Work of Works	Civil Service Com.	do,	October 7th	xvi.

LONDON.—For alterations and repairs to 84-86, Oxford-street, for Messrs. Beare, Gosnell, & Co. Mr. E. Flint, A.R.I.B.A., architect:—
Greenwood £2,432 18 0
Corbett 2,392 17 0
Hall, Beddall, & Co. 2,270 12 0
Hush 2,307 6 0

LONDON.—For alterations at 1, Love-lane, and 34 and 35, Wood-street, for Messrs. Virgoe, Middleton, & Co. Mr. C. W. Chapman, architect:—
Neave & Neave £289 0 0
Taylor 243 0 0
Slaines & Son 194 0 0

MARYLEBONE.—For new floor and roof, foundations for machinery, &c., at the Public Baths and Washhouses, Marylebone-road, for the Commissioners, Mr. Jno. Waldram, C.E., surveyor, Craven-street, Charing Cross:—

J. G. B. Marshall, Brighton £1,950 0 0
John Oliver, Camberwell 1,793 0 0
G. S. S. Williams & Son, Barnsbury 1,784 0 0
John Hicks, Stamford Hill 1,780 0 0
T. W. Smith & Son, Islington 1,769 0 0
L. H. & R. Roberts, Islington 1,735 0 0
Grover & Son, New North-road 1,738 0 0
H. S. Stephens, New North-road 1,642 0 0
[Surveyor's estimate, 1,745.]
* Accepted.

MARYLEBONE.—For engine, laundry machinery, &c., at the Public Baths and Washhouses, Marylebone-road, N.W., for the Commissioners, Mr. Jno. Waldram, engineer, Craven-street, Charing Cross:—

Coalbrookdale Co., Limited £5,980 0 0
Walker, Tewkesbury 2,002 0 0
Gimson & Co., Leicester 1,490 0 0
Goddard & Massey, Nottingham 1,405 0 0
F. Brown & Co., Upper George-street, W. 1,393 0 0
Crowther & Co., Huddersfield 1,375 0 0
T. Murdoch & Co., Glasgow 1,300 0 0
W. J. Fraser & Co., Commercial-road 1,259 0 0
Best & Co., Dockhead 1,245 0 0
J. & F. May, High Holborn 1,198 0 0
Bradford & Co., 150, High Holborn 1,190 0 0
Fraser & Fraser, Bow 1,183 0 0
Watford Engineering Co., Watford 1,125 0 0
Manlove, Allott, & Co., Nottingham 1,122 0 0
[Engineer's estimate, 1,350.]
* Accepted.

NORWOOD.—For the erection of out-buildings and other works at Norwood Schools, for the Lambeth Board of Guardians, Mr. Sidney R. J. Smith, architect (Messrs. Catt & Smith), Farnal's Inn:—

Hitchcock £1,200 0 0
Paine Bros. 1,200 0 0
Burman & Son 1,257 0 0
W. H. Castle 1,250 0 0
John W. Sawyer 1,222 0 0
Leeks & Hooker 1,222 0 0
Wallis Bros. 1,206 0 0
G. Vaisit 1,174 0 0
Turtle & Appleton 1,170 0 0
F. Huges 1,149 0 0
Chas. Robson 1,148 0 0
J. Holloway 1,143 0 0
Chas. F. Kearley 1,141 0 0
G. Jarvis Smith 1,138 0 0
George Roberts 1,127 0 0
R. G. Bentley 1,097 0 0
W. Martin 1,095 0 0
Chas. Fox 1,082 0 0
W. Smith 1,068 0 0
W. Johnson 1,080 0 0
Gee Parker 1,075 0 0
J. O. Richardson 1,068 0 0
Woolgar & Son 1,030 0 0
A. M. Deacon & Co. (accepted) 1,020 0 0
Smith & Ballard 898 0 0

PECKHAM.—For alterations and additions to the Montpelier Tavern, Chommet-road, Peckham, for Mr. E. Fow. Mr. Arthur W. Saville, architect, Strand. Quantities supplied:—

Wm. Oldrey £1,185 0 0
Burch & Co. 1,141 0 0
Walker 1,134 0 0
Moreton 1,100 0 0
Cook 1,098 0 0
Ward & Lambie 969 0 0
Spencer & Co. 947 0 0
Trewicke 898 0 0

ROTHERHITHE.—For paving the carriage-way of Rotherhithe New-road and Haymouth-road with 4 1/2 in. by 9 in. Gurney cubes, re-laying curb and footways, for the Rotherhithe Vestry, Mr. Edward Thomas, surveyor:—

	Contract No. 1.	Contract No. 2.	Total.
Hindle & Morris	£3,500	£1,690 0	£5,190 0
Beyers	3,395	1,800	5,195 0
Carey	2,827	1,609 10	4,436 10
Mowley & Co.	2,765	1,669 0	4,435 0
Etheridge	2,717	1,432 0	4,149 0
Turner & Son	2,620	1,210 0	3,830 0

[Surveyor's estimate, 4,200.]

SOUTHAMPTON.—For pulling down and rebuilding No. 29, East-street, Southampton, for Mr. Edwin Jones, J.P. Mr. James Lemon, F.R.I.B.A., architect:—
Benton & Bone, Southampton £2,100 0 0
Stevens & Sons, Southampton 1,994 0 0
[Architect's estimate, 2,100.]
* Accepted.

SOUTHGATE (Middlesex).—For erecting four shops at Bunker's Corner, High-street, Southgate. Mr. W. Smith, architect, Gresham-buildings:—
Clark Bros. £2,530 0 0
Sheel Bros. 1,628 0 0
Mattock Bros. 1,610 0 0
Say 1,467 0 0
Lanham 1,464 0 0
Deering & Son 1,476 0 0
Ward 1,469 0 0
Newby 1,390 0 0
Park 1,310 0 0
Wheeler 1,320 0 0

TOXTETH PARK.—For the reconstruction of the carriage-way of Smithdown-road, between Stubbins and Wellington roads (Contract No. 3), for the Toxteth Local Board. Quantities supplied by the engineer, Mr. John Price, Assoc. M. Inst. C.E.:—
Catterall & Co., Liverpool £1,587 14 0
Ireland & Hurley, Liverpool 1,147 18 6
J. Garnett, Liverpool 1,108 7 3
McCabe & Co., Liverpool 1,079 5 0
R. Lomas, Toxteth Park 1,062 17 9
R. B. Ballantine, Everton 1,038 18 7
W. F. Inglis, Liverpool 961 12 0
Walkden & Co., Bootle 923 0 0
L. Marr, Toxteth Park 817 15 1
Jas. Evans, Parkgate (accepted) 860 16 11
[Engineer's estimate, 950.]
* Accepted.

TOXTETH PARK.—For curbing and channelling Smithdown-road, between Wellington and Clet roads, for the Toxteth Park Local Board. Quantities supplied by the engineer, Mr. John Price, Assoc. M. Inst. C.E.:—
J. Garnett, Toxteth Park £462 5 5
Ireland & Hurley, Liverpool 412 14 6
R. B. Ballantine, Everton 388 3 6
W. F. Inglis, Liverpool 379 8 7
R. Lomas, Toxteth Park 373 0 0
McCabe & Co., Liverpool 347 3 4
Walkden & Co., Bootle 339 11 0
Catterall & Co., Liverpool 329 0 0
L. Marr, Aspen Grove, Toxteth Park 306 3 9
[Engineer's estimate, 350.]
* Accepted.

UPTON (Essex).—For five shops for Mr. Baines, Green-street, Upton Park. Mr. H. Bethall, architect:—
James Baxter, Upton £2,460 0 0
Parsons, Plaistat 2,300 0 0
James Wyles, Upton Park 2,298 0 0
Allerton & Fox, West Ham 2,260 0 0
* Accepted.

WOODFORD (Essex).—For a pair of villa residences at Woodford Green, for Mr. J. R. Roberts, Mr. J. K. Cole, architect:—
Wood Bros. £3,883 0 0
J. Eagen 3,883 0 0
T. Little 3,630 0 0
Wells 3,630 0 0
Williams & Son 3,629 0 0
Perry & Co. 3,490 0 0
Walton 3,375 0 0
J. O. Richardson 3,364 0 0
J. Bentley 3,267 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

K. O. M.—A. G.—W. E. M.—H. H.—P. Ros.—R. L. R.—A. D. (next week).—W. R. Shawyer received shall have consideration. R. S. R.—A. G. We do not think the convenience has any direct scientific value as bearing on the cause of earthquakes.

We are compelled to decline pointing out books and giving addresses.

Notice.—The responsibility of signed articles and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications. Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

WESTWOOD GROUND.
Box Ground, Combe Down,
Corsham Down, And Farleigh Down,
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [ADVT.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
Box, Wilts. [ADVT.]

Doulting Freestone.

THE CHELYNCH STONE.
The stone from these quarries is known as the "Weather Beds," and is of very crystalline nature, and undoubtedly one of the most durable stones in England. It is the same crystalline nature as the Chelney Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [ADVT.]

Doulting Free Stone For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke - under - Ham, (Ground or Lump), Ilminster. [ADVT.]

Ham Hill Stone! Ham Hill Stone!! For Ham Hill Stone of best quality and workmanship, apply to JOHN HANN & SON, Quarry Owners, Montacute, Ilminster. Established 1837. Agents, MATTHEWS & GEARD, Albany Wharf, Regent's Park Basin, N.W. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouses, floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tan-rooms, and terraces. [ADVT.]

Asphalte.

Seyssel, Patent Metallic Lava, and White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [ADVT.]

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY.

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

VOL. LI. No. 2275.

SATURDAY, SEPTEMBER 18, 1886.

ILLUSTRATIONS.

Designs for the Mappin Art Gallery, Sheffield.—By Mr. J. D. Webster, F.R.I.B.A.	414-415
Interior View and Entrance Hall of Mr. J. D. Webster's Design for the Mappin Art Gallery, Sheffield.	418, 419
The Triumphal Arches of the Romans: Arch at St. Remi, Provence.—From an Engraving by Baltard.	422-423
The Triumphal Arches of the Romans: Arches at the Bridge of St. Chamas.—From an Engraving by Bance.	426-427

CONTENTS.

Administration Report on the Railways in India for 1885-86	403	Micro-Organisms in Air and Water	411	Experiments in Electric Induction	432
A Stroll by the Welland	404	Obituary	412	Further Notes on the Trades' Union Congress	432
Notes	407	Wrought-iron Work at Mr. Tadema's Studio	412	The Walls of Chester: Stone Quarries.—XII.	434
The Triumphal Arches of the Ancient Romans	408	The Mappin Art Gallery, Sheffield	412	The Student's Column: Stone Quarries.—XII.	434
The Post-office Extension in St. Martin's-le-Grand	409	The New London and County Bank, Kensington	413	Recent Patents	435
The Great Seals of England in Early Heraldry	410	Canal Communications	413	Recent Sales of Property	435
The Proposed "National Art Exhibition"	410	Abbotsbury Abbey, Dorset	413	Miscellaneous	435
The Electric Street Tramway at Blackpool	410	The Sanitary Congress at York	413	Association of Municipal and Sanitary Engineers and Surveyors	435
Notes and Sketches of an Architect (Illustrated)	411	The Water Supply of Birmingham	413	Prices Current of Building Materials	435

Administration Report on the Railways in India for 1885-86.



THIS Official Report, which contains a mass of useful and intelligently tabulated information, is concise and to the purpose, and has the rare merit of enabling outsiders, specially interested in the subject, to

ascertain such particulars as they may individually want without the labour so often involved in wading through an array of figures, the gist of which only the initiated can gather. In order to set those particulars before our readers, it will be convenient to follow the order maintained in the Report itself, which opens with the statement that the receipts for the year 1885 show an increase over those of the previous year of 1,196,643*l.*, and that the percentage on the capital expenditure gives a return of 5·84 per cent., against 5·27 per cent. in that year. The increase is due largely to improved results obtained from working the Frontier lines now forming the north-west system, and which have contributed 43·4 per cent. of that increase. There was a considerable movement of military stores and railway material likewise, but it did not amount to more than 12·2 per cent. of the total receipts on those lines. As regards merchandise, the total tonnage has increased by 1,887,378 tons, or nearly 15 per cent., of which no less than 1,159,386 tons have been in grain and pulses. A comparison of the receipts during the first four months of the three years 1884-5-6 shows an increase of over 400,000*l.*

During the past year 376½ miles were completed and opened, making a total of 12,376 miles open for public traffic throughout India, besides 3,767 more miles under construction, and an additional 606 miles which have been subsequently sanctioned. Of these last, 383 miles belong to the Indian Midland Railway Company's system, a temporary line of 58 miles to the top of the Bolan Pass, and an extension of 50 miles of the Sind Pishcen Railway to the fort of the Amran Range,—two lines which signify the pushing on of our railway system into Afghanistan to within 100 miles of Kandahar, a not too speedy move towards the direction in which Russia has made far greater strides than ourselves.

The total length of 12,376 miles is distributed as follows:—

State Imperial and Provincial lines	7,112½ miles.
Guaranteed companies	3,922½ "
Assisted companies	645½ "
Other companies	7½ "
Native states	687½ "
Total	12,376 "

Turning to the works in progress, the most remarkable feature is the number of large bridges under construction, of which may be more particularly specified those being erected over the Hooghley at Calcutta, consisting of one central span of 120 ft. and two side spans of 540 ft. each; another over the Jumna consisting of ten spans of 250 ft.; a third over the Sutlej near Ferozepore, of twenty-seven spans of 150 ft., and the bridge over the Indus at Sukkur, which is awaiting the arrival of the large span of 790 ft., with which the main channel of the River between Rohri and Bukkur Island is to be crossed. The state of progress on each line is concisely given in the Report, the most interesting portion of which is contained in an unofficial communication from the engineer in charge of the Sind Pishcen Railway, on the line to Kandahar. The difficulties encountered from climate and other causes are graphically described, of the nature of which the following extract will give an idea.

"The tunnel near Kulhali has proved a most difficult job. The soil is so rotten that the roof is utterly unreliable, and falls in from above, forming a high arch above the timbering, from which enormous pieces of rock come down from 50 ft. to 60 ft. in height, and crush everything it is possible to put up. For some time work was stopped, owing to the impossibility of getting any workmen to go into such danger, but charges of dynamite were put in from the hill above on to the roof, and the explosion blew out a crater down into the tunnel. This is now being taken out from above, and it is hoped the 75 ft. of tunnel between the two masonry faces may be secured and lined with masonry arching before the sides come in. For the last three months work has been going on day and night, with electric lights, but with very slow progress, the earth squeezing in to the made parts of the tunnel as fast as taken out through the tunnel ends." The construction of the line through the Bolan Pass is a work evidently not only of considerable difficulty in itself, but one aggravated by the accompaniment of intense heat, cholera, sun-fever, and dysentery, which completely demoralised the labourers and caused them all to desert. On the upper portion of the Pass the climate still proved a source of trouble, though in the opposite way. Here the sufferings were

occasioned by extreme cold, which brought on pneumonia, and superadded to all the rest, was scarcity of water, which was only procurable at a distance of two miles from the line. Another noticeable work is a 2 ft. 6 in. gauge line, opened in the district of Kattywar, the permanent way of which is made with steel rails, 19 lb. to the yard, with transverse steel sleepers, 3 ft. 6 in. long by 5 in. wide, spaced 10 to the 24-ft. rail. The engines are of two classes, the heaviest, with six wheels coupled, weighing 10 tons, with a load of 3½ tons on a pair of driving-wheels. The single line is estimated to cost the very low rate of 1,544*l.* per mile.

Out of 14,993 miles of track, including sidings, 9,750 miles are laid with timber sleepers, 4,521 with cast-iron sleepers, and 335 miles with steel sleepers. No comment is made as to the relative economy of these different pattern sleepers, either as to first cost or subsequent durability.

The chapter devoted to fuel consumption and supply contains a statement of the rate of consumption and cost per ton and per train mile, showing such very marked differences that it is to be regretted no attempt is made to explain the reason for such great variations. The lowest consumption appears to be on the Nalhaty line, on which Bengal coal is used exclusively, and which amounts to 19·76 lb., at a cost of 1½*d.*, the average cost of the coal itself being nearly 14*s.* per ton. The highest rate is on the Wardha coal line, being 92 lb., costing 3*d.*, while the coal itself costs only 6*s.* per ton. On the Indus Valley Railway, where the fuel used is English coal, patent fuel, and wood, principally the latter, the consumption reaches 117 lb., costing 7*d.*, while the average price of the fuel is 11*s.* 3*d.* per ton. On the E.I. Railway the consumption is 47·56 lb., costing 1*d.*, while the price of the coal is only 4*s.* 3*d.* per ton. The mines producing this coal are worked by the railway company itself, which turns out the coal at the low price of 4*s.* to 6*s.* per ton. At a place called Khatun, in Scind, veins of petroleum oil have been struck. It was sent to Sukkur to be used in the boilers there, and as far as they went the trials were most satisfactory. Subsequently favourable experiments were made with the engine pulling a fully-loaded train, so that the question now remains as to what supply can be counted on, and at what cost. The chapter concludes with the announcement that a concession has been made to Messrs. Watson & Stewart, of London, by the Government of His Highness the Nizam, to carry on mining operations at the Singareni coal-fields, which are situated not far from the first barrier on the

river Godavery, whence that river is navigable all the year round to the coast.

From an analysis of the financial details, the general result of which is noticed at the outset of the Report, it appears that the total capital outlay on Indian railways amounted on 31st December last to 161,917,840*l.* (at the conventional exchange of two shillings to the rupee) of which 71,032,838*l.* have been expended by Guaranteed Companies, 82,255,391*l.* on the State Railways (Imperial and Provincial, including the E. I. R.), 4,821,379*l.* on Native State Lines, and 3,808,232*l.* on Assisted Companies lines.

The gross receipts during the calendar year 1885 amounted to 17,987,625*l.*, being an increase of 1,923,400*l.* over those for 1884, while the working expenses have been 8,863,294*l.*, or only an increase of 707,137*l.* over those of the same year. The net revenue amounted to 9,126,361*l.*, and the net earnings on all lines yielded a return of 5*l.* 12*s.* 9*d.* per cent. as compared with 5*l.* 1*s.* 9*d.* in 1884. Of this return the E. I. R. yielded 8*l.* 8*s.* 4*d.* per cent. The Guaranteed lines 5*l.* 8*s.* 4*d.* per cent. The State lines, excluding the E. I. R., gave 5*l.* 9*s.* 7*d.*, the Assisted lines 1*l.* 13*s.* 11*d.*, and the Native States 2*l.* 13*s.* per cent. There has been a satisfactory increase both in the number of passengers carried and in the tonnage of goods. The former amounted to 80,864,779, being an increase of 7,049,660 over the previous year, and the receipts from coaching traffic amounted to 5,538,126*l.*, or 467,372*l.* more for the same period. The aggregate tonnage was 18,925,385 tons, the receipt from which yielded 11,915,375*l.*, being an increase of 2,262,378 tons and 1,319,434*l.* over the year 1884.

An analysis of the capital expenditure shows that the cost of 7,272 miles of 5 ft. 6 in. gauge lines amounted to 126,222,720*l.*, giving an average mileage rate of 17,371*l.*, the net earnings per mile being 1,072*l.*, or about 6.17 per cent., while 3,536 miles of metre gauge lines cost 26,928,271*l.*, or a mileage rate of 7,632*l.*, the net earnings being 341*l.*, or 4.45 per cent. In round numbers, the average length open during the year 1885 was 12,092 miles, upon which the traffic work performed was equivalent to 3,640 millions of passengers, and 3,320 million tons of goods carried one mile. Selecting the E.I. and the G.I.P. as the two busiest lines, the traffic along them in passengers amounted to 865,745,800, and 448,419,661 individuals, equivalent to a daily through traffic of 1,411 and 816 on their respective lengths of 1,681 and 1,505 miles. Similarly the goods traffic aggregated 1,048,601,489 and 658,165,314 tons over one mile, giving a daily through traffic of about 1,700 and 1,200 tons respectively. Five chief items, viz., coal, cotton, grain and pulses, salt, and seeds, make up 10,390,000 tons out of the total traffic of 14,000,000 tons of goods, exclusive of railway material and Government stores. The total number of passengers carried shows an increase of 9.55 per cent. over that carried in 1884. The passenger mileage has increased 8.48, and the receipts therefrom 7.00 per cent. Of the total number carried in 1885, the lower class passengers constituted 97.27 per cent., the second class 2.28, and the first class only 0.45 per cent. The distances travelled by each averaged 44, 67, and 80 miles, and the fares a trifle over 4*d.*, 3*d.*, and 1*d.* per mile respectively. The lowest average cost of hauling one passenger unit over one mile on the broad gauge was one-tenth of a penny on the Indus Valley line, and on the narrow gauge nearly one-eighth of a penny, the receipts for this work being 0.3 and 0.27 of a penny.

The total working expenses during 1885 amounted to 8,770,196*l.*, the percentage on the gross receipts being 49.27, against 50.47 in 1884. The lowest percentages were 34.30 on the Jodpore Railway, 35.26 on the E. I. R., and 48.17 on the Indus Valley,—figures which have not yet been reached on any of the English lines.

The expenses per train mile average nearly 4*s.*, the lowest being 2*s.* on the Bengal and N.W. Railway, and 3*s.* 6*d.* on the East Indian Railway. The rates for goods quoted in the Report are those for short distances. That

for wheat is 4*d.*, and for salt, 3*d.* per ton mile. On the Eastern Bengal Railway, the rates appear to have varied considerably, especially those for jute, which had to be reduced to an abnormally low figure, 4*d.* per ton, on account of the water-carriage competition. That rate, however, could scarcely have covered the working expenses. On the Bengal and N.W. Railway, grain and seeds are carried short distances at 0.425, and salt at 0.375 of a penny, but from Delhi to Calcutta,—954 miles, a special rate for grain is fixed at only 0.27 of a penny.

It is satisfactory to learn that as regards the persons employed on the open lines, the natives of India form 93.84 per cent. of the whole body of servants, whose total number reached 215,886 individuals; for it proves what an opening for remunerative employment of all kinds the railways have created.

More than thirty-five years have elapsed since the railway system was first introduced into India by one of the ablest Viceroys that England ever sent to that country, the late Lord Dalhousie; but it is within the last twenty years that the great expansion has taken place; and though the progress made cannot be called rapid, it has, nevertheless, been sure, and the Government are to be congratulated on the financial success which has been attained on the great arterial lines. Seeing that the guaranteed lines are now earning more than the guarantee, it would seem that whatever technical objections there may be to the guarantee system, and whatever inconveniences may temporarily arise from unfavourable exchanges for paying the interest on capital raised in England pending the earnings covering the guarantee, the ultimate financial position is, nevertheless, stable, and the Government finally recoups itself even directly the guaranteed amounts, to say nothing of the gain derived by the augmentation of the indirect sources of revenue which are sure to follow increased facilities of communication.

A STROLL BY THE WELLAND.

IT is one of the boasts of Northamptonshire that the fields of Naseby give rise to three great streams, which discharge into oceans separated by the whole breadth of the land. So close together as almost to have been all three tainted by the blood shed in one great battle, spring the Avon, the Nene, and the Welland. The fame of the first two is secured. One listened to the lisps of Shakspeare's childhood; the other winds beneath more noble buildings than any stream of like degree. The last of the trio, though it never may boast like its cradle companions, flows, nevertheless, through much that is fair and near much that is interesting. Before it has become a full-grown river it passes close to Market Harborough, beloved of hunting men; thence, marking the northern limit of its native county, it sluggishly drops down to Stamford, and so away through the fens, past Crowland Abbey, to the sea.

Between Harborough and Stamford the Welland hardly does itself justice. It divides and subdivides itself so much that from the mighty viaduct which strides across its valley near Harringworth the river looks like a few small streams. And so indeed it is; and amongst them all they hardly offer a pool where a man may bathe with any comfort. Nevertheless, the valley is a noble one, and, for this part of the world, quite precipitous. Most of Northamptonshire undulates in a very casual way; here it goes up, and there it goes down, and why it does either of these in preference to keeping flat no one can say. But here, by the Welland, there is reason shown for the conformation of the ground. Elsewhere it gives few reasons for its vagaries. Here it gathers itself together and descends abruptly to the meadows through which the Welland flows, and rises in gentler, but still notable, hills on the other side. From all of the many villages which dot the sides of the valley extensive views can be had, without the trouble of climbing the church tower, and in most of them the traveller

with architectural tastes need not go to nature for his amusement.

To begin with Dingley, which lies on the Northamptonshire slopes, some two or three miles from Harborough. There is a manor-house of considerable interest, the porches of which were built in the short reign of Philip and Mary, and bear the dates 1558 and 1560, as well as many inscriptions, among which is "In the rayne of Felep and Marey," an inscription which is not to be found on many buildings. It was built by Edward Griffin, who was Attorney-General, and, consequently, made enough money to buy a large tract of land in the neighbourhood. But though the Griffins were new-comers in 1558, twenty years later they were sufficiently acclimatised for that excellent builder, Sir Thomas Tresham, to place their arms in two several places on his market-house at Rothwell,—a distinction accorded to only a select few, most of the numerous arms occurring but once. Of course, Griffin bore a griffin for his arms.

A little way further east, and some two or three miles from the river, is Stoke Albany, where is much to attract the traveller. In addition to the church and some characteristic cottages, there is the old Manor House, a fourteenth-century building, once the home of the Lords De Roos, whose arms appear above the doorway, while on a buttress are two panels, bearing a monogram with a crown, and an "I H S." Who put these religious monograms there? Were they the outcome of the general piety of the age, or some special appeal



AT DRAYTON
BY BRINGHURST.

Fig. 2.

in mitigation of violence and crime? We know nothing beyond what the stones tell us: no more of the builder of the house than of the De Roos who lies buried in the church, and from whose tomb all record has gone, unless haply this inscription, preserved in an old collection of such sentences, belongs to him:—"Hic jacet Johannes Roos le bonne compaignon." Of all the life of John De Roos, of all the deeds which he did, of the houses he built for himself, and those which he knocked down for his neighbours, of his wit and his wisdom, we know nothing. All we know is that he was a "bonne compaignon." And what was that? Perhaps a kind, courteous, fine fellow, ever ready to help a friend. Perhaps a good man at a tankard, merely. However, he was a De Roos, and he or his must have lived at the old Manor House, and have read those monograms, and very likely revered them.

In crossing over into Leicestershire from Stoke Albany the road goes through Ashley, where there is nothing of interest. On the Leicestershire side is Medbourne, where is an ancient footbridge over the stream; and, overlooking the Welland, perched on the top of a knoll, is Bringhurst. Here in old times dwelt the Norwiches, of whom one, Symon, slew an ancestor of all the Treshams, the family which subsequently played such a prominent part in Northamptonshire. In the year of grace 1451, Sir William Tresham was quietly going home from Northampton to Sywell, where the family then lived (before they moved to Rushton), when he was suddenly fallen upon as he was saying his matins and cruelly thrust through with a spear. His servants, coming up presently, found him in this deplorable state, and, for the better carrying of him back to Northampton, they cut off each end of the spear that stuck out at the back and front. But when they reached the

town and pulled out the rest of the truncheon the patient died.

In Bringham there is not much to see. An old house opposite the church presents the characteristic features of the country side, which, simple as they are, never fail to give

Its steep coped gables and thatched roofs give it an old-world air, while signs of departed magnificence occasionally appear in cottages boasting elaborate architectural features evidently brought from some demolished mansion.

Further on, and just inside the little county of Rutland, is Caldecot, another old village now slowly decaying since the coaches ceased to run and the towns began to absorb the rural population. Here, too, are steep thatched roofs with their stone-coped gables, and a few quaint cottages. But there is little to detain the traveller; the time will be better employed by crossing into Northamptonshire and going to Rockingham.

Rockingham is, historically, one of the most

1095, and no vestige of the chapel is left, though the site is still pointed out. In fact, we must leap over two hundred years before we come to any of the existing work. There are, however, considerable remains of late thirteenth-century work in the great gateway and the entrance to the hall. The gateway lies between two bastion towers, and retains the grooves for the portcullis, and other features. It is very much like the gateway of the storyless castle at Barnwell, on the Nene, only the entrance is here somewhat wider. Indeed, at Barnwell, nothing larger than a man on horseback could get through. Within the gateway most of the work is of the sixteenth and seventeenth centuries. The



Fig. 1.

satisfaction (fig. 1). This is nothing more than a farmhouse, and is too late in date to have been the home of the vengeful Symon Norwich.

In Drayton, a hamlet close by, on a coped gable is a date-stone (fig. 2), which, at small cost, contrives to give a very valuable touch to the little house it adorns. At Holt, up on the hill further away from the Welland, is a large old house, the residence of that excellent sportsman, Sir Bache Cunard. Though con-

interesting places in the neighbourhood, as well as one of the most important on the Welland. It has been the site of a fortification from the times when the ancient Britons cast up their mounds. William the Conqueror made it the chief stronghold of the district, and within the shelter of its walls many of his successors placed themselves and their retinue when they came to hunt in Rockingham Forest. In the time of William Rufus a most important meeting of prelates and nobles was



Fig. 3.



Fig. 4.

siderably modernised internally, the porch and part of the front are of very good Late Gothic architecture. The church, which stands so close to the house as to look like part of it, is also of considerable interest.

Resuming our stroll down the stream from Bringham, we soon come to Great Easton, a rambling village with many picturesque corners,

held in the chapel, to decide a knotty point regarding the appointment of Archbishop Anselm. In those days there were two infallible popes, and it seems that, in the king's opinion, Anselm was appointed by the wrong one. The council came to no definite decision, and the question really answered itself in course of time. This was so far back as A.D.

whole effect is extremely good, whether we take the courtyard with its wings or the delightful long and low garden front. But there is no novel detail. The situation is superb, and from the terraces by the ancient walls glimpses of surprising extent may be gained along the Welland valley. A sketch of a corner of the buildings is annexed (fig. 3).



Gretton, further down the valley on the same side as Rockingham, abounds in old stone farm-houses of the usual Northamptonshire type, but one of which it is difficult to weary. Their charm lies not in abundance of detail (though every feature has some, however slight), but rather in their steep roofs of Colly-Weston slates, their mullioned windows, and the colour and texture of the stone. Here the walls are of brown ironstone, and the dressings of a soft grey freestone. The steep streets of

ever to be out of its shadow, stands the Bede House, once the residence of the Bishops of Lincoln, but now shorn of much of its splendour, and relegated to the use of the poor. This was originally the Manor House, built by the Bishops of Lincoln for their own delectation. At the dissolution of the monasteries it came into the Burghley family, and the third Lord Burghley converted it into a bede-house or almshouse to accommodate twelve poor men, two women, and a warden. It retains much of

church is of much interest and contains several of their monuments, on all of which the Digby fleur-de-lis is set forth in carving or colour. In the south chapel is an interesting tomb having a Gothic canopy supported by Renaissance pilasters. We append one of the shields from it, showing the fish as an heraldic emblem (fig. 7). The Digbys were deeply implicated in the Gunpowder Plot; indeed, Sir Everard was executed for his share in it, January 30, 1606, at the west end of St. Paul's



Fig. 5.

the village; its picturesque irregularity; the green, with its stocks and whipping-post; and the neighbouring inn, with remarkable wrought ironwork round its sign, combine to render Gretton one of the most attractive bournees which the sketcher can seek in his stroll. At every turn the eye wanders across the broad valley to the villages we have already passed, to the swelling hills of Rutland and

its ecclesiastical character, and abounds in quaint corners and picturesque groupings (figs. 4, 5). Downstairs is a covered corridor or cloister, into which the lower rooms open. Upstairs there is some good glazing, in which occur roses and lilies, and the legend *Deus exaltatio mea* (fig. 6). In one window is a fine portrait of one of the bishops. The large dining-room has a good cornice of quasi-fan tracery of

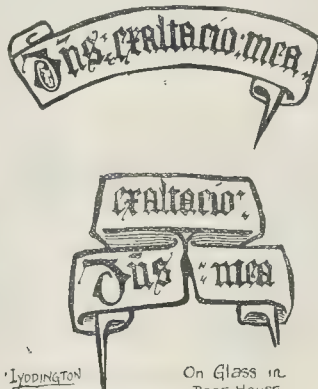
On Glass in
BEDE-HOUSE.

Fig. 6.

on the Tomb of
Jacquenetta Digby.
STOKE DRY CH.
(enlarged.)

Fig. 7.

in London, somewhere near where Queen Anne stands looking down Ludgate Hill. Of course where a conspirator lived legend has pitched upon some place as the scene of his nefarious plottings. At Stoke the room over the porch is said to be the spot where the plot was devised, but there are a score of others with equal pretensions.

Stoke Dry has led us a little way back on



Fig. 8.

Leicestershire, bathed in the sun, or darkling with every passing cloud, or to the spires of Lyddington and Seaton, rising from the midst of masses of trees.

It is but a step (perhaps two miles) across to Lyddington in Rutland, and here the seeker for the picturesque may prepare for another feast. The church, with its pretty little spire, is a fine structure of the Decorated and Perpendicular styles, containing several good brasses. To the north of the church, with the green graves between, but so near as hardly

ingenious design. The warden offers no difficulty in the matter of access, and is, indeed, glad to find a fresh ear into which he can pour his grievances.

There are many other old houses in Lyddington with more or less character,—mullioned windows, variations of the universal flat-pointed doorway, and simple gables and dormers.

Not far from Lyddington is the little village of Stoke Dry, where the Digbys used to live. Their house has entirely disappeared, but the

our journey down the river. Returning to Lyddington, and pushing on through Thorpeby-Water and Seaton, where we need not rest, we finally reach Harringworth on the Northamptonshire side.

Harringworth, though now a secluded agricultural village, was once the seat of a noble and powerful family, the Zouches; and their descendants to this day take their title, Zouch of Harringworth, from this village. Their house stood amid the broad meadows through which the Welland fritters itself away, a little

to the east of the church. Hardly anything is now left, but probably the windows which are built into some cottages standing in those meadows once gave light to the lords of the soil. In the time of Bridges, the historian of Northamptonshire (1720), the old manor house still remained, as well as ruins of a chapel (the burying-place of the Zouches) between the house and the church. Leland, about 1530, said that "the Lord Souche had a right goodly manor place by the parochie chyrch of this village, builded castelle like. The first court whereof is cene down, saving that a great peace of the gate-house and front of the waulle by it yet standth. The ynnar parte of this place is meately welle maintained, and hath a diche aboute it. The waulles of this ynnar court be in sum places imbatellid. And withyn this court is a faire chapelle, in the bodie whereof lyith one of the Souches hyried, and a greates flat stone over him."

Nothing now remains of the chapel, nor of the Zouch, nor of the great flat stone that was over him; but Bridges describes the tomb, and assigns it, from the inscription, to Lord George Zouche, who died in 1569. It was evidently an elaborate Renaissance monument.

Although the manor-house and chapel of the Zouches have disappeared, the parish church remains, and is of some interest. Apart from its architectural excellence, which is considerable, it would appeal, in a way, to the feelings of the orthodox Churchman, from its peculiar arrangements. The whole of the north aisle is occupied by the vault of the Tryons, except the space reserved for the gangway and the coals. Beneath the middle of the north arcade are the pulpit and clerk's desk, and to these as a centre do all the pews face. Those at the west end face east, those in the south aisle face north, while those at the east end face west, and turn their backs on the chancel, which is absolutely bare, except for a communion-table with a marble top. Near the church is a farmhouse with some quaint yews in front clipped into the semblance of birds; an exercise of a questionable art now nearly forgotten. Further along, and near the middle of the village, is the inn, with a good front (fig. 8), and still further is the market cross. On one of the cottages to the left is a chimney from the old manor-house (fig. 9).



Fig. 9.

The rest of the villages between here and Stamford do not call for much remark. At Wakerley, the church has a very curious Norman chancel-arch. At Barrowden church, across the river, is a good Renaissance wall-monument. Further down is Tixover, a lone church some distance from any houses; lower still is Duddington, with some picturesque houses and a bridge; then comes Colly-Weston, famous for its roofing stone; Ketton in Rutland, with a fine church and excellent stone quarries; then Tinwell, and lastly Stamford.

At Stamford we may well end our stroll, for here we shall be anxious to stop more than one day to ramble about the quaint old town, and,

if possible, to visit some of the neighbouring villages which have been already described in these pages.*

NOTES.

WE understand that a question is to be put to the First Commissioner of Works next week in regard to the proposed alterations to Westminster Hall, and the manner in which the appearance of the Hall will be affected by the one-sided intrusion into it of Mr. Pearson's staircases. We hope some members of Parliament may think it worth while to exert themselves to prevent the disfigurement of a building so closely linked with English history.

A CONSIDERABLE time was given at the recent Trades' Union Congress to the question of labour representation. That there should be some working-men members in Parliament is obviously desirable, even though it only be to prevent working-men from thinking that they have no direct representatives of their interests, and so are not properly looked after. But working men do not go the right way to work when they propose that working-men members should be independent of political parties. There can be no such thing as an M.P. who represents a particular interest alone: he represents his constituency, and if he belongs to any particular calling, he speaks with authority on subjects relating to it with the confidence of those who belong to it. But the very way to have labour candidates rejected by constituencies is to allow the idea to prevail that they go simply as representatives of a particular interest. Even the working men of a division or a borough are in most cases no more desirous to have local or general interests neglected for the purpose of a representative representing a special interest than are any other body of the electorate of a place.

THE importance of efficient house sanitary arrangements, as bearing upon public health, is strikingly illustrated in a report of a house-to-house inspection made recently in Chiswick by Mr. Ramsden, Surveyor to the Local Board. It is shown by statistics that in those sub-divisions of the parish where there is a high percentage of houses with the sinks, baths, and soil-pipes connecting directly with the main sewer, the death-rate is proportionately high. For instance, in the Bedford Park sub-division, where the soil-pipes to each house are ventilated, and the sinks and baths are disconnected from the main sewer, the death-rate during the past year has been at the remarkably low figure of seven per thousand of the population. Out of the 215 houses in that part of the parish there was only one of which the soil-pipe was not ventilated; and there were only two dust-bins which were not properly covered. Every one of the sinks was disconnected from the main sewer. On the other hand, in the sub-division of the parish called Chiswick proper there were 212 sinks out of 293 connected directly with the sewer. To this circumstance Mr. Ramsden attributes the heavy death-rate in this district, viz., about 25 per thousand of the population. It appears that throughout the whole parish there are 1,805 sinks and 311 baths connected directly with the main sewer, and out of the 1,500 soil-pipes only 860 are ventilated. These periodical house-to-house inspections undoubtedly tend greatly to the sanitary improvement of a parish. This report shows that, though Chiswick may have an excellent drainage system, the internal sanitary arrangements of too many of the houses are out of harmony with the by-laws. It is satisfactory to know, however, that in many cases the owners are readily carrying out the suggestions of the surveyor.

MR. ANDREW CARNEGIE, of New York, a native of Dunfermline, has intimated to the Lord Provost of Edinburgh that "he would like to do his part in adding to the numerous

attractions of the superb metropolis of his native land, and that it would give him great pleasure to present the Magistrates and Town Council with 25,000*l.* for a free library." This munificent gift he subsequently increased by another donation of 25,000*l.* The gift is contingent upon the citizens adopting the provisions of the Library Act, which provide for the proper maintenance of a free library by the imposition of a tax not exceeding one penny in the pound. The Lord Provost seems to desire that the library should be incorporated with the new Municipal Buildings, but there is a widely-expressed opinion that Mr. Carnegie's gift is amply sufficient to provide a separate building, and that it would not materially add to the attractions of the city were the library merged in the civic buildings. Two most eligible sites have been pointed out, one at the south-western extremity of Chambers-street, immediately to the west of the Museum of Science and Art, and the other at George IV. Bridge, on the vacant site between the Sheriff's Court-house and County Buildings. The former of these sites is mostly occupied by a congeries of old buildings, which, through motives of mistaken economy, were not scheduled under the City Improvement Act; these buildings, by the opening up of the new thoroughfare, are of double the value they were at that time, and give to the neighbourhood an air of incompleteness. The site is open on all sides, and is admirably adapted for the purpose. The second of the above sites has the advantage of being the property of the Faculty of Advocates, and adjoins their library, which has the privilege of receiving a copy of every work entered at Stationers' Hall. The library is inconveniently crowded, and the Faculty are not possessed of sufficient means to complete their building, and if the Advocates were approached in a fitting manner, an agreement might be come to whereby the free library would enjoy some of the benefits accruing from the privilege possessed by the older institution. Mr. Carnegie gave a free library and other benefits to Dunfermline some years ago, and a free library and music-hall are in course of erection in Alleghany City at his cost. Such gifts "bless him that gives and him that takes."

THE Liverpool Autumn Picture Exhibition is one of the best which has been held there. A good many of the noticeable pictures are, of course, those which have appeared in London already; but the net has been cast wide. The collection is a very catholic and representative one, and the hanging is very effective. Sir F. Leighton's triptych, for instance, which hung at the end of Gallery III. at the Academy, has in the Liverpool Exhibition been hung with a special regard to decorative effect, it being a distinctly and essentially decorative painting; a kind of framework has been formed for it by arranging, above and below it, small pictures of decorative character, selected in regard to their colour harmony as accessories to the large painting; and the whole collocation of colour thus formed is surmounted by draped hangings. The Marlborough Gallery clique is fairly represented by some of its best productions, among which the works of Mr. Kennington are especially good in regard to flesh painting. The success in the hanging is attributed by a member of the committee to the fact that "they knew all the rules about hanging, and had broken them all." Among the works at Liverpool which have been prominent in the London exhibitions are Mr. Calderon's "Ruth and Naomi," Mr. Moore's "Sound of Isla," Mr. Goodall's "Susanna," Mr. Sadler's "Habet," Mr. Bottomley's "Death's Betrothed," &c. As on other occasions, we come across works which held a secondary place in the London picture-galleries, which surprise one by their added force when seen in a new light; Mr. Beadle's "Toil and Storm" for instance, which at the Academy we noted as a fine work, but which asserts itself much more decidedly with its present better light and hanging. A fountain of Minton's ware, playing in the entrance gallery, is a pleasant

* See *Builder*, vol. xlix., p. 527 (Oct. 17, 1885).

addition to the Liverpool Art Gallery; and we must congratulate the Committee also on the good taste of style and make of some new furniture in the way of chairs, settees, &c. An art gallery is a very suitable place to give people practical lessons in regard to good taste in common objects of everyday use, as well as in pictures.

THE Committee of the Manchester Picture Exhibition have succeeded in getting together a greater number of the leading Academy pictures of the year than are to be seen at the Liverpool Galleries; but beyond these there is not such a good average of work nor such a classical tone about the collection and the manner in which it is arranged. Besides Academy and Grosvenor works, there is Mr. Holman Hunt's "Triumph of the Innocents," the new view of which, in a stronger and less artificially arranged light, does not do anything to reconcile us to it or to the absurdly high claims made for it. The flesh-colouring and texture in the figures is very questionable, and the intellectual conception of the painting appears to us only fitted to interest children. Mr. John Reid would, probably, have avoided such very rough painting as is to be seen in his "Shipwreck," had he seen it in the strong light in which it is now hung at Manchester. As it was hung at the Academy, the pathos of the picture was manifest, and the carelessness of the execution was masked by the lighting under which it was seen. There is a fine work by Israels,—"Nothing Left,"—a working man seated by the bedside of his dead wife, which we do not remember to have seen before. Among the names not familiar to us we noticed two or three works by Mr. Anderson Hague, especially "The Return of Tywyn Musselers," which exhibit power and individuality. The permanent gallery of pictures bought for the town includes some important works by Messrs. Holman Hunt, Brett, Goodwin, Legros, Stanhope, and others, placed in a room where they are absolutely lost for want of proper lighting, and might as well not be exhibited at all. If the collection is to be of any use or pleasure to the town, a better room should be built for it.

MR. JUSTICE STIRLING, sitting as Vacation Judge, has just decided a point of much importance in regard to the easement of light. The plaintiff was the holder of a lease for twenty-one years, granted to him by a person who had obtained a lease from the freeholder, who was tenant for life of an adjoining plot of land. Under these circumstances the freeholder could not, as long as he was alive, as a rule, derogate from his grant by stopping the light to the plaintiff's house either by himself or by his assigns. The freeholder, however, under the Settled Land Act, granted this piece of adjoining ground to another person, who began to build, and in so building obstructed the light of the plaintiff's house. The judge held that the light could be obstructed, having regard to the provisions of the Settled Land Act, because by section 20 a lease might be made to override all the grantor's interests, except those binding on his successors, which this was not. The point is one of much legal technicality, which cannot be fully dealt with in a few lines, but the decision is of great importance, because it clearly diminishes the value of property which, were it not for the effect of the Settled Land Act, would otherwise be yearly increasing in value. The house with the light in twenty years would have had an indefeasible right; now not only is this accruing right prevented, but the light is materially obstructed. It is probable that so important a point will be heard of again in the Law Courts.

ONE of the few really practical contributions to the controversy on the permanence of water-colours has been made by Mr. William Simpson in a letter to the *Times*. He has a number of strips of card which have been washed with various water-colour pigments fifteen years ago, cut in half, and one half kept in darkness and the other half in light. Here

is a really practical test,—for a period up to fifteen years, at all events. The results are, in the main, in opposition to the pessimist view of water-colour so pertinaciously urged by Mr. Robinson. The majority of the colours thus tested have stood well, and show little difference between the parts exposed to light and those kept from the light. Mr. Simpson proposes to hand over the test pieces to Sir James Linton to submit to the committee which is to consider and report on the subject.

ANOTHER ornamental brick pattern-book which has reached a new edition, that of Mr. Jas. Brown, to which he gives the somewhat high-sounding title, "Brick Ornament and its Application," is, like one we noticed a week or two back, very mixed in style and merit. Mr. Brown's brick is an excellent material; his series of moulded bricks is varied and useful, and many of the more simple diaper patterns are very effective and very suitable to the material. It is when we come to the higher efforts that we meet with things that are questionable, or more than questionable. Who (but simpletons) want imitative natural foliage in brickwork? It is a question whether we want it even in carving; but we certainly do not want it in repeated brick patterns. Then there are many varieties of the apparently undying "swag" a feature which we fancy retains its remarkable popularity chiefly because of all so-called ornamental details it is the most common-place, and the one which it takes least thought to produce. We cannot say no one wants it, for it is the fashion at present, but it is a foolish fashion. *Au reste*, the book is a useful compendium of what can be done, practically, in the way of moulded and decorative brickwork; but there is room for a great deal of improvement and originality in the more ornamental designs.

THE demolition, for rebuilding, of some houses at the corners of Museum and Hart streets, Bloomsbury, affords a good, albeit transient, view of Nicholas Hawksmoor's parish church of St. George. Its site, formerly Plough-yard, is said to have been devised by Lady (Rachel) Russell. She lived in Southampton House, hard by; and died there in the year 1723. This church was consecrated on January 28th, 1731, for a parish which had been taken out of St. Giles-in-the-Fields. It is conspicuous for a fine southern portico, raised well above the street level,—perhaps inspired by those of St. George, Hanover-square, and St. Martin-in-the-Fields,—and the tower at its western side. The singular graduated spire, which Walpole stigmatised as a master-stroke of absurdity, is modelled after Pliny's description of Queen Artemisia's Mausoleum at Halicarnassus, whereof some remains are preserved in the neighbouring British Museum. The crowning statue, upon a round pedestal, of King George I., who here figures according to the epigram as "head of the steeple," is due to the loyal feelings of one William Hughes, M.P., brewer to the royal household. The lions and unicorns, often mistaken for dragons, that guarded its base seem to have disappeared. In this composition, which, however, has many admirers, Hawksmoor was less successful than in his *chef d'œuvre* of St. Mary Woolnoth, Lombard-street. The burial-ground is in St. Pancras parish, being just northwards of the Foundling Hospital.

SINCE the article on the Indian Railway Report, which heads this week's number, was in type, we observe that the subject has come up in Parliament in the form of a question put by Mr. Maclure on Tuesday to Sir J. Gorst, as to whether, considering the present low prices of steel rails, railway plant, &c., the Government would now proceed to the construction of those railways which have been declared to be of urgent public utility for the benefit of the country. The answer returned was formally affirmative, but appears to have been only one of those cautious conventional affirmatives, committing to nothing, which are frequently given by Government representatives in answer to questions of this kind. It

is to be hoped that the extension of the Indian railway system will before long receive practical as well as theoretical approval.

THE Berlin Imperial Museum has recently been enriched by three terra cottas of extraordinary beauty. They will shortly be placed in the antiquities room of the Museum, but are not yet shown to the public. The terra cottas are of Athenian workmanship, and two out of the three are characteristically of Athenian subjects. They are all three in a remarkably fine state of preservation. One represents a scene at a tomb; in front of a tall slender stele a woman figure is seated; a warrior in armour stands near her and regards her with fixed and melancholy attention; to the left is an attendant figure. The subject is common enough on the Attic white lekythoi, but rare in terra cottas, and the expression of the whole group is unique. The second terra cotta represents a youth carrying away a maiden. Here, again, the special value of the work consists in the intensity of the expression. The third terra cotta represents a Silenus, cowering as if beneath a heavy burden; the pose is just the same as that of the well-known colossal Silenus in the attitude of Atlas supporting the heavens, found in the Dionysiac theatre at Athens. The department of antiquities has also further been enriched by several remarkable bronzes bought at the sale of the collection Gréau in Paris: specially to be noted is the exquisite little Apollo, restored, with laurel branch in the left and bow in the right hand.

ST. ALBAN'S seems to be a never-failing theme of controversy in the *Times*. Lord Grimthorpe and Precentor Venables are at it now. The latter had referred to the front (by implication) as "Brummagem," and Lord Grimthorpe wants to know why. The Precentor says, because it is modern work pretending to be ancient. It is "making believe very much," as children say, in that case. But Lord Grimthorpe and the Precentor both miss the real point. Lord Grimthorpe's contention is that a man of the nineteenth century has as much right to add a façade to a building as a man of the fourteenth or fifteenth century. Granted. Precentor Venables says it is not bad work, but it has no business to be there, good or bad. We think he is wrong in both points. A modern architect has every right to make his own additions to a building, provided that he do it well. The point exactly is that it is done badly at St. Alban's; it is not good Gothic, but bad Gothic. Lord Grimthorpe, of course, does not know that; but for that he is more to be pitied than blamed. But Precentor Venables ought to know better.

THE TRIUMPHAL ARCHES OF THE ANCIENT ROMANS.*

RETURNING to the list of Roman triumphal arches in France, which we commenced last week by a reference to the fine example at Orange, we first notice the Black Gate of Besançon, which has a fine bold arch of large size, flanked by two Corinthian columns on each side. Their shafts are ornamented with figures and scrollwork. The entablature is on a level, or nearly so, with the spring of the large arch, and from this level a second order of smaller columns carries up the composition to the crown of the arch, where it is completed by a horizontal cornice from pier to pier, enclosing the arch, the spandrels being filled with winged Victories. The interspaces of the piers are also filled in with sculptured figures in more or less perfect state. While the execution has every evidence of late date, the composition shows a design different to any other arch yet indicated.

While the two arches now mentioned have a proportion more lofty than the arches of Italy, at St. Remi (see illustration), also in Provence, is an arch wider than the average of such structures. It appears still more so from its upper portion

* See pp. 333, 371, ante.

being destroyed. There is a bold semicircular arch, the architrave being filled in with a banded garland of oak leaves, flowers, and fruit. A wide space on each side has two fluted columns to each face, mounted on a continuous base, and with tall pedestals to each. The capitals are gone, and also the whole of the entablature, but there are winged Victories remaining over the arch which indicate the height of its commencement. There are also sculptured figures corbelled out from the walls between the columns. This fine arch is of a good period, and the workmanship is excellent. It stands in a solitary spot, and it is difficult to realise that this is the site of a Roman city.

Close to it is the graceful monument called the Tomb of St. Remi, one of the most beautiful ancient works in existence.

Midway on the Roman bridge of Saintes is a triumphal arch, again of a different type. It consists of two plain semicircular arches, admirably adapted to the position for ingress and egress to the city. They spring from a heavy impost of architrave, frieze, and cornice, which is continued from end to end of the building. At each angle, as well as at the jambs of the arches, are broad, low, fluted pilasters, with large Corinthian capitals, out of all proportion to the height. Above, there is a thin fluted column at each of the angles only, and on them is mounted an entablature with a plain dentilled cornice, just level with the apex of the two arches. Above this, again, is a plain attic, having also a cornice. The inscriptions are too illegible to be deciphered.

At Langres there is an arch of somewhat similar design, there being two semicircular openings, but the position is on solid ground and not on a bridge, and the proportion is larger and taller. A bold Corinthian fluted pilaster of fair proportion separates the two arches, while the flanking piers right and left have each two similar pilasters. The entablature is continuous, not being broken over the pilasters, and the frieze has been filled in with sculptured shields and other trophies.

Like the Arch of Janus at Rome, and some others yet to be mentioned, the fine arch at Cavellon is four-sided, each side presenting a single bold arch of large size, the angles having pilasters covered with elaborately carved scrolls. The arches spring from moulded impostas, and the soffits are panelled in small squares alternating with others of lozenge shape, the whole being filled in with rich carving.

The Roman bridge at St. Chamas (see illustration) has a triumphal arch at each extremity, the whole forming an architectural design of great beauty, deserving of far greater attention than it has hitherto received. Indeed, the whole of the fine Roman works of Provence merit much more notice than they have had at present, and it must be a matter of regret that while so many other countries are explored for works which prove to be of inferior merit, those of this favoured land are ignored or forgotten. A plain bold arch of solid masonry forms the bridge over the narrow river. The triumphal arches, which are alike, consist of a single broad arch, formed by a moulded archivolt springing from an impost and a plain pilaster. At the angles of the piers are fluted pilasters with Corinthian caps. The entablature has a dentilled cornice, a frieze filled in with carved scrollwork, an inscription, and a moulded architrave. It is broken around the angle pilasters, above which are crouching lions. There is no attic or blocking course.

The Arch of Carpentras, now laid open from the walls, which had so long encumbered it, presents a single arch springing from fluted pilasters, and having angle columns. The whole of the superstructure has been destroyed. There are some curious figures which indicate a late date. One of these is a lion grasping a human head, similar to what has been noticed on some carvings in England.

There was a fine arch at Arles, but it was demolished in 1743. M. de Caumont speaks of fragments of friezes, and of other sculptured stones, which he believed to have formed portions of other arches at Narbonne, Perigueux, Tours, and Sens.

These few indications will be sufficient to show how rich ancient Gaul must have been in monuments of the class under consideration, and how different were their designs to those of similar works elsewhere.*

THE POST-OFFICE EXTENSION IN ST. MARTIN'S-LE-GRAND.

In his capacity of arbitrator between the two parties, Mr. John Clutton has determined his award concerning the claim advanced by the Governors of Christ's Hospital as against the Postmaster-General. It is adjudged that the former shall receive, in terms of the Lands Clauses Act, a sum of nearly 130,000*l.* as purchase-money and compensation for so much of their City property as is required to carry out the proposed extension of the General Post-Office, St. Martin's-le-Grand. This sum exceeds by some 15,000*l.* the departmental assessment; whilst on the other hand the surveyors who acted on behalf of the hospital gave in estimates ranging in amounts from 160,000*l.* to 170,000*l.* The case was heard at the Surveyors' Institution, Westminster, the arguments lasting over several days. The late Attorney-General, Mr. Bidder, Q.C., and Mr. Casserley held briefs for the Government; the hospital authorities were represented by Mr. Littler, Q.C., and Mr. Herbert Lako.

All the scheduled property is situated in the Wards of Farringdon Within and Aldersgate, and within the parishes of St. Anne and St. Agnes; Christ Church, Newgate-street; and St. Botolph Without, Aldersgate. Around and about the ground to be acquired are certain disused graveyards, being those of Christ Church, to the north and west; of St. Botolph, to the north; whilst to the east and north lies that of St. Leonard, Foster-lane. This last now forms a private garden; a pretty little plot of well-cultivated land, immediately behind the central Money-Order Office (formerly the site of Magpie-alley), through which it is approached. St. Leonard's parish church was founded * within the precincts of St. Martin's Collegiate Church to serve the residents therein. St. Leonard's parish and the collegiate precincts were co-terminous. The site of the church, nearly opposite to St. Vedast's, has already been absorbed in the Post-Office buildings. Since these limits, however, will not be readily identified by the ordinary wayfarer, we should state that the area in question lies between St. Martin's-le-Grand and King Edward-street, east and west; and Bull and Mouth and Angel-street, north and south. Of the existing buildings within this space the most conspicuous are the Queen's Hotel, the Great Northern Railway Company's City Depot at the Bull and Mouth, the French Nonconformist Protestant Church, and the Blue Coat School masters' three houses in King Edward-street. In the Guildhall Museum may be found two relics of Bull and Mouth-street. These are the two stone figures of the boy and girl from above the entrance to the former ward schools (Farringdon Within) in that thoroughfare; and a marble tablet inscribed,—

STEWKLEY'S
STREET,
1068.

It appears that, having been promised some property here by one Stukeley, or Stuckeley, the hospital governors called this street by his name; but, inasmuch as the promise was not kept, they removed the tablet and re-named the street under its *ci-devant* style. That name was derived from the Bull and Mouth Inn, at one time a leading coaching house in the City. As in the case of the Bull and Gate, or Bullogue Gate, in Holborn, the sign is most probably due to King Henry VIII.'s popular victory at Boulogne Harbour in 1544. This hostelry was famous, too, for its associations with the once persecuted Quakers. George Fox is said to have often preached here; and here in more troublous days Thomas Ellwood, who was then enjoying the friendship of Milton at his "garden house" in Jewin-street hard by, was arrested at a prayer-meeting, 26 August, 1662, and carried off to Newgate. Its later aspect as a coaching house is preserved for us by W. Watkin's engraving (1831) from a drawing by T. Hosmer Shepherd. Though they should both be rescued from destruction, we can scarcely expect that room will be made in the Museum for the big sign of the Bull and Mouth above the yard entrance in Angel-street; or for the

* The foundation is by some attributed to William of Wykeham, the then Dean. In Alderman Staples' "Notes on St. Botolph Without, Aldersgate," the founder's name is given as "Walter or William Wykeham," and the date as about A.D. 1238. This is 150 years before William of Wykeham flourished.

lofty composition which is placed against the front of the Queen's Hotel. Surmounted by King Edward VI.'s bust upon a voluted pediment, beneath which is the hospital coat of arms—this trophy includes the figure of a bull supported by festoons and some more or less appropriate adornments. Underneath is a tablet to record the two-fold capacities of Milon of Crotona. His feats of carrying a four-year-old heifer through the stadium at Olympia, and of then consuming his burden in a single day, are commemorated in a block-letter inscription that, accurately transcribed, reads as follows:—

Milo the Cretonian
An ox slew with his fist
And ate it up at one meal
Ye Gods what glorious twist

The original inn was on the south side of Bull and Mouth-street; its successor, the Queen's Hotel, dating from 1838, faces eastwards in St. Martin's-le-Grand. In Jacob live's map of March 10, 1739-40, a "Quakers' Meeting" is laid down just east of the inn.

The Mourning Bush Tavern, since the New Post-office Coffee-house, in Aldersgate-street, together with its ancient vaults abutting against the City wall, is a thing of the past. But it is to be observed that along the southern sides of the St. Leonard and St. Botolph burial-grounds are yet to be seen fragments of the wall, its best portions being covered by the lean-to shed in St. Botolph's graveyard. This graveyard stands over the former City ditch whereof the name is still retained for the play-ground beyond of the Blue Coat boys. Closely adjoining is the French Protestant Church across the boundary line between the two parishes of St. Botolph and St. Anne and St. Agnes. This church, covered by the scheme for demolition, together with a small portion of a certain warehouse, does not, be it noted, appertain to the hospital freehold.

As we shall show below, a French colony had settled here in Queen Elizabeth's reign. But this church was built, after Owen's Gothic design, in 1842, upon the pulling down of St. Mary's Chapel, in Threadneedle-street, upon the site of the much older St. Anthony's Hospital. The congregation succeeded to that branch of the church of French Protestants which had been enfranchised by Edward VI.'s charter of 24th of July, 1550. Originally composed of refugees who left France before the revocation of the Edict of Nantes, they should not be confounded with the German, Flemish, and other Walloon Protestants who represented the following of Jean à Lasco from Embden, and to whom the Dutch church, Austin Friars, was assigned. Their church, at Aldersgate, possesses a donative library of about 2,500 volumes on ecclesiastical and theological subjects, written chiefly in the French and Latin tongues, and including several books of considerable value and rarity. The Charity Commissioners have framed a scheme whereunder certain appointed trustees are charged with the maintenance, custody, and insurance of the library.

The Collegiate Chapel of St. Martin's-le-Grand dates from a very early period of our history. In his book, already cited, the Lord Mayor (Alderman Staples) says:—"That there was a building on the site of St. Martin's appropriated by the early Christians in our island to the worship of the true God is probable by the Bull of Pope Clement V. (A.D. 1307), reciting the church among those exempted from episcopal jurisdiction, because they were founded before bishops were ordained in this kingdom, and episcopal jurisdiction had been usurped over them in times of civil commotion." The story goes that *temp.* Edward the Confessor, in 1056, two Englishmen of repute, Ingelric, Earl of Essex, and his brother Gerard, re-endowed the existing chapel with large possessions for the maintenance of canons secular. The Conqueror gave them a confirmatory charter in the second year of his reign, when Ingelric, having lost his lordship over Essex, after the defeat at Senlac, came hither in retreat, and was appointed the first dean. Though placed within the later walls, the canons were always successful in resisting the repeated efforts of the Corporation to interfere with their privileges, comprising the oftentimes abused rights of sanctuary. King Henry VII. bestowed the deanery advowsons upon the Abbots of Westminster, who henceforth became Deans of St. Martin's. William of Wykeham signalled his tenure of the deanery by rebuilding the church-house, and nearly the whole of the church.

* To be continued.

Under purview of the Act of Chancery, 1 Edward VI., the Crown gained possession of St. Martin's-le-Grand. The buildings were soon razed to the ground. But over the ruins arose another "Alsatia." This at once proved a highly-favoured resort, by reason not only of the surviving rights of sanctuary, but of the exemption from civic jurisdiction, and its consequent freedom in trade, which residence within the Liberty continued to afford. In Queen Elizabeth's days the inhabitants consisted for the most part of Scots, French, Dutch, and Germans,—all such "strangers" being able to ply their respective callings, as dealers and manufacturers, secured from interference on the part of the City authorities. Strype, and even later writers, bear testimony to the excellence of their wares, notably of the "St. Martin's" and "Boul" lace, a description of copper filagree work. The ground was cleared in 1818 for Sir R. Smirke's new General Post Office (from Lombard-street), constructed in 1825-29. Amongst the places removed were Dean's-court; Mouldmakers'-row; Bell, Three Crown, and Round courts; Horse-shoe-alley; George-street; New-rents; Dark-entry; and the Three Tuns Tavern. During the progress of the works the cellars of the Queen's Head Tavern were exposed, and identified as the church crypt attributed to William of Wykeham. Deeper down were discovered abundant remains, such as coins (one of Constantine), beads, lachrymatories, Samian ware, funeral urns, and the like,—all indicative of Roman occupation in London.

THE GREAT SEALS OF ENGLAND IN EARLY HERALDRY.

We have no grounds for assuming that heraldic figures were known in the British Isles before the latter half of the twelfth century. The first great seal of our Crusading Richard gives us one of the first undoubted examples. It represents a lion rampant turned to the inner, or sinister, side of the shield, and we may take it for granted that the other half was similarly charged, thus placing the animals as combatants.

After the expedition to the Holy Land a second great seal was struck for Richard, charging the shield with three golden lions passant guardant on a red field, and thus have they remained for seven centuries as "the lions of England."

All too soon comes King John to claim the great seal, and to hold it in his most unworthy hands, and then to pass it on to the long-lived Henry III., and thence it finds a noble holder in the person of warlike and illustrious Edward, who made the presence of the lions felt in the concluding days of the crusades amongst the defenders of the crescent. It is in this latter monarch's reign that the lions first appear charged on the bardings of his horse.

Again England's great seal descends to weak and worthless grasp, as the second Edward assumes it, while swayed by foreign and odious favourites, hastening to his terrible doom, and claiming our sympathy *alone* by this ending of his almost intolerable reign.

Strange and rapid are the vicissitudes of our Island's seal, and now we follow it with a feeling of relief, as another Edward comes forth to claim it, and in his good keeping to watch the lions of England through half a century of her greatest glory. And now the *fleurs-de-lis* of France appear quartered with them, showing the title of this great monarch to the French kingdom, through his natural descent. It was in this reign that a great improvement in the designs of the great seals was made, and it is generally acknowledged as the period of their greatest excellence; most elaborate architectural details were introduced, and the heraldic bearings become more interesting.

Richard II. made no alteration in the seal beyond putting his own name in the place of that of his predecessors, and the same remark will apply to Henry IV., but the latter afterwards added a second seal, perhaps the largest and most elaborate of them all, reducing the *fleurs-de-lis* to three in number, in accordance with the alteration that was made in France about this time. We might well expect gorgeous design for a monarch who revelled in "the pomp of heraldry," and had twelve personal badges.

With the accession of Edward IV. the roses

make their appearance on the great seal, while Henry VII. brought in a rose on a branch, and Henry VIII. added a lion and *fleur-de-lis* to the obverse, and finally adopted a seal with designs from the Renaissance school.

THE PROPOSED "NATIONAL ART EXHIBITION."

To a letter to the *Times*, Messrs. George Clausen, Walter Crane, and Holman Hunt append their scheme for organising a National Art Exhibition which would, they think, meet the needs of artists in a more satisfactory manner than that in which they are met by the Royal Academy:—

NATIONAL ART EXHIBITION.

Programme.

First obtain guarantees for money to pay expenses before and during Exhibition. In the event of the Exhibition not being self-supporting the deficit will be met by a *pro rata* call on the money guarantors,—i.e., each guarantor will lose from the sum he guarantees the proportion that the deficit bears to the total amount guaranteed.

For example, if the total amount guaranteed is 500%, and the deficit to be met is 100%, each guarantor will lose one-fifth of the sum he guarantees.

If the Exhibition, nevertheless, the money advanced by the guarantors will be returned.

If there is a balance it will be carried forward to next Exhibition.

The functions of the Managing Committee (elected from and by the money guarantors) to be quite separate and distinct from those of the Artistic Committee, the latter to have the sole and only voice in selecting and hanging the works of art submitted to it.

When there are sufficient guarantors, a circular explaining the "movement" will be sent at once to the suffrage, and every effort made to advertise to voters and general public.

The suffrage to be as wide and as universal a suffrage of all ranks and conditions of artists as possible, without discrediting the suffragan voice.

Let us say every artist who in the last two years has exhibited a work of art in any of the principal exhibitions. Let us say for "principal exhibitions" the different widely-known existing art societies, and the exhibitions managed by the municipal corporations of the provinces.

The circular to be an explanatory programme, saying very distinctly that the voter to whom it is sent will have no pecuniary responsibility, and asking:—

(1.) That the voter will submit two works to the Selecting and Hanging Committee for exhibition.

(2.) That the voter will send in his name as a candidate for the Selecting and Hanging Committee.

(3.) That the voter will vote the names of twenty for the Selecting and Hanging Committee.

Then explain that these twenty will be chosen from a list of the names that are given in response to paragraph (2). That this list will be sent early next year.

Then early next year this list of names, collected as above, will be sent to the suffrage, and by its vote will be finally chosen the Selecting and Hanging Committee of twenty.

THE ELECTRIC STREET TRAMWAY AT BLACKPOOL.

In the Mechanical Science Section of the British Association meeting at Birmingham, Mr. Holroyd Smith, of Halifax, read a paper on an Electric Street Tramway, of which he has been the engineer, at Blackpool. He stated that the difficulty of applying electricity for tramway working lies in the fact that other vehicular traffic passes over the same road, and therefore the necessary conditions of safety to the public, and practical and economical efficiency, have to be considered. This is accomplished by constructing an underground channel in the centre of the track, having a narrow slit or opening in its surface for communication between the electric motor on the car and electric conductors within the channel. The general conditions are three:—(1) safety to the public, (2) efficiency, (3) economy. With some reservations the first condition may be accomplished by the employment of secondary batteries, which are destined to play an important part in the progressive development of electricity for tractive purposes; but it must be admitted that they occupy only a secondary place when it is shown that electricity can be used direct, and then can not only fulfil the first condition but the other two conditions also. The employment of rails as lead and return conductors is out of the question, for in large installations it must fail in regard to all three conditions. Side fence rails or overhead conductors, though fulfilling the conditions of efficiency and economy, are inadmissible for street purposes. There seems, therefore, but one course, and that is to place the electric conductors underground. Many carefully-worked-out details are necessary to carry this into effect. The channel is formed strong enough to support the ordinary

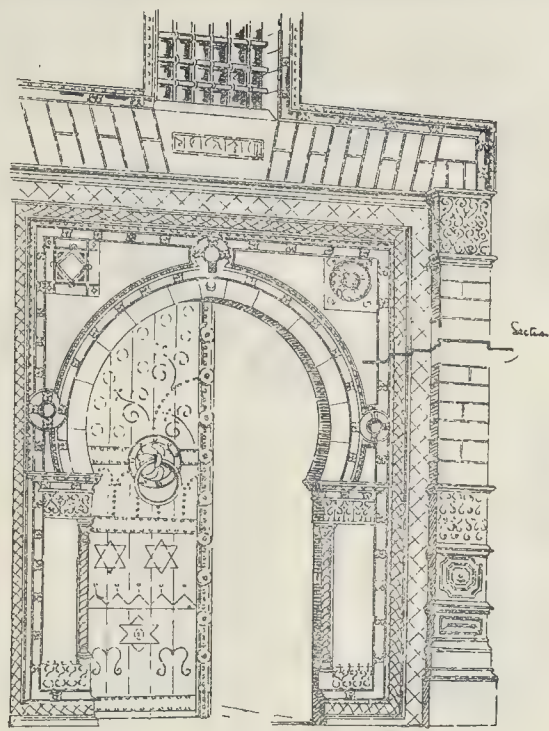
traffic of the road, and so as to be easily flushed and cleansed. Its surface consists of steel troughing filled with wooden paving blocks, and forms a good roadway: the sides of the channel are partially formed of creosoted wood, holding porcelain insulators, which carry electric conductors of specially drawn copper, so formed that they can be readily and securely fixed, and the different lengths secured by expansion joints. Two conductors are supplied first, that they may be hidden under either side of the surface, and so be protected from injury by any substance falling through the slit in the surface of the channel; and, secondly, to make it possible to deal with points, loops, and crossings. Only the positive electricity passes along these conductors; the return is made by means of the rails, which are electrically connected one with the other. Communication is made with the cars by means of a collector which runs upon the copper conductors within the channel. Insulated copper bands, protected by steel plates, pass through the slit or opening in the surface of the road, and by a flexible insulated cord attached to the electrical terminal underneath the car, so that when the car moves the collector is drawn along with sufficient force to clear away any ordinary obstruction; but should an absolute block occur, then a special clip releases the collector, and a breakage is avoided. From the terminal underneath the car the current passes to the switch-box, where the quantity and direction of the electricity to and within the motor is regulated, and thereby the speed and direction of the car are controlled. Switch-boxes are placed at each end of the car, and are provided with removable handles, without which it is impossible to operate them. The driver, who has charge of these handles, can cause the car to move backwards or forwards at will. From switches the current goes to the motor, and there produces mechanical energy. The motor running at a high speed, a combination of spur and chain gear is employed to communicate the power to the wheels and drive the car. The gear is specially designed to run smoothly and silently; from the motor the current passes by way of adjustable clips to the axle, and by them through the wheels to the rails and back to the station, where the electricity is generated. The electricity is generated at a station situated near the centre of the line. The engines and dynamos are in duplicate, and are capable of supplying a force of 250 volts and 300 amperes when required. The arrangements are such that the supply is equal to the demand,—viz., if one car is running enough current to drive it, and no more; if ten cars, sufficient for them. The practical success of the undertaking is proved by the continued working of the line. Nine cars run daily during the present season; they are always crowded, and most of the passengers ride the full two miles. Over 42,000 have been carried in one week of six days, there being no Sunday traffic. The cost of coal burned being under 5*l.*, gives thirty-five passengers carried the mile for a halfpenny worth of coal.

Mr. R. Horsfall, the chairman of the Blackpool company, said that for the last four weeks their receipts had been 330*l.* per week, and the cost of working had been 45*l.*. They hoped to pay the cost of working during the winter, and to make a nice profit for the shareholders, during the summer. He believed there was a great future for electric tramways in this country if they were properly constructed; but the misfortune of the Blackpool line had been that it had cost for the two miles as much as 30,000*l.*

Captain Douglas Galton, speaking with reference to the Brussels and Antwerp tramways, said that they were worked by accumulators on the cars, and at first sight that system, if it could be shown to be economical, seemed to be preferable to others, because it did not involve a large outlay in plant or maintenance. But as yet the experiment in neither city gives much light.

Professor Perry said that the most valuable thing a mechanical engineer could go in for was the construction of a motor which should have no mechanical defects. The electrical engineer made his motor perfect electrically, but its nuts and keys were always getting loose.

Mr. Gisbert Kapp and other gentlemen having also spoken, Mr. Smith replied. He denied that accumulators could be economically carried, on account of their weight. He believed that there was great scope for the development of electrical tramways in towns.



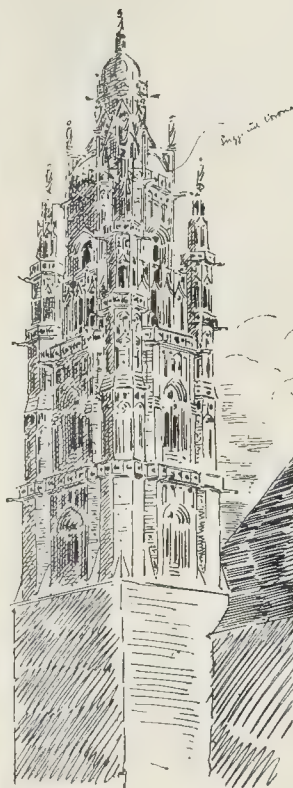
The delicate ornamentation, in marble,
of this door is very beautiful. The
mouldings on the door itself is executed
in Arab hands.



Local moulding

Dunn. Tunis 1884 A.D.

DOORWAY, TUNIS.



TOWER, RODEZ CATHEDRAL.

From "Notes and Sketches of an Architect."

NOTES AND SKETCHES OF AN ARCHITECT.

UNDER the above title Mr. Archibald Dunn has produced a very pretty and interesting quarto volume* of architectural sketches, some of them of rather out-of-the-way work. We give reproductions, by the author's permission, of two of the sketches, showing the kind of thing that is to be found in the book. Mr. Dunn is desirous it should be distinctly understood that these sketches are given simply as sketches, "facsimile reproductions by photolithography of work done on the spot." We find, however, from another sentence of the preface that many of the sketches, originally in pencil, were traced in ink for photolithography. That was unavoidable, but we may point out that this is not exactly the same thing as a facsimile of a sketch "finished on the spot." However, the book contains a good many freely-sketched bits which are suggestive to glance over. The tower of Rodez Cathedral is an example of the more rough and free sketches in the book, and the sketch of the door at Tunis one of the more finished ones.

MICRO-ORGANISMS IN WATER AND AIR.

IN the Biological Section of the British Association meeting at Birmingham, on behalf of Dr. Frankland (London) an abstract of a paper on "The Multiplication and Vitality of certain Micro-organisms, Pathogenic and otherwise," was read by Professor Ward. In this paper the author recorded a number of experiments which he had carried out on the multiplication of the micro-organisms present in natural waters, and also on the vitality of certain pathogenic organisms when purposely introduced into similar media. These phenomena had been studied by aid of the method of gelatine-plate cultivation, originally devised by Koch. The first part of the paper treated of the influence of storage in sterilised vessels upon the number of micro-organisms present in the unfiltered water of the rivers Thames and Lea, in the waters of these rivers after sand filtration by the companies supplying the metropolis, and in deep-well water obtained from the chalk. Of these three different kinds of water, at the time of collection the unfiltered river-waters were the richest in micro-organisms, containing as they did several thousand microbes, capable of being revealed by plate cultivation, in one cubic centimetre of water, whilst the filtered river-waters had this number generally reduced by about 95 per cent., and the number present in the deep-well water rarely exceeded 10 per cubic centimetre. On storage in sterilised vessels at

20° C., however, a great change in the relationship of these numbers soon took place, for whilst the number of organisms in the crude river-water underwent but little change or even suffered diminution, that in the filtered river-water exhibited very rapid multiplication, and that increase was even still more marked in the case of the deep-well water. The author suggested that the differences in the rate of multiplication exhibited by those three kinds of water was dependent upon the number of different varieties of micro-organisms which they contained. Thus in the unfiltered river-waters the organisms belong to a number of different kinds; the filtered river-waters exhibited fewer varieties; whilst in the deep-well water the number of varieties was still more limited, the gelatine-plates having generally the appearance of almost pure cultivations. The microbes in the deep-well water would thus be less hampered in their multiplication by hostile competitors than those in the filtered river-waters, and these again less than those in the crude river-waters, in which an equilibrium must have already been established between the various competitors. The author pointed out how necessary it was that each pathogenic organism should be made the subject of separate investigation, and how fallacious must be any generalisations concerning the vitality of pathogenic microbes which were based upon the study of a single form.

Dr. Frankland also contributed a paper on

* Notes and Sketches of an Architect. By Archibald M. Dunn. A collection of sketches made in England, France, Germany, Italy, Spain, &c., and also in Eastern countries. Andrew Reid: Newcastle.

the distribution of micro-organisms in the air of town, country, and buildings, which contained the results of a number of experiments which the author had made on the relative abundance of micro-organisms in the air of different places, and of the same place at different times. In these experiments the number of microbes contained in a given volume of air had been supplemented by the determination of the number falling upon a unit of horizontal surface (1 square foot) in a unit of time (one minute). The number of organisms falling on a given area had been determined by exposing for a definite time small glass dishes filled with sterile nutrient gelatine. The greater part of the experiments had been made on the roof of the Science Schools, South Kensington, whilst comparative determinations had been made in various places, both in town and country. A number of experiments were made with a view to determining the effect of altitude upon the abundance of microbes in the air. These experiments were carried out at various stages on the dome of St. Paul's and on the spire of Norwich Cathedral. The air in buildings had also been submitted to examination, and the fact established that, whilst in enclosed spaces in which the air was at rest, the number of microbes in suspension might be very small, yet when aerial disturbance was occasioned by persons moving about the number was enormously increased.

OBITUARY.

Mr. Rowland Mason Ordish, whose name will be well remembered by many of our readers as an authority on ironwork, died last Sunday at his residence in Camden Town. When in practice in Great George-street he was constantly being consulted by architects and engineers on questions of detail. His courteous manner, and his readiness at all times to give information to those who would take the trouble to consult him, won for him a reputation as a kind friend and a willing adviser. There are numbers of his old pupils now about Westminster, and holding good positions in the country and abroad, who owe their practical knowledge of ironwork to the experience gained in Mr. Ordish's office. He was one of those who attached great value to neatness of work, and was himself both an excellent draughtsman and very neat penman in writing dimensions and descriptions upon his drawings. He could appreciate mathematical work, but always preferred, where possible, to work graphically in calculating strains. Among the works with which his name remains associated we may mention the St. Pancras Station Roof, the restoration of the roof over the Chapter House at Westminster, the Leeds Infirmary Winter Garden Roof, the Albert Hall Roof, the Albert Bridge over the River Thames at Chelsea, the Franz-Joseph Suspension Bridge over the Moldau at Prague, the Singapore Bridge, the Czernowitz Bridge, Watson's Building, Bombay (an hotel constructed of cast-iron); the Wellington Pier, Bombay; the Nitheroy Gasworks roof, Brazil; the Derby Market-hall, the Derby drilled, the Farringdon-street bridge of the Holborn Viaduct, the widening of the Victoria railway bridge over the river Thames at Battersea, and the various railway bridges over the roads and railways in the immediate vicinity upon the Surrey side; the Amsterdam station of the Dutch Rhenish Railway, and the Amsterdam Exhibition. The Dublin Exhibition roof, now re-erected at Battersea, was also due to his genius. These works, which are not here given in order of date, show a variety and extent of work which rarely passes through the hands of one man. In his early days Mr. Ordish was engaged upon the Great Exhibition of 1851, and also that of 1862. Mr. Ordish spent a large amount of his spare time in advocating the construction of a low-level Tower Bridge, and in advocating a scheme known as the North-Western and Charing-cross Railway, which involved the construction of new thoroughfares between Oxford-street and Charing-cross.

A Statue of St. Winifride (life-sized), designed by Mr. Kirby, architect, of Liverpool, and executed by Mr. R. L. Boulton, of Cheltenham, has been erected at St. Winifride's Well, Holywell, under the carved canopied niche which has been empty for several centuries.



Wrought-Iron Work executed by Messrs. A. Newman & Co. for Mr. Alma Tadema, from the Designs of Mr. Tadema.

WROUGHT-IRON WORK AT MR. TADEMA'S STUDIO.

THE accompanying sketches, supplied by Messrs. A. Newman & Co., represent some wrought-iron work which has been executed at Mr. Newman's forge for Mr. Alma Tadema's studio at Hampstead, under the superintendence and mostly from the designs of the latter, though Mr. Tadema tells us that Mr. Newman may fairly claim the whole credit of the designs for the weathercock and its belongings, and for the grill panel on the right, which were designed by Messrs. Newman and approved by Mr. Tadema.

The details, as will be observed, show a greater degree of naturalism than is habitually used in wrought-iron design.

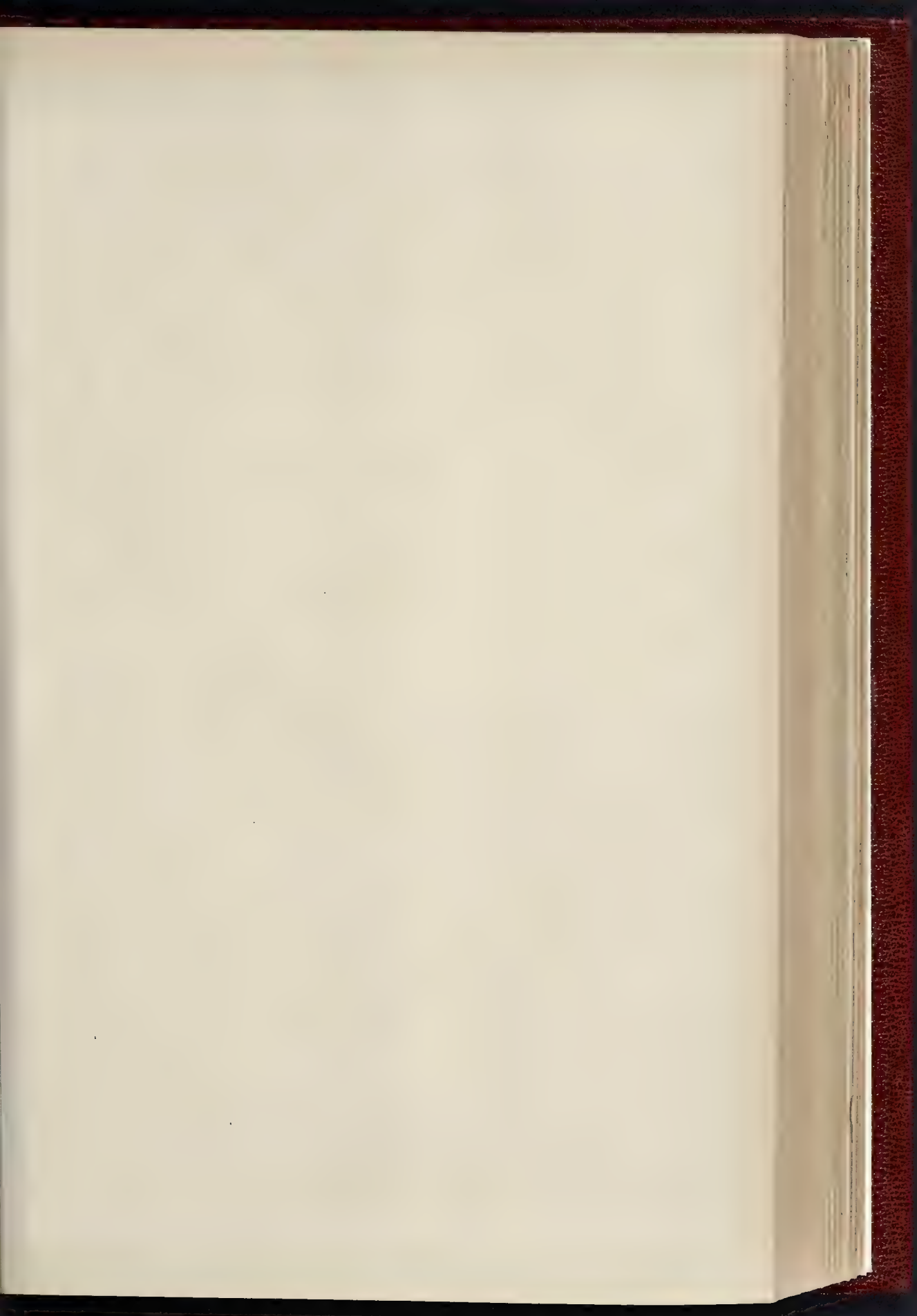
Illustrations.

THE MAPPIN ART GALLERY, SHEFFIELD.

THE late Mr. John Newton Mappin left to the town of Sheffield a valuable collection of modern paintings, and a sum of 15,000*l.* to provide a building for their exhibition.

The refined and beautiful design which we illustrate by three views this week was submitted in public competition for this building by Mr. J. D. Webster, who describes his object in the preparation of the design to have been the provision of adequate space for Mr. Mappin's collection and reasonable accommodation for the temporary exhibition of other collections, rather than the provision of a larger number of galleries at the expense of the architecture.

Our double-page external view is taken from a delicate and pretty drawing, which was hung in a good position this year at Burlington House. The semicircular portico projecting from the side of the building leads through a small vestibule to a hall, 35 ft. long by 28 ft. wide, from which on the right the principal gallery, 100 ft. long by 35 ft. wide, is entered; both of these are of the full height of the building. On the left of the hall are cloak-rooms and lavatories, and in the rear, not seen in the view, is a large gallery, 60 ft. by 35 ft., for loan collections. A corridor of three bays, seen on the left, affords communication with the Weston Museum. Over the portico and cloak-rooms, and reached by a small staircase in the tower, are galleries for drawings, &c., open to the hall, as is shown in the interior view of the latter. The other interior view, of the Mappin Gallery itself, shows the admirable method of lighting proposed.



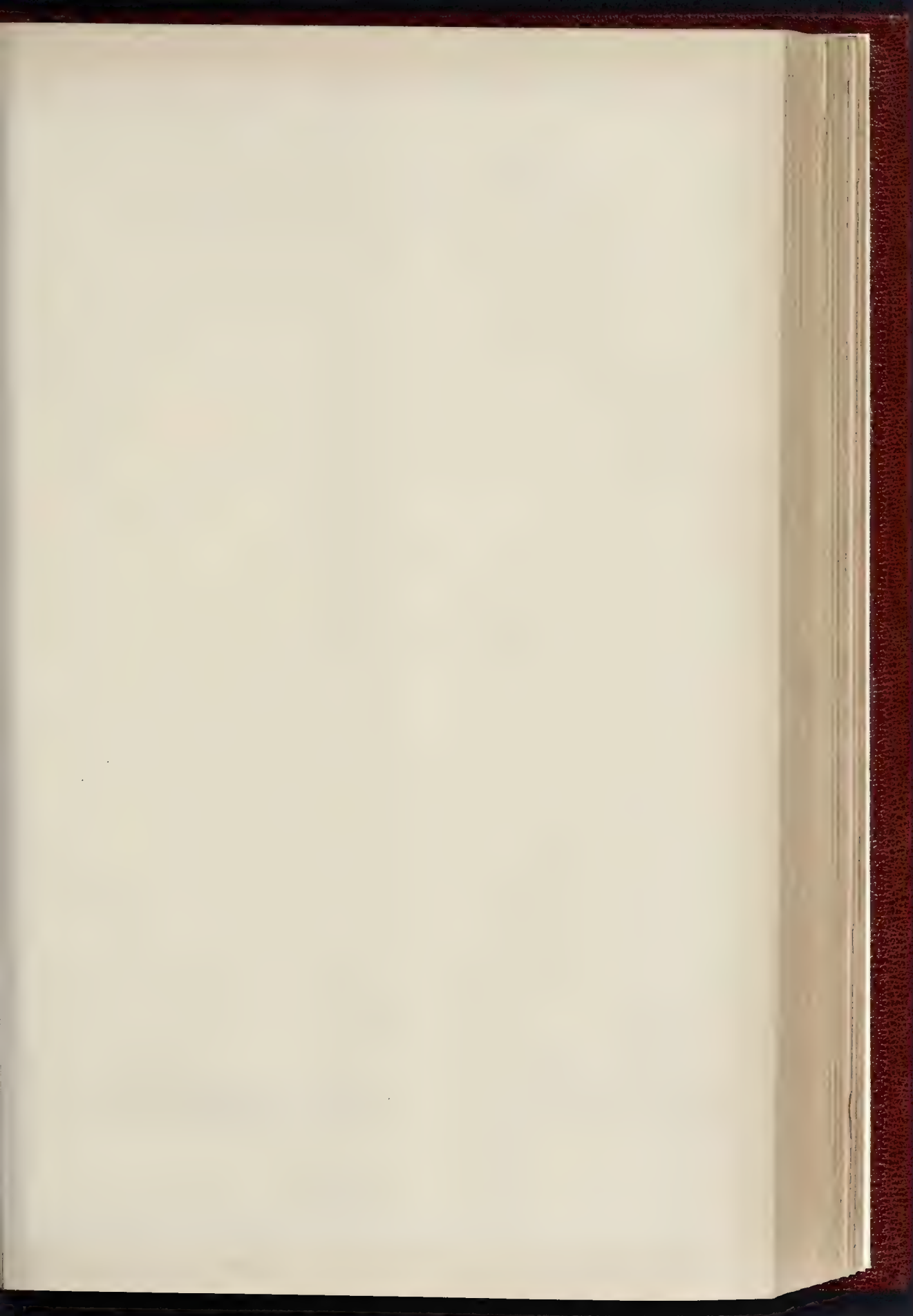


DESIGN FOR THE MAPPIN ART GALLERY



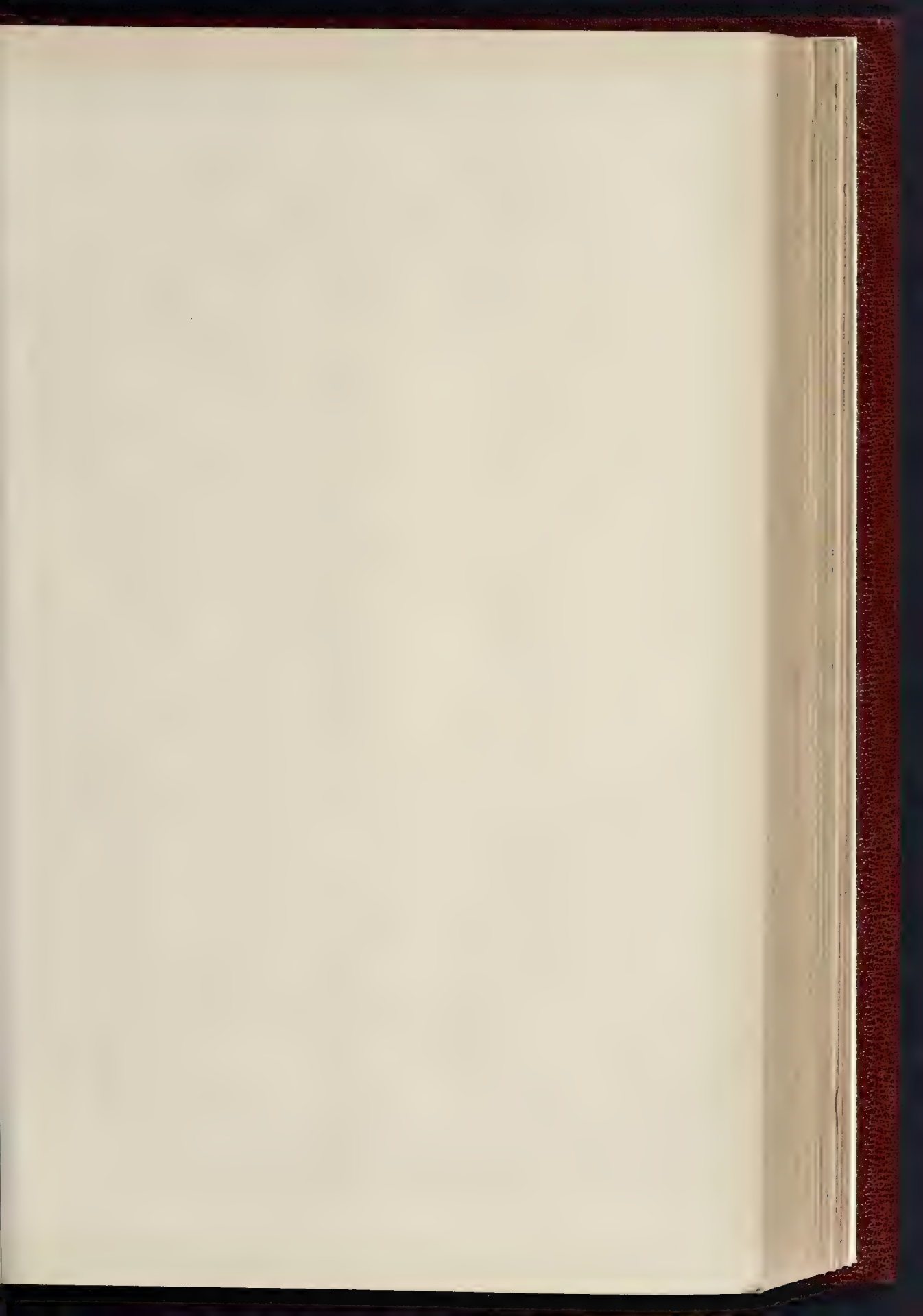
FIELD. BY MR. J. D. WEBSTER, F.R.I.B.A.

© Crystal Palace London, E.C.





DESIGN FOR THE MAPPIN ART GALLERY, SHEFFIELD: INTERIOR VIEW.
By MR. J. D. WEBSTER, F.R.I.B.A.





THE TRIUMPHAL ARCH
ARCHES AT THE BRIDGE OF ST.



C F Kell Photo-Lith & Printer. 8, Castle St. Holborn, London, E.C.

OF THE ROMANS.

From an Engraving by Dance.

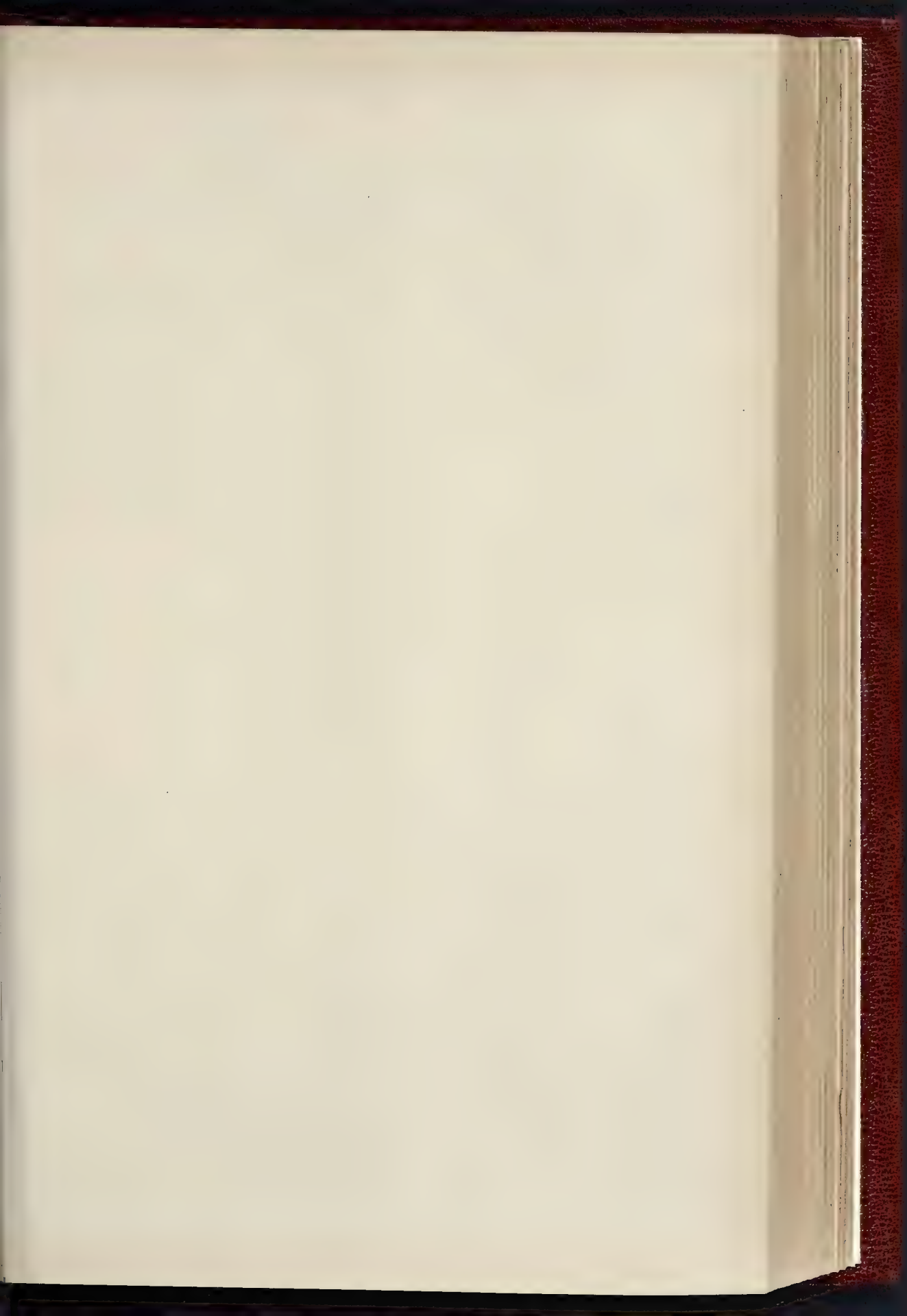


Wyman & Sons Photo Litho

©Queen St London WC

DESIGN FOR THE MAPPIN ART GALLERY, SHEFFIELD: THE ENTRANCE HALL

By MR. J. D. WEBSTER, F.R.I.B.A.





J. F. Kent Photo Lith & Printer

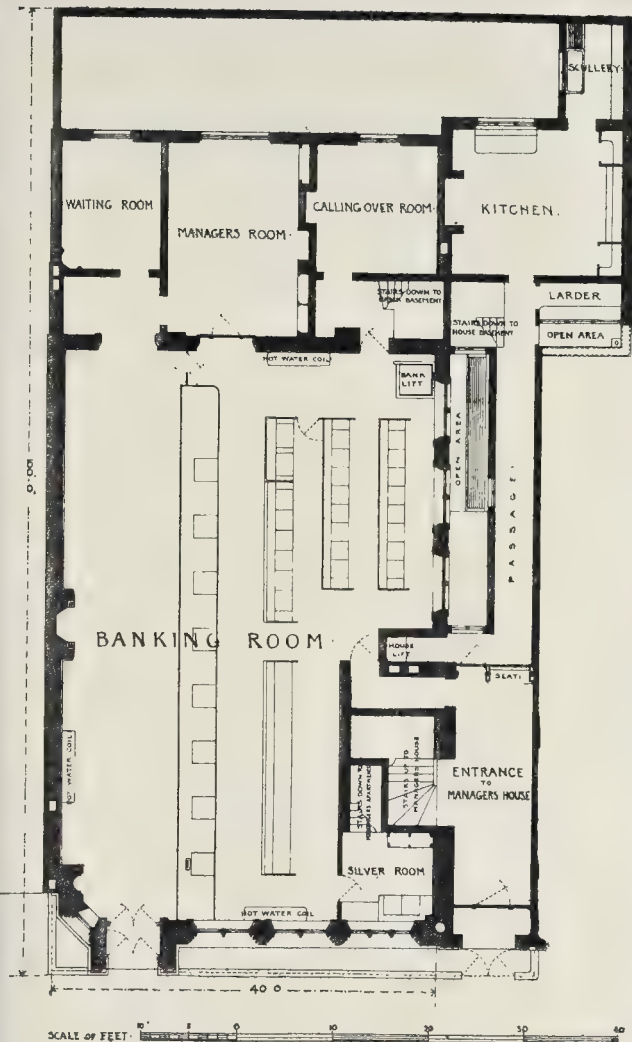
THE TRIUMPHAL ARCH
ARCH AT ST. REMI, PROV.



OF THE ROMANS.

an Engraving by Baltard.

8 Castle St. Holborn London. E.C.



London and County Bank, Kensington.—Ground Plan.

THE NEW LONDON AND COUNTY BANK, KENSINGTON.

We append a plan of this building, a view and description of which we gave last week. Mr. Alfred Williams is the architect.

CANAL COMMUNICATIONS.

This was the subject of a paper read by Mr. E. J. Lloyd in the Economic Science and Statistics Section of the British Association meeting at Birmingham last week. After giving a history of canal navigation from the earliest times down to 1846 the writer proceeded:—In that year England was under the influence of a railway mania, and canal undertakings were discredited and looked upon as no longer of much use, except locally as feeders to railway companies. Many canal proprietors participated in these views, and allowed their undertakings to be used and taken under railway control, until in 1870 the disadvantages resulting to the country became so manifest that a return was ordered. The canal mileage acquired by the railway companies, when it was found that out of the total length of canal and river navigations of England and Wales, amounting to 2,437 miles, 306 miles had passed under their control. These companies managed the canals to suit their own purposes, and the traders and the

public generally complained so strongly that their interests were sacrificed that in 1872 a Joint Committee of the House of Lords and House of Commons sat to consider the subject, who reported as follows:—"1st. That no inland navigation now in the hands of a public trust shall be transferred to or placed under the control of a railway company. That if the trustees of an inland navigation or a canal company apply to Parliament for power to purchase compulsorily a canal from a railway company, such purchase shall be favourably considered by Parliament. 2nd. That the utmost facilities shall be given for the amalgamation of adjoining canals with one another or with adjoining inland navigation." The continued unsatisfactory condition of many canals, especially of the 1,306 miles under the control of railway companies, led in 1883 to the appointment of a Select Committee on Canals. It sat for four months, and much valuable evidence was brought forward, which is published in a Blue Book of 331 pages. We have seen how unavailingly the Earl of Chatham endeavoured to have national attention given to canal construction. From that day to this successive Governments have sadly neglected it, so that in Mid-England we now find ourselves in the year 1886 with mere mud ditches to the ports. This was forcibly brought out in evidence before the Parliamentary Committee

in 1883, when Mr. E. J. Lloyd, who acts in the triple capacity of engineer, general manager, and secretary to the Warwick canals, stated that the canals between Birmingham and the ports were, as a matter of fact, enlarged ditches, 5 ft. in depth, with a top water of 30 ft., and inclined slopes of mud on each side, which have a constant tendency to silt and fill up the bottom. It was impossible to make use of them for steam power. The Grand Junction Canal had tried to do so, but had failed, and had sold their steam boats. This state of things had led to a virtual monopoly on the part of the railway companies, so that in October last, in answer to the question issued by the Royal Commission on Depression in Trade, "Are there any special circumstances affecting your district to which the existing condition of trade and industry there can be attributed?" the Birmingham Chamber of Commerce replied:—"The exorbitant cost of carriage of goods from Birmingham to the seaboard which has placed inland districts at a great disadvantage compared with maritime towns." Birmingham and South Staffordshire object to pay higher rates than any other district. To enforce them may not prove to the permanent advantage of the railway companies, as it tends to cripple trade and seriously lessen the carriage of goods. In illustration, one out of many cases may be given. Messrs. Hudson & Son, the well-known washing powder manufacturers of West Bromwich, had, like many others, occasion to complain. They told the railway companies that they should go to Liverpool if the exorbitant charges were not abated. Their remonstrances were unheeded. They removed, and commenced to send their goods by sea to London, when the London and North-Western Railway Company agreed to carry them at a less rate from Liverpool to London than they had been charging from West Bromwich to London, although the distance was nearly double. Numerous cases like this have tended year by year to depress and diminish the prosperity of the district. As the Belgians have given their manufacturing centre the advantage of a 2s. rate to Antwerp, 105 miles distant, and to distant German works one of only 7s. 6d. per ton, is it too much to expect that England should permit its most inland manufacturing centre to acquire similar advantages? The corresponding rate from South Staffordshire to London would be 3s. a ton, exclusive of lock dues. The evidence brought before the Select Committee on Canals in 1883 proves conclusively that goods may be conveyed as cheaply in England by water as on the Continent; for instance, on the Weaver, in Cheshire, salt is conveyed a distance of thirty miles for 6d. a ton, equivalent to a rate of 1-8th of a penny per mile, which is even lower than between Liège and Antwerp. But this is not a solitary instance. Mr. Bartholomew, the general manager of the Aire and Calder Navigation, stated that he found the cost of transit was as low as 1-34th of a penny per ton per mile, after allowing 10 per cent. for depreciation of capital and all repairs. Mr. E. J. Lloyd stated that traffic could be transported from Birmingham to London by an improved canal system at a wharf to wharf rate, made up as follows:—150 miles toll, at 1-5th of a penny per mile, for maintenance and interest upon capital, 2s. 6d.; haulage, 1-10th of a penny per mile, 1s. 3d.; boat-hire, depreciation of plant, and terminal agency, &c., 9d.; total 4s. 6d. That this rate of 4s. 6d. per ton would be profitable between the two great commercial centres of London and Birmingham upon a canal system adapted to the advantageous use of steam power can be irrefutably proved; also that the ordinary heavy merchandise of the town and district could be loaded at the various works and shipped in the port of London at an average rate not exceeding 7s. 6d. per ton. In 1846 the London and North-Western Railway Company arranged to guarantee a dividend of 4l. on each share of the Birmingham Canal Company. The Chairman of the London and North-Western Railway Company, in his speech at the half-yearly meeting of proprietors, held last month, said,—"The most unfavourable item we have in the accounts is that relating to the Birmingham Canal traffic. We guarantee 4 per cent. on the capital of that company. We made a loss of 15,000l. written off this half-year. . . . I do not see what is coming to pass in that district. A few years ago it was reckoned that there had been 143 blast-furnaces built, but to-day there are only twenty-seven in blast."

Others like Mr. Moon do not see what is coming to pass. The London and North-Western Railway Company have had the canal for forty years, but nothing appears to have been written off for depreciation. If this had been done annually the capital would probably have been reduced to its value, and the trading would not have appeared so unfavourable. The company charge 1½d. per ton on goods conveyed by the canal to the railway stations, and subsidise themselves and other railway companies to the extent of 5d. a ton or more out of the canal revenue,—at least, so it is reported,—while a neighbouring canal company complain that if the goods are passed to other canals the toll averages 10d. a ton. If Mid-England is to enjoy the advantages of cheap water communication to the ports, and thus be enabled to send its manufactures abroad at a cost that will leave a margin of profit beyond the cost of production and delivery, it is essential that a trust under Parliamentary powers should be obtained for the purpose. A joint-stock company would not avail, as its aim would be to exact the highest tolls possible, and it would soon act in compact with existing railways. The estimated cost of improving the Severn route is 600,000l., and merits attention especially on account of the rising importance of Cardiff and Newport as great shipping centres. The improvement of the route to London should be first carried out. A trust should be formed by the towns of the district, and the State should be asked to advance the money at a moderate rate of interest to the local authorities, if at 3 per cent. this would leave the Government a margin of ½ per cent. beyond the interest paid to savings bank depositors. The canal rates should be fixed so as to yield a clear ½ per cent. after payment of the interest on the Government loan and the expenses of working and maintenance; this ½ per cent., if invested by the trust at 3 per cent. per annum compound interest, would in a period of sixty-six years extinguish the loan, and the whole undertaking belong to the towns and district represented by the trust. We have a precedent in the Act for Granting Loans in aid of Public Works, under which a loan of 60,000l. was made in 1817 to assist the construction of the Gloucester and Berkeley Canal, the final balance of which was paid off in 1840, with 3 per cent. interest. The coalfields of Warwickshire and South Staffordshire are supposed to be one vast field. However this may be it is certain they will last for centuries. They are the nearest to London, and the annual consumption of coal in the metropolis is now nearly eight millions of tons. It is estimated that the improved canals would convey 10 per cent. of the amount required. This, in addition to the large traffic low rates would attract, would ensure the success of the trust, and make it a source of profit to the towns interested.

Mr. E. B. Marten also read two papers on the history of the Birmingham and Stourbridge Canals.

The Mayor of Birmingham (Alderman Martineau) said this happened to be a question to which he had given some attention, and he could confirm what had been said as to its extreme importance to this neighbourhood. No doubt they had been suffering in Birmingham from the want of this improved water communication to convey their goods to the seaboard. Birmingham was the furthest town from the seaboard of any place in England, and when they compared their rates with those towns which had the advantage of water communication they found themselves at a great disadvantage, and he mentioned that there were cases where a large amount of employment for the industrial classes was likely to be taken away and given to places with better waterways to the coast. England was falling behind continental nations in this respect, and this might result in giving a great advantage to French and other foreign manufacturers. English railway companies had been allowed to choke their canals, and it was time that something was done to retrace their steps in the matter. It had been clearly shown that there were no engineering difficulties in making a cheap route to the Severn.

Mr. G. W. Hastings, M.P., said that in Worcestershire they wanted larger and more direct canal communication with the seaboard. He approved of the project which had been started in Birmingham, and if he could help to further it he should do so. He thought the best method would be to run into the canal at Droitwich, which ran into the Severn.

ABBOTSBURY ABBEY, DORSET.

This was the subject of an interesting paper by Mr. H. J. Moule, read by him on the occasion of the visit of the Dorset Natural History and Antiquarian Field Club to the abbey last week. Mr. Moule's paper appears in *extenso* in the *Dorset County Chronicle* for Sept. 16. We extract a portion of it:—

"Here at Abbotsbury we by no means have to call wholly on our theoretical knowledge of Mediæval architecture and on our creative fancy for a presentation of the abbey. . . . The buildings remaining are the great barn, a portion of an important edifice a little north of its west extremity, the east wall of the farmhouse-garden, and the stable attached to it. All these are on a lower level than the sort of plateau on which the Abbey Church and its surroundings stood, and my impression is, I do not in the least insist on it,—my impression is that, like the barn, these two other masses of building were for purposes of less dignity than those on the plateau. These latter,—this upper group in position and dignity,—are 'the old Pynion end,' so-called locally, a building south-east of the parish church, and now a workshop and stable, an isolated archway, remnants of the gatehouse arch, and last and chiefest some recovered bases of the Abbey Church north wall. Let us consider this upper group first. I believe that it is to a request or suggestion of the late vicar, the Rev. G. H. Penny, that we are indebted for the partial uncovering of the base of that wall, on which is built the south wall of the parish churchyard. We can see the lower courses of five bays of the eastern part of the wall of the north nave aisle. We see the cheeks of five windows with dropped sills for benches, and bases of vaulting, or at least roof shafts. These appear to be fifteenth-century Third Pointed work. The tile pavement, too, remains in part at least under some inches of earth. What I have seen appears to be of plain tiles. Then there is one bay of the corresponding part of the western portion of the nave visible. There are bases only of smaller subordinate vaulting shafts of the thirteenth or fourteenth century. Now, how far can we trace the rest of the plan of the church? Little enough, as far as the look of the ground is concerned,—in midday light, at least. I greatly regret that I have not been able to study the spot in a low but strong light. Then is the time to see the slight inequalities which sometimes enable us to trace old foundations. But a careful inspection in even a high light has helped a little, and not a little assistance has been derived from the late vicar's notes, most kindly lent to me by Mrs. Penny. These notes record the results of excavations made in 1871, before the visit of the Archaeological Association. It appears that the nave was 192 ft. long and 54 ft. wide, and that the choir was 27 ft. wide, length unknown. There is no sign of transepts. There seems to have been a chapel, perhaps the Strangways chantry, opening from the north-east part of the nave. We may conjecture that the 13 ft. 6 in. narrowing of the chancel on each side, as compared with the total width of the nave, represents the width of the north and south aisles of the latter. Mr. Penny shows foundations of two buttresses of pretty bold projection, perhaps enough to allow us to imagine them to have carried flying buttresses and therefore a vaulted roof. But this is mere speculation. I think that what I have said tells us all we actually know about the Abbey Church, except that signs of a south door towards the east end of the nave have been detected. With this certainty as to the general site of the Abbey Church on the northern extremity of the convent precinct, and the certainty as to the vast existing barn on the southern boundary thereof, our certainties as to the buildings unfortunately come to an end, and we cannot call to our aid arguments from the normal Benedictine plan, which Lübke says was to group the buildings round the church. Here that could not be, the church, as we have seen, being at the very northern edge of the precinct. I may remind you that the refectory at Benedictine Milton is north of the church, and so are the remaining buildings at Benedictine Sherborne. Here at Abbotsbury all has to be looked for south of the church. It seems to me just possible to trace a square, of about 65 ft. each way, south of the western half of the nave, which may be the area of the cloisters. It is difficult to reconcile with this idea the

isolated remaining archway, forming part of a demolished enclosing wall. But I do not think that we need reconcile it, for I consider that, arch not to have belonged to the abbey at all, but to be part of the precinct of the later Strangways House. Now, to speak of the 'Pynion end,' the high fragment with ivy on it. In Buck's view, dated 1733, this gable has fragments of the side walls attached to it, and a two-light Second Pointed window in each, with a low arch showing below that on the south side, and, indeed, the sill of the south window and a springer of the arch below it yet remain. From the look of those upper windows, and from the chimney and fireplace on a level with them, I conjecture that this was the refectory, with cellars or other storehouses below. There is a sign of a ledge or set-back in the wall below the windows. This might have carried beams for the refectory floor. There is a curious little stone, panelled in an odd way, in the chimney back. The dwelling of the monks would be adjoining the church, the refectory, and the cloisters, and I imagine them to have been on the east side of the cloister square. Possibly the abbot's lodging was on the south side of the same, reaching to the steep descent to the pond. Of this upper group of buildings, spoken of a little way back, we have still to consider only the last, that now used as a stable and workshop. It has been a building of dignity and importance, judging by the excellent Second Pointed two-light window, arched, with a six-cusped light in the head, in the north wall. Adjoining is a square-headed window of the same date, and also good. And in the east gable there is a very queer little window only a yard each way. It is square headed, without hood moulding or any reveal. It contains eight tiny lights in two ranks, each light arched and trefoiled at top. To my eye it seems a very curious window, and probably of the fourteenth century. Now, what was this building? It stands in a position suitable for the chapter-house, and I venture to suggest that use. It was a not uncommon thing, to say the least, to have an altar in the chapter-house. That curious little window, facing east, may possibly have had the altar below it, or perhaps forming its sill. But I am ashamed to wander in this wilderness of conjecture, and in now taking up the buildings below the plateau, above spoken of, vague conjecture still surrounds us. I dismiss the traditional assignments of the dormitory, brew-house, and malthouse, believing the two latter to be most likely parts of the monastery converted to those uses in Strangways' times, and the first to be unlikely, to say the least of it, from the distance of any of these buildings from the church. To begin with the dairy-house. The large blocked-up arch in it suggests that it was the gatehouse of the abbot's garden at the back of it. I cannot indeed see or hear anything about a corresponding arch on the west side of the house, to prove a thoroughfare, but that side seems to have been altered and added to. If a gatehouse, it might be the dwelling of a lay brother in charge of the fourteen-acre garden,—the best bit of land in Dorset, I have heard,—and of the fishpond supposed to have been there. The lay brother kept grand fires, judging by the great chimney in what is now the milk-house. Then, what of the building by the farmhouse, consisting now of a stable and the garden wall at right angles to it? The remaining work looks somewhat like part of two sides of a quadrangle. Now, I am ignorant of the general position and nature of the dwelling of the lay brothers of a monastery. But in one where, as probably here, much land was kept in hand, the lay brothers must have been pretty numerous, for I presume most of the farm work was done by them. Can this supposed quadrangle, adjoining probably the great barn, have been the lay brothers' abode? Or, again, it might be that and stables combined. I said that probably much of the abbey lands, within easy reach, were kept in hand. I judge by the stupendous barn, to which we now come in our survey. It is difficult to believe that that enormous building was required only for tithe corn and perhaps rent corn. It is and always has been in two divisions. May not one be for the corn received as above, and the other for the home estate corn? But let us think a moment not of the uses but of the structure of this 252-foot barn. Ashlar without, aslar within, of most seemly and noble fifteenth-century style, with the north porch and

the west gable specially admirable features, well would it be if all our churches were half as well designed and carried out. The buttressing of the west gable is a very bold and clever bit of architecture, the crenellated heads of the corner buttresses and the charming niche crowning the centre one all giving a finished and artistic air to the whole, quite wonderful in a barn. We may notice the same style partly reproduced in the gable of the dairy-house and in the ivied 'Pynion end.' I think from the considerable rebuilding of the top of the north wall of the western barn,—that now in use,—that there was a time when it could not and did not therefore carry a roof. Probably this was after the spoliation of the monastery at the Dissolution, for I put down the present roof, with its quashammer beam, but not very old-looking framing, to be of the seventeenth century only, and probably always thatched as now. Whereas I cannot but believe that such grand walls originally carried a noble massive roof, with most likely stone tiles,—such a roof as that at the majestic Cerne Abbas barn. Further, I venture to think that the barn was parapeted all round, the parapet carried on corbels and with rain-holes in the parapet. The south wall shows signs of this. Before quitting the barn, I may say that while I think the roof only 200 or 300 years old, the beams upholding the upper floor in the north porch may be original, and just possibly the two or three vastly long ones reaching right across the barn. The north doors are by no means new, perhaps as old as the roof. On the oak door-bar there is a cutting of the date 1730. I cannot see how wagons got easy exit or entrance at the south doors, the steep land rises so close to them. I think, indeed, the disused mill-race there to be a modern intrusion, but even allowing for this there seems but little room. As no remark seems called for respecting the all but demolished gatehouse, the supposed scene of the starving to death of the last abbot, we now pass on to by many degrees the most noteworthy building belonging to Abbotsbury Abbey. This, of course, is St. Catharine's Chapel, intended, it is believed, both as a searack and beacon tower, and as a chantry for sailors. Chapels with this dedication to St. Catharine are often on hills,—for instance, the little one at Milton Abbas. Why was this? Mr. Hills, secretary of the British Archaeological Association, when they met here in 1871, threw out this suggestion. Catharine is from *καταρως* pure, as every one knows. Might the high situation for her chapels be chosen with an idea of placing them in air of congenial purity? Again, another idea is that lofty sites were chosen because of a mountain coming into the legend of St. Catharine's death, when she was borne of angels to Mount Sinai. But, for whatever reason so placed, here have a grandly situated St. Catharine's, and well worthy of its heavenward, airy site. From appearance, and I think from tradition, the track to the chapel from the monastery seems to have taken a reach through or more likely north of the abbey garden, and then a contrary reach south-west, skirting the north ends of the many landchets which so remarkably cover the east side of the hill. Now, as to the building. Set up there, buffeted by all the blasts of heaven, specially by the unbroken force of the tearing south-westers, no common building could stand for long. And it is no common building that was placed there in the first half of the fifteenth century, and stands bravely up, roof and all, now in the evening of the nineteenth. Yes, there is the roof—that is the wonder. Fergusson is severe on the imperfections of most roofs, ancient, Mediaeval, and modern. They mostly consist partly of wood. A glorious vaulted church, like Westminster, laid alone as St. Catharine's was for ages, would shortly fall to pieces. The outer lead and wood roof is perishable, and would not long keep off rains, and worse still, frosts from the thin film of stone forming the groined inner roof. This would then perish lamentably. Not so with what he calls a genuine roof,—a really imperishable one, stone without, stone within, stone all through. Such are rare in these islands; and rarest of all, I fear, in England. I myself have seen only four: two in Scotland,—Roslyn and Borthwick; two in England,—our Dorset St. Aldhelm's and our Dorset St. Catharine's here. How splendidly this last is planned for its situation. How splendidly was the plan carried out. Go within, and how splendidly there, too, has solid simplicity been glorified with admirable detail in that

roof. I may be wrong, but I think that this style of detail for a roof,—bold vaulting ribs richly bossed where ridge and purline ribs intersect them, and each recess so formed simply panelled like three blank foliated window lights,—I think this style a very rare one. All the rest of the chapel harmonises perfectly with the imperishable looking yet not cumbersome roof. The parapet surrounding it, with the bold spots of shadow formed by the rain-holes, the beacon turret, the massive buttresses crowned with crenellated cresting instead of pinnacles, the porches so enduring looking,—all are in absolute concord and combine into as perfect a Mediaeval building of its kind and for its purpose as can easily be found anywhere. I have only to add, firstly, that while everything else inside and outside stamps St. Catharine's as of the fifteenth century, the piscina rather looks as if of the fourteenth; and, secondly, that the projection of some of the upper courses of the turret is to me a puzzle. It does not appear to show inside. It obviously is not an accident, and yet there seems no reason or use for it. I am ashamed of this tame sketch of St. Catharine's. Every Dorset man with the least glow of admiration for our old-world betters in design and in work,—every such Dorset man must have a real affection for this our old country's triumph of headcraft and handicraft. But I am here to read a paper, not to make an oration, if I could even. And while expressing shame, let me apologise for my string of conjectures throughout this paper. I might be a very Yankee for guessing. But let me end at least with a certainty. There certainly was an amazing plenty of energy, art, and money in Abbotsbury Abbey in the fourteenth and fifteenth centuries. All we see dates from that epoch. Nay, St. Catharine's, the barn, the pynion end, and the dairy-house gable are all identical in style, and must have been built within a very few years of each other. At what a vast cost! But we know that the Benedictines did, as the ages went on, heap up riches. Some contrast between Benedict, unseen, lost to the knowledge of men, hidden in a drear cave in the wild waste of Subiaco that he might be alone with God, and his Benedictines 800 years after pulling down their barns here to build greater with their redundant money for their unmeasured corn. Well for them, though, if the annals of Benedictine St. Alban's, for instance, told of the Order no worse things than that here, in this fair Dorset vale, the Abbotsbury Benedictine fathers reared up stately, seemly building after building of the mellow ochry ashlar, to glow in the evening suns of half a millennium."

THE SANITARY CONGRESS AT YORK.

The following will be the order of the proceedings in connexion with the Ninth Autumn Congress of the Sanitary Institute of Great Britain, to be held in York next week:—

Tuesday, September 21st.

- 1 p.m.—Reception by the Right Hon. The Lord Mayor.—Exhibition Buildings.
- 1.30 p.m.—Public Luncheon.
- 3 p.m.—Opening of Exhibition by the Right Hon. The Lord Mayor of York.*
- 8 p.m.—First General Meeting.—Opening Address by Sir T. Spencer Wells, Bart.

Wednesday, September 22nd.

- Section I.—"Sanitary Science and Preventive Medicine." 10.30 a.m.—Address by Prof. F. S. B. F. de Chaumont, M.D., F.R.S.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 2 to 5 p.m.—Conference of Medical Officers of Health.
- 8 p.m.—Conversazione in the Exhibition Building.

Thursday, September 23rd.

- Section II.—"Engineering and Architecture." 10.30 a.m.—Address by Mr. Baldwin Latham, M.Inst.C.E., F.R. Met. Soc.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 2 to 5 p.m.—Ditto.
- 8 p.m.—Lecture to the Congress by Capt. Douglas Galt, R.E., F.R.S.

Friday, September 24th.

- Section III.—"Chemistry, Meteorology, and Geology." 10.30 a.m.—Address by Mr. William Whitaker, B.A., F.R.S.
- 11 a.m. to 1 p.m.—Papers and Discussions.
- 2 to 4 p.m.—Ditto.
- 5 p.m.—Closing General Meeting of Congress.

Saturday, September 25th.

- Excursions. 8 p.m.—Addresses to the Working Classes by Mr. G. Vivian Poore, M.D., F.R.C.P.; Mr. Edward C. Robins, F.S.A., F.R.I.B.A.; and Mr. James Mansergh, M.Inst.C.E.

* The Exhibition will remain open until Saturday evening, October 16th.

THE WATER SUPPLY OF BIRMINGHAM.

MR. C. E. MATHEWS, F.R.G.S., read a paper before the Mechanical Science Section of the British Association last week, on "The Birmingham Water Supply, from the Year 1826 to the Present Time." He commenced by saying that in the year 1808 the population of Birmingham was slightly in excess of 70,000 souls. There was then no regular water supply. The 12,000 houses which then constituted the town were either supplied by pumps from ordinary wells, or were dependent upon water-carts for their daily consumption. The system in vogue in the days of their grandfathers seemed sufficiently satisfactory, and no one desired any change. Mr. Ralph Dodd, however, a London engineer, with unerring professional instinct, spied out the nakedness of the land, and published a report on the "Intended Birmingham Waterworks," addressed to the inhabitants in general, and to the subscribers in particular, in which he showed that an ample supply of water could be procured at a very reasonable cost, and that subscribers to his intended undertaking would reap the double advantage of conferring a benefit upon the public and of putting money into their own pockets. A committee appointed by a town's meeting to consider the scheme resolved, "That the erection of waterworks in this town was wholly unnecessary, and would be productive of great evil." Nothing further was heard of Mr. Dodd. Similar proposals were made by other persons, and also proved abortive, and it was not until the year 1826 that the Birmingham Waterworks Company obtained an Act "for supplying with water the town and neighbourhood of Birmingham." The promoters of the scheme were influential men, and nearly eighty of the leading inhabitants,—including such well-known names as Attwood, Spooner, Anderton, Lloyd, and Scholefield,—were duly incorporated by the name of "The Company of Proprietors of the Birmingham Waterworks." The estimate for the undertaking was 116,925*l*. The capital was fixed at 120,000*l*, in shares of 25*l* each, with borrowing powers not exceeding 30,000*l*. The works authorised were a reservoir at Aston, near Salford Bridge, and another at Edgbaston. Mr. Mathews, after describing the early operations of the new company, went on to say that in 1851 the Birmingham Improvement Act was passed, which contained a clause empowering the Corporation to supply water to the borough and to purchase the works of the company, at a price to be fixed by arbitration or by a jury. In 1854 notice was given by the Corporation of their intention to purchase the undertaking of the company. Subsequently the company obtained power to increase its capital from 120,000*l* to 240,000*l*, and to borrow 30,000*l*, in addition to the sum authorised to be borrowed by the Act of 1826. In March, 1861, public attention was attracted to the water reservoirs, by the bursting of the dam of the Bradfield reservoir, near Sheffield. In the same year the directors consulted Mr. Hawkesley; and in a report, dated September 19, 1861, that eminent engineer propounded his views as to future sources of supply. He investigated the Tame, the Res, the Cole, the Blythe, the Park Brook, and the Arrow, the Avon, and the Severn, and also called particular attention to the water-bearing strata of the new red sandstone formation. He desired to add Sutton Coldfield, Curd-worth, Coleshill, King's Norton, Northfield, and Harborne, to the districts of Birmingham and Aston as the future area to be supplied. He dismissed other rivers in the neighbourhood as either already contaminated or likely to become so, and he pointed out that in the immediate vicinity of Birmingham there were many square miles of the Lower Keuper and Upper and Lower Bunter sandstones, which he believed were replete with water of a very fine quality. He therefore recommended the sinking of wells at Aston, Edgbaston, Sutton Coldfield, and Upper Witton, from which he anticipated a yield of eight million gallons per day. It was remarkable that the waters of the Bourne, near Whitacre, which now formed a considerable portion of the daily supply, were not included in this memorable report. The company from time to time enlarged their area as well as their capabilities for supplying water. In 1875 the directors not only paid eight per cent. to their shareholders, but applied between 2,000*l*. and 3,000*l*. in working up dividends for the half-year ending June 30th, 1865. Mr. Mathews

referred at some length to the great fight between the Company and the Corporation concerning the compulsory purchase of the undertaking, which was transferred on August 2nd, 1875. The undertaking was to be transferred to the Corporation by a deed containing six lines, and each shareholder was to receive payment by way of perpetual annuity. The annuities were charged on the revenues of the undertaking, aided, if necessary, by the rates. After five years a sinking fund was to be established, by which all the annuities were to be extinguished within ninety-five years from the passing of the Act. A reserve fund was also to be provided, limited to 50,000*l.* The surplus, if any, of revenue after making these provisions, and the annual proceeds of the reserve of 50,000*l.*, were to go to the Borough Fund. The shareholders received, in addition to their capital, nearly 700,000*l.* by way of goodwill. The concern was taken over by the company on the 1st of January, 1876, and Alderman Avery was elected chairman of the Water Committee. The work initiated by the company was carried on by the Corporation, and the profit at the end of the first year, after the payment of the annuities and all out-goings, amounted to 5,456*l.* A considerable reduction in the water rentals was made in 1881, and a still further and greater reduction in 1883, with the result that for the first time for forty years there was a deficit. The reduction was applied in respect chiefly of small house property, but all classes of consumers reaped some advantage. The reductions made by the Corporation had amounted altogether to 26,175*l.* per annum; in other words, if the old tariff had remained in force the rental of 1885, instead of being 115,704*l.*, would have reached a total of 141,879*l.* In 1878 it was found that the daily average quantity of water required for consumption, which had previously been 7.7 million gallons had risen to 8.76 million gallons. It was estimated that in four years more the average daily requirement would be 10.4 million gallons, with a maximum of 14 million gallons. The provision made for meeting the increased demand for water was described, and in 1881, Mr. Mathews said, the advantage reaped by the ratepayers, both as water consumers and as ratepayers, was equal to a rate of 2*d.* in the pound. In 1883 the fourth and last area of supply was added. In 1875 the population in the area of the water supply was 400,000. In 1885 it was 600,000 in the extended area, and of this population about 500,000 used the Corporation water. In 1875, the annual consumption was 3,090,000,000 gallons; in 1885, 4,300,000,000 gallons, the present supply to meet this increasing demand was as follows:—Aston Well yielded 3 million gallons per day; Witton Well 2½ millions; King's Vale Well, ½ million; Perry Well, 2 millions; and Selly Oak Well, 1½ million gallons per day; or a total of 9 million gallons of well-water per day. In addition, Plant's Brook yielded two million gallons per day; Perry and Witton streams, one million; Blythe, 2½ millions; Bourne, two millions; making the total river-water, 7½ million gallons per day. There was, therefore, a supply of 16½ million gallons to meet a demand of, say, 12 million gallons, and this altogether exclusive of storage. In 1875 the storage was 175,874,532 gallons. In 1885, 441,817,081 gallons. In the event of a serious and protracted drought, the population included in this great area, containing 81,591 acres, had a provision of 26½ million gallons for sixty days, or 21½ million gallons for 130 days. They need have no anxiety, therefore, for the future, though, as all the pure streams within the legitimate water-shed had been already annexed, it was obvious that further extensions could be made only in the direction of increased storage and more deep wells. The loss shown by the balance-sheets for the three years ending the 31st of December, 1885, did not give the department any uneasiness. Indeed, the loss was more apparent than real, as interest on the reserve fund of 2,000*l.* per annum, and the sinking fund for the repayment of the annuities had first been deducted. The Water Committee believed that in three years the present adverse balance would be cleared off, and that they might before long be able to consider the question of further reductions in the water rental.

The President of the Section (Sir J. Douglass) said they had to congratulate the directors of the first company and the Corporation of Birmingham on the great success that had

attended their efforts to give to the town a liberal supply of good water at a low cost.

Alderman Avery said the paper to which they had listened would be of considerable value as a permanent record of the history, the progress, and rise of the Birmingham water undertaking. No part of the paper gave him more satisfaction than the manner in which the old company was recognised throughout. In their day and generation they did their work wisely and well, and they were continually advised by one of the most eminent of engineers, Thomas Hawksley. Though a trading company, they recognised with honourable fidelity their obligations to the public. As Mr. Mathews stated in his paper, they enjoyed the unspeakable felicity of doing a good service to the public and filling their own pockets at the same time. In this advanced age of civilisation, it was hardly worth while discussing the question whether or not the matter of the water supply, involving the health and lives of the whole community, should be in the hands of private companies, who were necessarily governed by public obligations and also by financial considerations, or whether it should be in the hands of the Corporation. The Corporation had just the same views, but in a different degree. Instead of making the financial results predominate, they were subordinated to the sanitary results. The Corporation of Birmingham had expended, since January, 1876, no less a sum than 446,000*l.* in constructing and converting reservoirs, and in providing hydrants, in enlarging the mileage of the distribution mains, and in other useful work. They had also provided for the interest and repayment of that vast sum of money, and they had besides, in a financial sense, earned sufficient to reduce the price to ratepayers to the extent of 26,000*l.* yearly, or equal to a rate of 4*d.* in the pound. So that though they paid a very good price,—much more, he thought, than they ought to have paid,—they had no reason to be disappointed with the result. They stood at the present time, having paid the annuities and made provision for outlay, with a net surplus fund in hand of about 39,000*l.*

The Mayor (Alderman Martineau) remarked that the more they saw of the working of the water-supply in Birmingham the more reason they had to be satisfied with all the early provisions that were made by the directors of the company.

Sir Thomas Hawksley, referring to his connexion with the waterworks companies in Birmingham and elsewhere, said it was in 1831 that the Nottingham company entered on the principle of a constant supply. Birmingham followed the example, and ultimately the principle was adopted all over England, with the exception of the metropolis. Birmingham started well, and continued in the path on which it started. The cost of obtaining water was increasing every year; for they were obliged to go further and further afield. In some places it was almost impossible to obtain a proper supply. Most of the valleys were becoming occupied by railways, and besides there was a spread of the population.

Mr. C. E. Mathews, in reply to a question, said the Corporation pumped their water to an altitude of about 500 ft.

EXPERIMENTS IN ELECTRIC INDUCTION.

In the Section of Mathematical and Physical Science, British Association Meeting, Birmingham, Mr. W. H. Preece, F.R.S., gave an interesting account of some experiments in electric induction between wire and wire. He prefaced his remarks by stating that along the Gray's Inn-road, London, the Post Office had a line of iron pipes buried underground, carrying many telegraph wires. The United Telephone Company had a line of open wires along the same route over the house-tops, situated 80 ft. from the underground wires. Considerable disturbances were experienced on the telephone circuits, and even worse, signals were read which were said to be caused by the continuous and parallel telegraph circuits. A very careful series of experiments extending over some period proved unmistakably that it was so, and that the well-known pattering disturbances due to induction were experienced at a much greater distance than was anticipated. With a view of finding out how far these effects could be detected, experiments were conducted on the Newcastle Town Moor. The area of the dis-

turbance was extended to a distance of 3,000 ft., while the effects were detected on parallel lines of telegraph between Durham and Darlington at a distance of ten miles and a quarter. But the greatest distance experimented upon was between the east and west coasts of the Border, where two lines of wire forty miles apart were affected, the one by the other; sounds produced at Newcastle on the Jedburgh line being distinctly heard at Gretna, on a parallel line, though no wires connected the two places. The experiments were made on a Sunday, and in order that there should be no possible mistake between the sounds obtained by working the telegraph, a special commutator was placed at the Newcastle end. By several rapid intermittent currents a sound resembling a rising and falling fall was produced, which was heard distinctly at Gretna. Every possible precaution was taken by isolating the lines, but they were still compelled to use the earth. It should also be remembered that the whole of the North of England was one network of telegraph wires. Although the experiment was very interesting, he did not think it conclusively proved that inductive effect could be transmitted across such a length of country. At the same time the evidence was quite sufficient to justify a pursuit of their researches in this direction as far as they possibly could. At the present moment they were putting up from London to the Welsh coast a line of copper wire, many lengths of which, extending forty and fifty miles, would be perfectly distinct from any other system in the country. In the next two months, during the construction of the line, he hoped to be able to make many more exhaustive experiments. Careful experiments had also been made to show that the effects were quite independent of the earth, and were probably inductive effects through the air. In one case a circuit of copper wire, sheathed with gutta-percha, was laid on the ground forming a quarter of a mile square. At a distance of a quarter of a mile another square of similar dimensions was formed. It was then found possible to hold distinct conversation by telephone through the air without any connecting wire between the two squares. This distance, it was thought, could probably be much exceeded. It was not even necessary that air should be the medium between the two wires. Since those experiments were made the English cable to the Scilly Islands was broken at a certain part. Half a mile from the damaged cable there was another belonging to one of the submarine companies, and extending to Brest. These two cables were half a mile apart in the water, and they did not approach each other on shore, yet signals on the Scilly cable were heard distinctly on the French one. Mr. Edison, as they knew, had been working in this direction in America, and had been able to establish communication with passing trains. The trains carried induction coils, which sent their influence to induction wires along the line and enabled conversations to be carried on. There was no doubt that this inductive influence would lead to inquiries and result in a more extensive and practical development of the telephone.

Professor Thompson said he must enter a mild protest against the somewhat miscellaneous use of the word induction. In the experiments from square to square he did not doubt that the results were produced by genuine induction, but in the other experiments, notably the forty-miles one, he believed the greater portion of the effect was due to the earth returns.

FURTHER NOTES OF THE TRADES' UNION CONGRESS.*

Factory and Workshop Inspection.

WITH regard to Factory and Workshop Inspection, Mr. T. Birtwistle (Accrington), moved

"That, in the opinion of this Congress, the Factory and Workshops Act is destined to become a dead letter, unless a much closer supervision is inaugurated, and for this purpose a considerable increase in the staff of factory and workshop inspectors is indispensable. This Congress, therefore, instructs the next Parliamentary Committee to continue to urge upon the Government the importance of appointing a considerable additional number of practical working-men, and, where expedient, women, as factory and workshop inspectors."

In proposing that resolution, he said that what was wanted, in his opinion, was a more

* See p. 398, ante.

thorough supervision all over the country. They proposed that the 55th Section of the Act should be made to apply to workshops as well as to factories.

Mr. Freak (London), in seconding the proposition, said he supposed that none but those who lived in London saw the evil of the want of official inspection of a certain class—not of factories, but of workshops, which were springing up all over the Metropolis. In London there was a great deal of outdoor employment in workshops, and they wanted the same interference for them as they had within the factories. Employers were managing to do away with the possibility of having an adequate arrangement for inspection in factories, by giving their work out of doors very extensively. In the shoe trade and tailoring trade there was no great deal of space required for each individual to do his work, and the consequence was that the workers were packed together like sardines in a box, with scarcely room to move. No one could get inside the dens where the unfortunate people worked to see what they were like. He thought that something should be done to root up those places. He thought that a proper workshop and factory inspection by officers who knew where these places were was absolutely necessary, as the system under which the people he had referred to had to work was intolerable.

Mr. Howlett (Hull) moved, as an amendment:—"That the number of sanitary inspectors be greatly increased, but that no man be appointed to the post of sanitary inspector of workshop or factory without passing a thoroughly practical examination."—On the recommendation of the Chairman, he consented to allow this to go as a resolution to the Standing Orders Committee.

Mr. Slater (Manchester) asked how they could best increase the numbers of inspectors. The difficulty was a financial one. Because a parsimonious feeling prevailed, the Acts were inefficiently carried out. What he thought they ought to do was to impress upon the Government that they were determined, while they believed those Acts to be good and necessary for the health and welfare of the people, that there should be no difficulty in finding the money to see the proper number of inspectors appointed. He believed that there were other departments in their national administration where economy might be far more effectually practised than in a parsimonious administration of those Acts.

The motion was, after some further discussion, carried unanimously.

Engineers' Certificates.

Mr. J. T. Swift moved the following resolution:—

"That, in the opinion of this Congress, most of the loss of life and injury to person caused by boiler explosions and accidents to machinery is caused by the want of practical experience in the persons placed in charge of steam engines, boilers, and machinery; that, therefore, some Government test of practical fitness should be provided by Parliament, and that the Parliamentary Committee be instructed to arrange for the introduction of a Bill which will secure this desirable object."

He stated that from 1864 to 1885 the returns of one Boiler Insurance Company showed that 1,017 explosions had taken place, that 1,146 deaths had occurred, and that 1,926 people had been injured. Last year there had been fifty-four explosions, forty-five deaths, and eighty-three persons injured, though the whole of those explosions had not consisted of the bursting of boilers. In looking through the figures he found that out of 33,000 examinations only 752 serious defects had been pointed out, whilst 2,586 minor deficiencies brought up the total to 3,338 out of 33,000 inspections.

Mr. W. H. Lambton (Durham) seconded the resolution, which was carried unanimously after an explanation by the mover that it was not intended to make the Act retrospective. Men who had been in charge of an engine for two years before the passing of the Act would receive a certificate of competence.

Evidence in Coroners' Courts.

Mr. B. Pickard, M.P., moved:—

"That, in the opinion of this Congress, relatives of deceased persons or their representatives, or any person appointed by workmen of any workshop or mine, shall be allowed by law to attend coroners' courts for the purpose of questioning witnesses or giving evidence to the Court, in order that the cause of death may be fully inquired into; it therefore urges upon the Parliamentary Committee the necessity of securing further legislation on this important matter."

This was seconded and carried unanimously.

Overtime.

Mr. Broadhurst, M.P., proposed:—

"That, in the opinion of this Congress, the systematic working of overtime in many of the trades of the country is an evil to the persons so engaged and an injustice to the large body of unemployed, and should, therefore, be discontinued. Also that the system of piece-work, except in such trades where standard prices can be classified and maintained, is an injury to the moral, physical, and social well-being of the working people."

Mr. Broadhurst said he moved the resolution as the representative of the Operative Stonemasons' Society, and it was the first resolution his trade had ever asked him to move in the fifteen years he had represented them in that Congress. The resolution was in favour of doing away with the system of overtime, which had of late years considerably increased amongst the trades. The second part of the resolution was directed against the evil system of piecework where it was adopted in trades that could not well ascertain a standard price, and where it was not easy to maintain the varying values of the work done. For instance, in the tailoring trade it was easy to ascertain and maintain the value of a garment, a pair of boots, and of many other articles of necessity. But with masonry, where every piece varied from another piece, and in joinery, where much the same difficulty prevailed, they had found that the system of piecework had been used to the great disadvantage of those who engaged in it. Thus, if he obtained a price that week of so much per foot, and he made ten shillings more than his wages, the probability would be that next week, through his extra labour, his employers would insist upon a still further reduction in the price, so that they could go on and on till nothing but ruinous prices were allowed for the work done. That was well known to joiners who had worked in London twenty years back. A great firm there had done it to such an extent that they not only ruined others, but he was very happy to say they had succeeded in ruining themselves. They were all complaining of the large number of men out of employment in their trades. Many of the trades had a considerable amount of remedy in their own hands, if they only cared to exercise their powers. He knew in his own trade that within five minutes' walk from the house in which he lived, there was a building in course of erection where all the building operatives were employed during the whole of the daylight each day, while there were a great number of men in the same trades walking about without anything to do. They said that the work should be equalised as far as possible. They contended that overtime was an evil to the men engaged in it, physically as well as morally. Overtime money had never done much good to those receiving it. It demoralised all concerned in it, and it was an enormous injustice to those who were out of employment suffering from that evil. He understood from a gentleman in the Congress that he was likely to move an amendment to the effect that forty-eight hours per week should be the week's work. They all agreed that forty-eight hours per week would be a desirable limit to fix for labour, but when they had sixty-six and seventy hours a week it would be much more practical for those out of employment that they should succeed in reducing the limit to fifty-six hours per week than that they should neglect the present and practical evil for the purpose of endeavouring to apply hours to a universal system which, however desirable, would take a very long time to establish throughout the length and breadth of the country.

Mr. J. Swift (Manchester) seconded the resolution, remarking that the question of overtime was day by day coming to the front. In America it had been decided that all overtime should be paid for at the rate of time and a half, and it was high time that the systematic practice of men being kept out of employment by reason of others working overtime at the ordinary rate should be put an end to.

Mr. J. M. Jack (Glasgow) moved, as an amendment, the insertion of the words, "wherever the unions have sufficient influence for the purpose," urging the abolition altogether of the present system of overtime.

Mr. J. O'Neill (Hull) seconded the amendment, emphatically declaring his conviction that the system of overtime was an evil which they should do their best to remedy.

Mr. Freak (London) supported the resolution, on the ground that if the words proposed by Mr. Jack were inserted, they would weaken the

effect of the resolution, especially in regard to the working hours in Government works.

Mr. Arrandale (Manchester) supported the resolution, contending that the piecework system ought to be done away with.

Mr. Knight (Newcastle) supported the resolution, and said there were times when men were compelled to work overtime, but the Unions ought to put a stop to systematic overtime. They could not abolish piecework, but they could have a standard rate of payment for such work. The foremen and managers were the greatest tyrants, as they asked men who were out of work to send in contracts for piecework.

Mr. Hughes (Liverpool) suggested the alteration of the wording of the resolution so as to read, "Also that the system of piecework, which has got deeply rooted in many trades of the country, is an injury to the moral, physical, and social well-being of the working people," but Mr. Broadhurst declined to accept this amendment.

After some further discussion, a vote was taken, when eighteen delegates voted for the amendment, and fifty-four against it. The amendment was declared lost.

Mr. Threlfall (Southport) then moved "the previous question," which was seconded by Mr. Inskip and carried by fifty-five to twenty-three, thus for the time shelving the decision of the Congress on this important question. The subject came up again, however, on the last day of the Congress, when Mr. Swift formally moved:—

"That, in the opinion of this Congress, the systematic working of overtime in many of the trades of the country is an evil to the persons so employed, as well as an injustice to the large body of unemployed, and should, therefore, be discontinued."

Mr. Threlfall (Southport) seconded the resolution.

Mr. Drummond (Glasgow) suggested, as an amendment, that all overtime should be charged either time and a half or double time, but, after some further discussion, the resolution was unanimously carried.

Registration of Plumbers.

Mr. J. Howlett (Hull) proposed:—

"That, in the opinion of this Congress, it is essential, in the interest of the public health, that the plumbers should be properly qualified by being registered, and that such registration be made compulsory."

Mr. Howlett pointed out that they, as plumbers, were convinced that unless the present system of optional registration was converted to a compulsory system no satisfactory results could be attained. What they wanted was that the already qualified plumbers should be properly registered, the instruction of the rising generation in a proper system of plumbing, and an organised inspection of all plumbers' work.

Mr. S. Uttley (Sheffield) seconded the proposition, observing that the object of the Congress was, he took it, to obtain the best possible workmen in all trades, whilst at the same time they took care to do everything in their power to improve all sanitary matters.

Mr. W. Pickard, J.P. (Wigan), supported the resolution, and urged upon the Congress the necessity of a general improvement in the sanitary laws of the country. The law in this respect needed quite as much attention with regard to the mansion as it did to the cottage, and no more important question could have been brought before the Congress.

The resolution was then put to the vote, and carried unanimously.

Sanitary Inspectors.

Mr. J. Howlett (Hull) moved, and Mr. Biggins seconded:—

"That, in the opinion of this Congress, it is desirable that the number of sanitary inspectors be largely increased; but that no man be appointed without previously passing a thoroughly practical examination."

Mr. McIntyre (Glasgow) moved the previous question. Mr. Stradley (London) seconded, but on being put to the vote the original motion was carried.

Mr. Broadhurst, M.P., was unanimously elected Parliamentary Secretary, and the Parliamentary Committee was appointed.

The Congress again practically negatived a proposal in favour of opening museums on Sunday.

It was resolved to hold next year's Congress at Swansea.

One of the results which have followed the holding of the Congress in Hull was a meeting of bricklayers at the Corporation Hotel, Neptune-street, on the 11th inst., with a view to forming a branch of the Operative Bricklayers' Society in the town. Mr. J. Toomey, the society's delegate to the Congress, attended, and explained the benefits and advantages appertaining to the society. The society, he said, had paid to members and their families since June, 1869, for sickness, 35,674*l.*; for funerals, 9,589*l.*; for accidents, 634*l.*; for superannuation, 296*l.*; for trade privileges, 4,757*l.*; grants to other trades, 853*l.*; making a total expended of 51,805*l.*; and upon December 31st, 1885, the worth of the society was 30,826*l.* At the close of his remarks, several men gave in their names.

THE WALLS OF CHESTER.

SIR,—Referring to the letter on this subject, signed "F. S. A.," which appeared in your issue of last week [p. 375], it is not denied that the members of the British Archaeological Association had pointed out to them in 1849, both at the Northgate and Roodeys, walls composed more or less, to all appearance, judging from their faces, of Roman stones, as, in fact, they still exist. Further, under the circumstances, those archaeologists, following Mr. Roach Smith's view, could come to no other conclusion than that the walls themselves were Roman. *Mais nous avons changé tout cela.* Excavations have shown that at the Northgate only some of the facing stones were of Roman date, that they had no Roman mortar, and that a slight and very rotten wall was behind them, with poor and late mortar much decayed. Again, at the Roodeys, where some large stones project from the wall, many of which seem to bear marks of Roman tooling, and have been found to extend 15 ft. beneath the surface, excavations have shown that they have been merely placed in front of a clay bank, to prevent it from slipping forward, and thus destroying the wall proper, which latter is on the said bank above, and behind the large stones.

As to the nature of the stones of which the walls are composed, competent geologists have found them to be composed of the same stone as the rock on which Chester is built, and they have not been brought from a distance. It has also been found that both the red and white lichen grow on the same Chester red sandstone, so that the presence of a red lichen on one part of the walls, and of a white lichen on another, is no evidence that the stone in each is different. That, in places, buried deep below the present walls, some portion of original Roman work may exist, is quite possible, and I think will be found to be the case, but above ground nothing of the Roman age remains *in situ*, as was verified by the decision of the numerous archaeologists and architects who accompanied the members of the Royal Archaeological Institute at their recent meeting in the City.

W. THOMPSON WATKIN.

Liverpool, September 14.

Thrashing Corn by the Transmission of Electrical Power.—A further application of electrical power has just been made on the estate of the Marquis of Salisbury at Hatfield by Mr. Shillito, the resident electrician, in addition to those which we have recently recorded, but in this case Gramme machines have been used, the generator being driven as before by water-power, half a mile distant. The Gramme machine is connected in the ordinary way to one of Clayton & Shuttlesworth's thrashing-machines. The result is reported to be highly successful in every respect, a very regular, rapid, and noiseless power being obtained. In contrast with the ordinary steam engine, with its demand for skilled attention, and for constant supplies of water and fuel, the new motive power is most promising, and no doubt a great saving in cost can ultimately be effected, wherever the circumstances for the supply of power are favourable. Should a temporary stoppage of the machine be necessary, an ingenious arrangement has been made by Mr. Shillito, whereby the current from the leads can be turned from the Gramme machine into a cluster of Swan's lamps, so that a short break in the operations does not necessitate any communication with the source of power, or stoppage of its regular working, and at the same time gives warning to the men where the current is running.

The Student's Column.

STONE QUARRIES.—XII.

ABERDEENSHIRE GRANITES (continued).

THE mineral constitution of the granites of this county varies greatly. Speaking broadly, it consists of a mixture of quartz, felspar, and mica; frequently with the addition of some hornblende. This last mineral, however, is almost without exception in very minute quantities, and may thus be regarded as merely accessory; but true hornblende granite is not unknown in the county. Occasionally, the mica occurs in very small quantities; sometimes it is nearly or altogether absent; and many considerable masses of rock occur,—known as granite,—composed principally of quartz and felspar, with very little of anything else.

The difference in colour is owing primarily to the nature of the felspar, this mineral varying in tint from red to white. The redness is, no doubt, owing to a mixture of peroxide of iron, disseminated throughout the mineral.

Besides the Peterhead district, red granite is very common in many of the mountains in the interior of the county, more especially near Braemar. The celebrated mountain known as Lochnagar, not far from Her Majesty's Highland residence at Balmoral, is wholly composed of granite, much of which is of a reddish colour. Ben-Muick-Dhui, Ben Avon, and Cairngorm, which are amongst the highest hills in Scotland, are likewise all formed of granite.

With such an abundance of material in the county, and much of it being near the sea, it is not wonderful that, after engineers and others gave an impetus to the quarrying of it, granite work became one of the most important industries, not only of the county, but of Scotland. We learn that even in 1817, the quantity of stone exported from Aberdeen to London was 22,167 tons; in 1821, the total export was 34,687 tons; and in 1868, about 50,000 tons. The amount fluctuated considerably in different years of the above periods. In 1860, for example, it only reached 24,666 tons. This, of course, represents nothing like the total amount raised from the quarries during the respective years; and it is calculated that over a million tons are now quarried in Aberdeenshire every year.

We are informed that the trade with America was once much more considerable than it now is, which is largely owing to the opening up of quarries in Rhode Island and elsewhere. Many of these, however, are in the hands of well-known Scotch granite merchants.

Although the introduction of the present system of polished granite into architectural ornamentation, monumental sculpture, &c., is of comparatively recent date, granite polishing was known more than one hundred years ago among the jewellers of Aberdeen, as the following extract from the *Aberdeen Journal* of the 3rd December, 1770, shows:—

"Colin Allan, jeweller and goldsmith in Aberdeen, begs to acquaint the public in general that he has established a manufactory for sawing and polishing granite slabs, tables, and chimney pieces, &c."

We will now describe some of the principal quarries that have come under our notice.

1.—The Aberdeen District.

Rubislaw Quarries.—These are situated about two miles from the centre of Aberdeen, and have been worked for a great number of years. The granite is of a greyish-blue colour, and very fine-grained. The three minerals are equally mixed, quartz being transparent white; felspar, white, and generally minute, but occasionally crystals up to 7 mm. in diameter are seen; the mica is black.

The rock lies in irregular masses, with numerous seams in all directions, and the blocks are usually found standing on the flat. One portion of the quarries has been worked in benches of from 50 ft. to 70 ft. in depth, and the present section of rock shown will last a number of years, even at the present rate of output, without compelling the owners to sink any deeper. Every time the quarry has been deepened, the colour of the stone has assumed a slightly richer greyish-blue colour, which renders it valuable for monumental and polished work, for which purposes it is very largely used. The blocks are roughly dressed and squared with hammers, and those intended to be polished are sent to the various granite works in Aberdeen, whence it is not only carried to various

parts of the United Kingdom, but to America, Australia, and to the East generally.

Most of the paving-stones made come into the London market, and the rest of the produce of the quarries is used for ordinary building purposes.

From 1795 to 1820–30 this stone was supplied in large blocks for dressed work, and used in the construction of Portsmouth and Sheerness Dockyards, Bell Rock Lighthouse, balustrade of Waterloo Bridge, London Bridge, &c.

Dancing Cairns Quarries.—These are very old, and situated about two miles and a half from Aberdeen. The stone is of a bright light blue or grey colour, and is composed of clear quartz, two felspars (orthoclase and oligoclase), and black mica.

The "posts" of granite,—the masses of granite that stand separate from each other by dries or natural divisions,—as a rule, are irregular, and not very large, although occasionally, as the quarry is worked into, several large blocks are found together, when they are usually sent to Aberdeen to be polished. The quarries are largely worked for paving-stones, and many thousands of tons of rubble for building purposes are annually carted into Aberdeen. From the indiscriminate manner in which stones from different quarries are built into the walls of some of the buildings in that city, it is not easy to discover which buildings are wholly made of Dancing Cairns stone, but we might mention two good examples of it, one in the portico of the Music-hall Buildings, and the other, the monolith of the statue of the Duke of Gordon, which weighed over 14 tons.

Sciattie Quarry.—This is about a mile further from Aberdeen than the last-mentioned quarries. The stone is fine-grained, not unlike the Rubislaw, except that it is a little lighter in colour, owing, perhaps, to mica not being quite so abundant. It has a decided and tolerably regular grain, being used largely by masons, though it is not very extensively polished. The beds of rock are heavier and more upright in this quarry than in Dancing Cairns, and the stone is suitable for dock and general engineering purposes.

To use up the smaller stones and the outcrops from the larger ones, a number of "cassemen" and curb masons are employed. This quarry also supplies large quantities of building rubble, facings, &c.

Dyce Quarry.—This is situated about eight miles from Aberdeen and about two miles from Dyce Railway Station on the Great North of Scotland Railway. The rock is of a greyish-blue colour and fine-grained. When polished on planes not coincident with the planes of a rough kind of foliation which is exhibited, the stone has a peculiar striped appearance. This, of course, is of much assistance to the mason in chiselling it, and makes a useful kind of ornamentation. We may remark that the laminae are not so conspicuous as to make sharp lines; indeed, the minerals are quite as much interlocked with each other, as in many of the other excellent fine-grained granites of the county, the only difference being that there is a general disposition of the three minerals to lie in definite planes, which is much more conspicuous on large polished surfaces than on small hand specimens. The mica is black and brown, the other two minerals being white with a slight tinge of blue. Iron pyrites are also present in very minute quantities.

The stone lies in "beds" sloping to the north-east, and large blocks are raised and polished, being especially adapted to monumental and architectural purposes, used both at home and abroad.

Kingswells, near Aberdeen.—Some authorities state that granite is quarried here, but we are informed by the owner of the land that no such quarries exist. About thirty years ago the land was cleared of many large blocks of granite in order to bring it into a cultivated state, and some of this stone was worked up, being blasted on the spot. Specimens of it were also prepared and exhibited in London: it was the way in which the mistake probably arose.

The stone was originally selected for Prince Albert's Mausoleum, for which purpose, however, it was not used, as the supply was found to be irregular.

Mission-Room, Tunbridge Wells.—The dedication stone was laid by Mrs. Wear, on the 6th inst., of the new Church Mission-Room, High Brooms, Tunbridge Wells, now in course of erection from the designs of Mr. Brett A. Elphicke.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,251, Uptake Ventilators and Smoke Cows. W. McHaffie.

The invention consists of a shaft or pipe, at the upper end of which a series of conic frustra is secured. The lower frustrum is placed with the base uppermost, to which base the base of another frustrum is connected. Above the second frustrum, another and similar frustrum is situated, with an annular space between it and the one last mentioned, which space is divided by ribs running the entire depth of the space into segments. Another frustrum is supported by columns, and the head of the ventilator is in the shape of an inverted cone. The effect of this arrangement of parts is that in whichever direction the wind acts upon the ventilator or cow, an inducing current or up-draught is produced.

4,110, Discharge Valve of Closets. A. Abbott.

The improvement consists of a cast-iron spiral fixed in place of the pull-up rod. On the end of the lever is fixed a brass stud with rubber roller attached thereon. When the handle of the closet is turned round instead of being pulled up, the roller travels up the spiral, thus opening the valve. When the handle is released, the valve closes automatically.

12,252, Glazing. A. Drummond.

A ridge or feather of wood is secured or fixed to the upper side of the astragal or sash-bar, and strips of lead are folded over the edges of the glass to secure them in place. The sides of the central ridge are covered with strips of lead, and the sides of the glass abut against it, and the strips are folded over the edges of the glass.

6,365, Silent Door-closing. G. B. Thornton.

This is an improvement adapted for use with a former patent (No. 12,605, 1886). A plate is formed with two small bars projecting from one side to receive the cushion part of the block of india-rubber between them, another portion of this block forming an elastic backing behind the said bars; or a block or cushion is inserted in the nose of the catch instead of the plate. This entirely remedies the jarring noise occasioned by the catch of the lock striking against the plate inserted in the framing of the door.

NEW APPLICATIONS FOR PATENTS.

Sept. 3.—11,220, G. and J. Falter, Levelling Instrument.—11,233, H. Doulton, Bristol Stoneware.

Sept. 4.—11,250, S. Sparkes, Stoneware Socket Pipes.—11,256, W. Allan, Venetian Blinds.—11,263, T. and K. King, Dry Closets, &c.—11,271, F. Bossard, Intercepting Noises caused on Floors, &c., and Excluding Draughts from Buildings.—11,292, T. Galloway, Locks, Latches, and Bolts.—11,294, T. Whited, Chimney-tops, Cows, &c.

Sept. 6.—11,310, A. Fowler, Privies and Water-closets.

Sept. 7.—11,360, G. Soper, jun., Hanging Sashes.—11,371, H. Hadden, Veneering.—11,377, W. Bull, Tiles for Roofing, &c.

Sept. 8.—11,435, R. Bucknall, Walls and Roofs of Temporary Buildings.

Sept. 9.—11,449, J. Shanks, Traps for Drain, Soil, or Waste Pipes.—11,453, W. Fox, Joiners' Drilling and Boring Braces.—11,454, R. Hunter and J. Turnbull, Kitchen Ranges.—11,460, T. Robson, Window Frames and Sashes.—11,483, C. Groombridge and J. Rickman, Window Sash Fastening.—11,486, F. Shipton and J. Thame, Washable and Sanitary Wall Hangings.—11,494, A. McLean and R. Smith, Pigments.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,265, H. Combs, Holding and Securing Window Sashes in any desired position.—10,262, J. Stapleton, High-pressure Flushing-tank and Water Preserving Cistern.—10,729, H. Kardon, Stoves.—10,853, A. Frey, Ventilating Stove or Fireplace.—10,944, J. Stanley, Screws and Screw-drivers.—7,877, J. Pease, Window-sash Fastener.—8,836, E. Bassett, Asphaltic Pavement.—9,378, R. Guest, Edging Tile and Gutter.—9,608, G. Newman, Pneumatic Door Checks and Combined Door Checks and Spring.—9,643, H. Lake, Construction of Walls, Ceilings, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

12,477, G. Smith, Chimney Cowl or Ventilator.—12,700, J. Westmorland, Ventilation and Construction of Buildings.—12,754, G. Newman, Floor Springs for Swing Doors.—12,853, A. Barr, Stair Railings.—13,110, W. Lake, Facilitating the Nailing of Laths.—13,271, S. Sutcliffe, Tile Grate-fronts and Tile Grates and Chimney-pieces combined.—13,498, W. Richards, Sliding Gasaliers.—14,060, W. Cliff, Water-closets.—15,195, E. Coldwell, Burning off Old Paint.—7,310, H. Smith and E. Bradley, Veneers and Lumber Cutters.—8,793, G. Schuritz, Casement Sashes.—11,128, C. Heywood, Water-closets.—13,143, F. Chambers, Shop-fronts.—13,585, A. Brooks, Artificial Stones or Marbles.—13,692, C. Parsons, Wood Sawing and Slicing Machines.—7,161, B. Whiting, Window-sash.—9,408, H. Leigh, Ornamental Masonry Columns.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 7.

By E. J. GARDNER.

Mile End—75, Baker's-row, freehold	2,300
88 to 94 even, Baker's-row, freehold	1,335
88, Baker's-row, freehold	690
Freehold ground-rents of 221, per annum, reversion in four years	3,185
127 to 138 even, Buxton-street, and 5 and 6, Buttress-street, freehold	2,735
14, Buxton-street; 91, 93, and 95, Underwood-street; and 59 to 60 odd, Baker's-row, freehold	1,875
By W. WYSE & BROWN.	
Tufnell Park—13, St. George's-avenue, 91 years, ground-rent 71. 7s.	600
Camden-road—No. 321, 50 years, ground-rent 8s.	630
Holloway—8, Hargrave-road, 74 years, ground-rent 61.	305
12, Hargrave-road, freehold	455
A plot of freehold land in Lambton-road	240
Stanwell—A freehold cottage called St. Mary's Belgravia—6, Beesborough-street, 41 years, ground-rent 101.	245

SEPTEMBER 8.

By ALFRED RICHARDS.

Tottenham, Northumberland Park—Bunkein Villa, freehold	700
By C. & H. WHITE.	
Pimlico—3 and 8, Hindon-street, 38 years, ground-rent 101. 10s.	890
By R. BOYCE.	
Stratford—18a and 20 to 50 even, William-street, freehold	4,250
69 to 75 odd, Martin-street, freehold	1,340
57, Western-road, freehold	270
56, 57, and 59, Station-street, freehold	430
Hackney—73, Mansford-street, freehold	430
24, Trenchard-street, freehold	345
2 and 3, Claremont-street, freehold	405
Bow—283, Roman-road, freehold	700

SEPTEMBER 9.

By A. & G. GUYER.

Ponders' End—1 to 7, High-street, freehold	2,400
"Smith's Wharf," and in 2s. 9p. 7, freehold	350
By C. C. & T. MOORE.	
Ilford, High-road—The residence Elmwood, freehold	400
Forest Gate—189, Sebert-road, freehold	430
South Hackney—165 and 167, Victoria-road, 65 years, ground-rent 14.	850

By J. K. COLEMAN.

Bow—1 and 6, Coborn-street; Coborn Lodge; and ground-rents of 16s. per annum, 31 years	1,020
SEPTEMBER 10.	
By RICE BROS.	
Bermondsey—93, Abbey-street, freehold	530
48, Upper Grange-road, 24 years, ground-rent 21. 5s.	200
By GIDDY & TURNER.	
Cricklewood—The residence called Thornbank, 53 years, ground-rent 68s.	1,600

Miscellaneous.

The Circulation of Underground Waters.

In the Geological Section of the British Association meeting at Birmingham last week, Mr. C. E. De Ranee, F.G.S., read the twelfth report of the committee of inquiry into the circulation of underground waters. During the thirteen years that the investigation had been going on much accurate and valuable information had been obtained. The complete dependence of the supply of underground waters on the proportion of annual rainfall, varying with the amount of rainfall and the character and porosity of the strata on which the rain fell, had been completely established; varying from 1 in. to 12 in. of rainfall annually absorbed on each square mile, 1 in. of rain giving 40,000 gallons per day for each square mile of surface exposed. The great value of underground supplies had been shown during severe drought, the dry weather flow of the streams and rivers being wholly dependent on underground supplies issuing as a deep-seated spring. That a large quantity of water could be obtained by deep wells in suitable situations was well shown by the Corporation supply at Birmingham. The Aston well yielded 3 million gallons a day, the Watton well 2½ millions, King's Vale a quarter of a million, Perry well 2 millions, Selly Oak well 14 millions, giving a total supply from wells of 9 million gallons a day; the remaining supply of Birmingham of 7½ million gallons a day was derived from streams. The total supply of 16½ million gallons a day is not required. The actual demand being only 12 million gallons. Large supplies of pure artesian well water, obtained and used at Nottingham, Liverpool, Birkenhead, and other cities had also been investigated.

Manchester Jubilee Exhibition.—We hear that it has been finally decided by the Executive Committee to represent the old towns of Manchester and Salford at this forthcoming exhibition, and that the work is to be carried out in a novel and artistic way. To this end the work has been placed in the hands of Messrs. Darbyshire & Smith, architects, Manchester.

Sales of Building Sites.—Messrs. E. & H.

Lumley, of St. James-street, had another successful (their eighth) sale by auction at Lee-on-the-Solent, on the Hampshire Coast, on the 8th inst., when forty-one lots out of forty-five were sold at prices averaging 501. per plot, or about 5001. per acre.—On Monday morning a special train left the Holborn Viaduct Station of the London, Chatham, and Dover Railway, conveying a numerous company to Birchington-on-Sea, where a sale of sixty-two plots of freehold building land by Messrs. Baker & Sons had been announced to take place. The property offered consisted of a portion of the Cliff Estate at Birchington, which was some time since purchased by a Metropolitan land company, who have laid the estate out for building purposes by the construction of several intersecting roads, the principal road, being designated Beach-avenue, laid out as a boulevard, and running in a north-easterly direction to the sea from the south boundary of the estate. The estate is situated on the summit of a bold cliff. Major Bell, the owner of some of the bungalows which form a feature of the place, is at present expending a large sum in the erection of a sea-wall in front of the chalk cliffs, to the height of 40 ft. above high-water mark. The northern portion of the Cliff Estate, facing the sea, and comprising an area of about four acres, is to be laid out as pleasure-grounds. At the sale, the plots having frontages of 25 ft. and a depth of 115 ft. were sold at from 351. to 401. each; those having frontages of 33 ft. and a depth of 170 ft. realised from 881. to 901.; and those having frontages of 50 ft. and a depth of 170 ft., were sold at from 1401. to 1701. each. All the plots submitted were disposed of, the total proceeds of the sale amounting to about 3,2001. During the progress of the sale it was objected that the stipulations as to the building values of the houses to be erected on the estate were too stringent and severe, the conditions stipulating that several of the houses were to cost not less than 1,0001. each, and others not less than 8001., 6001., and 5001. On behalf of the vendors the auctioneer announced that, in certain cases, the required cost of the houses would be reduced.

Association of Municipal and Sanitary Engineers and Surveyors.

—In connexion with the Home Counties District, there will be a visit to Rochester, on Friday next, September 24th. The members will proceed to the Council-chamber, and the following paper will be read and discussed:—"Public Health Act—the 150th Section—Remarks on its operation, and suggested remedies for its defects." By Mr. W. Spinks, A.M. Inst.C.E., Dufkinfield. Afterwards the members will visit the Steam Road Roller Works of Messrs. Areling & Porter, and the Works of the Barham Cement Company. If time permit after the inspection of these works, visits will be paid to the Cathedral and the Castle, prior to taking the 6 p.m. train to Victoria. On the following day, Saturday, September 25th, there will be a visit to Walthamstow, to inspect the Sewage Works, under the guidance of Mr. Jerram, who will explain the works. Afterwards, the party will go to the East London Water Works Pumping Station at Lea Bridge, where Mr. Bryan, the Engineer of the Company, will receive the members. Thence by carriages to Copper Mill-lane for inspection of turbine, and afterwards to new Pumping Station at Chingford Mills. It is proposed that the members should afterwards dine together at the Forest Hotel, Chingford.

The School of Art Wood-Carving. which was formerly held at the Royal Albert Hall, South Kensington, but was removed a year ago to the City and Guilds Institute, Exhibition-road, has been re-opened after the usual summer vacation, and we are requested to state that one or two of the free studentships in the evening classes maintained by the Institute are vacant. During the past year the students have been engaged on several chimney-pieces and other architectural works, the revival of architectural carving being one of the principal aims of the committee of the School. To bring the benefits of the School more within the reach of the artisan class, a remission of half fees for the evening class has been made to artisan students connected with the trade, and instruction by correspondence is also given. Forms of application for the free studentships, and all further particulars relating to the School, may be obtained from the Manager.

Apparatus for Determining the Hardness of Metals.—In the Mathematical and Physical Science Section of the British Association meeting at Birmingham, Mr. Thomas Turner described an apparatus which he has invented for determining the hardness of metals. He said that hitherto there had been few attempts to quantitatively determine the relative hardness of metals. The method adopted by the United States Government in 1856 consisted in the punching of a hole by a tool in the form of a pyramid and under a constant pressure. The indentation was carefully measured, its capacity calculated, and in this way relative hardness was expressed. But it had been shown that the results obtained really depended upon combined tenacity and hardness, and so were not accurate representations of hardness. The apparatus recommended by the author was an adaptation of the method which had already been employed in determinations of the hardness of minerals, namely by scratching the surface with a weighted diamond. The diamond is attached to a graduated beam, arranged so as to allow of motion in both a horizontal and a vertical plane. By means of a sliding weight sufficient pressure is applied to cause a distinct scratch on drawing the diamond over a smooth surface of the metal to be tested. The weight is then moved until the diamond just ceases to produce a visible scratch, when the position of the weight on the scale is observed. Some experience and care was necessary in observing the scratch, but when that had been obtained the apparatus gave uniform results. The author said his experiments with cast iron had shown that the common idea that hardness and tenacity necessarily accompanied each other was erroneous. Very soft cast iron could be obtained with a high tensile strength, while hard cast iron had very often a low tensile strength. When metal had to be worked unnecessary hardness led to useless expenditure of power and loss of tools, and in such circumstances a soft metal was much to be desired. The apparatus was intended to be used in connexion with tensile tests of the metal, and in that way afforded valuable information as to the mechanical properties of the material.

The Use of Compressed Air in Birmingham.—In the Mechanical Science Section of the Birmingham meeting of the British Association for the Advancement of Science, Mr. J. Sturgeon contributed a paper on "The Birmingham Compressed-air Power Scheme." After pointing out the objects of the scheme, and showing that the large number of engines of moderate size used in Birmingham, often intermittently, rendered some such system peculiarly applicable to the town, the author pointed out that, although each 1,000-horse-power at the central station might only produce 500 effective horse-power at the users' engines, it would displace fully 1,000 horse-power of small boiler plant, furnaces, chimneys, &c., and the same engines could be used with compressed air as with steam. The centralisation principle enabled engines and boilers to be used of large power, with all modern improvements, such as high-pressure triple expansion, gas-firing, &c. At the pressure proposed (45 lb.), the air-driven engines would indicate from 30 to 65 per cent. of the power developed at the main engines, according to the mode of using the compressed air. According to the investigations of Sir F. Bramwell and Mr. Percy, on behalf of the Birmingham Corporation, the present consumption of fuel in small engines of from four to twenty-five horse-power varies from 36 lb. to 81 lb. per horse-power per hour; and, as it was estimated that compressed-air power would reach the consumer at an expenditure of from 5 lb. to 23 lb. fuel per horse-power per hour, a saving of from 70 to 400 per cent. is effected. It was pointed out that compressed air could be used for all purposes for which steam was employed, except heating; air, on the other hand, had the advantage over steam that it was available for refrigeration.

Archæology at the British Association Meeting.—In the Anthropological Section, Mr. R. G. Haliburton read some notes on the use of the tan cross, basing his remarks on an ornament which had been brought from Queen Charlotte's Island, and which distinctly bore the symbol. He pointed out the extensive prevalence of the use of the letter in remote and modern times, and said it seemed to foreshadow a sacred symbol of the faith upon which the whole world depended. The use of the tan

cross was found in all parts of the world. Sir William Dawson showed some photographs of the recently discovered and examined mummies of Seti VI., Ramses II., and Ramses III., and, by request of Dr. Schweinfurth, of Cairo, he drew attention to the fact that mummies when unrolled decay rapidly, and asked that the Association should exert its influence on behalf of the preservation of these precious relics, either by urging that they should be restored to their wrappings or placed in air-tight cases, so that they might escape the destruction which had fallen on so many mummies in European museums. On the proposition of the President of the Section (Sir George Campbell), seconded by Mr. A. Albright, it was resolved:—"That this Section instructs its representatives on the Committee of Recommendations to submit the earnest request of this section that moral or material aid, or both, shall be given to Dr. Schweinfurth towards preserving the ancient mummies recently discovered in Egypt."

Brookfield Unitarian Church, Gorton, Manchester.—This church, which for some weeks has been in process of cleaning and decoration, was reopened on the 29th ult. with special services. The work in the church was begun in May. The space over the chancel arch has been filled with a representation of an angelic choir, five angels near the roof forming a group by themselves, with "Alleluia" on a scroll, and lower down two other angels holding a scroll, with the words "Gloria in excelsis Deo, et in terra pax." The chancel arch and wall margins are decorated in keeping with the picture. The spandrels of the nave contain rich Gothic foliage designs, a medallion in the centre of each having a representation, where possible a portrait of an Apostle, Reformer, or other great man. The list comprises the Apostles Peter and Paul, the Venerable Bede and King Alfred, Wycliffe and Erasmus, Calvin and Servetus, Socinus and Baxter, Priestley and Channing. Bands of fret ornaments, small battlement designs, &c., complete the treatment of these spandrels. The tones of colour are olive, citron, chocolate, &c., upon a groundwork of vellum colour. The aisle walls and the west wall have decorations in similar tones, with bands of pomegranate designs, quatrefoil ornamentation, &c. Upon the east wall of the south aisle a panel has been formed containing the Beatitudes. In the chancel the walls have been diapered of Gothic rose-foliated design, with bands and borderings. The most important work here is, however, on the walls to the right and left of the window. On one side is a figure of Moses, with the Tables of the Law, and on the other a picture of Christ as the Good Shepherd. These figures are enclosed in a setting of canopy work and other enrichment. The work has been carried out, under the direction of the architects, Messrs. Worthington & Elgood, by Mr. Reuben Bennett, of South King-street, Manchester; and the pictures have been painted by Mr. J. Milner Allen, of London.

Highgate Woods.—Mr. H. R. Williams, the Chairman of the Hornsey Local Board, has given notice that at the next meeting he will make a statement and move a resolution that the wood known as Churchyard Bottom Wood be acquired by the Board for the use and recreation of the public. This wood is fifty-two acres in extent, and is represented as one of the finest pieces of woodland in England; it is separated from the wood lately given to the Corporation only by a public road, and the price asked for it by the Ecclesiastical Commissioners is 25,000*l.* The acquisition of this wood as an open space would be a fitting complement to the one already made public. The two would form a noble and unique recreation-ground for the whole of the northern portion of the metropolis.—*City Press.*

Lectures for Sanitary Inspectors.—The Council of the Parkes Museum, 74A, Margaret-street, W., have issued the syllabus of a course of lectures and demonstrations which are intended for the special instruction of those desirous of obtaining knowledge of the duties of sanitary inspectors. It is proposed to repeat the course twice each year, to suit the requirements of persons preparing for the examination of the Sanitary Institute of Great Britain; the lectures will comprise all the subjects scheduled for those examinations. The course will have a further use in supplying the wants of acting inspectors and of other persons desirous of obtaining a practical knowledge of

sanitary requirements and regulations. At the close of each lecture, students will be allowed to ask questions upon the subject treated. The lectures will be given on Mondays, Wednesdays, and Fridays at 8 p.m., in the Parkes Museum, 74A, Margaret-street, W., and students attending the course will be granted free admission to the Museum and Library from October 1st to November 13th. In order to put it within the power of every one to attend the lectures, a nominal fee only will be charged to cover the necessary expenses. The introductory lecture will be given on Tuesday, October 4, by Dr. G. V. Poore, who will treat of the "General History, Principles, and Methods of Hygiene."

Gas Lighting by Incandescence.—This was the subject of a paper read before the British Association at Birmingham last week, by Mr. Conrad W. Cook. It described the invention of Dr. Carl Auer von Welsbach, of Vienna, which consists in impregnating fabrics of cotton or other substances, made into the form of a cylindrical hood or mantle, with a compound liquid composed of solutions of zirconia and oxide of lanthanum (or with solutions of zirconia with oxides of lanthanum and Yttrium), which mantle, under the influence of a gas flame, is converted into a highly refractory material capable of withstanding for long periods without change the highest temperatures which can be obtained from the most efficient form of atmospheric burners, and which under the influence of such temperature, glows with a brilliant incandescence, very white and perfectly steady, and which, moreover, retains its woven or reticulated character; the organic volatile and carbonaceous matters being entirely burned out and replaced by an incombustible and highly refractory residual skeleton, which becomes by its brilliant incandescence the source of light in the burner. It is asserted that the light emitted is, at a distance, hardly distinguishable from a twenty-candle incandescent electric lamp, and by a modification of the composition of the impregnating liquid a yellower light is obtained, resembling that of the best gas-lights, but much more brilliant, and with a saving of gas of from fifty to seventy-five per cent.; and being perfectly smokeless it is incapable of blackening ceilings and internal decorations. It is stated that the illuminating power of the lights is about ten candles per cubic foot of gas consumed, and that the mantles last from 800 to 1,000 hours.

Ainsdale.—The memorial-stone in connexion with the new church at Ainsdale, near Southport, has been laid, on behalf of the trustees of the building fund, by Dr. G. B. Barron, J.P. The style of architecture adopted is sixteenth-century Gothic. The exterior will be of the best selected Burnley bricks, with terra cotta heads, sills, weatherings, &c.; the windows of the nave and large east and west windows being filled with tracery of an elaborate design; the gables being panelled in terra-cotta and in timber and cement. The roof will be covered with the best Welsh slates in ornamental bands. The interior comprises entrance-porch and vestibule, nave, chancel, transept, vestry, &c. The church, when complete, will, we are informed, accommodate 350 persons at the very low cost of a little over 4*l.* 10*s.* per head. Provision has been made for ample extension of the church, and the site, which has generously been given by Mr. Weld Blundell, contains sufficient area to accommodate the church and extensions, and intended parsonage and school. The architect is Mr. C. A. Atkinson, of Liverpool; and the contractor Mr. Riding, of Ormskirk. The heating apparatus will be provided by Messrs. Bennett Bros., of Liverpool.

PRICES CURRENT OF MATERIALS.

TIMBER.		2. s. d.	2. s. d.
Greenheart, B.G.	.....ton	9 10 0	7 0 0
Tak, E.I.	.....ton	9 0 0	14 0 0
Sequoia, U.S.	.....foot cube	0 2 4	0 2 7
Ash, Canada	.....load	3 0 0	4 10 0
Birch "	.....load	2 10 0	4 0 0
Elm "	.....load	3 10 0	4 10 0
Fr. Dantais, &c.	.....load	1 10 0	4 0 0
Oak "	.....load	2 10 0	4 10 0
Pine, Canada red	.....load	3 0 0	6 0 0
" "	.....load	2 0 0	3 10 0
" "	.....load	2 5 0	4 0 0
Lath, Dantais	.....fathom	3 0 0	5 10 0
St. Petersburg	.....fathom	4 0 0	5 10 0
Waincoat, Riga	.....log	2 15 0	4 0 0
" "	.....log	3 5 0	5 7 6
Odessa, crown	.....log	7 0 0	8 0 0
Deals, Finland, 2nd and 1st, std. 100	.....log	6 0 0	7 0 0
" "	.....log	6 0 0	7 0 0

Particulars on Application. Chief Offices:—352 to 364, EUSTON ROAD, LONDON, N.W.

Particulars on Application. Chief Offices:—352 to 364, EUSTON ROAD, LONDON, N.W.

The Builder.

VOL. LI. No. 2277.

SATURDAY, SEPTEMBER 25, 1886.

ILLUSTRATIONS.

The Triumphal Arches of the Romans: Arch at Pola, called the "Porta Aurea."—From an Engraving by Masquelier	450-451
The Triumphal Arches of the Romans: Arch of Theodosius and Hadrian, Athens.—From an Engraving by Andrea Gasparini	451-455
Front in Terra-Cotta, 17, Oxford-street.—Messrs. Batterbury & Huxley, Architects	459-169
Holborough Court, Sandiand, Kent.—Mr. Hubert Bensted, Architect	462-463

CONTENTS.

New Amsterdam	439	A Terra-Cotta Front, 17, Oxford-street	448	Episcopal Heraldry	469
The Railway Movement of 1886	440	Holborough Court, Sandiand	448	Sanitation and Flomans	469
Notes	440	Sanitary Exhibition at York	449	The Student's Column: Stone Quarries—XIII	469
The Triumphal Arches of the Ancient Romans	442	Institution of Civil Engineers	450	Recent Patents	470
Lincoln's Inn-Fields: The Story of a Wall	443	"The Influence of Ground water on Health"	450	Recent Sales of Property	470
Notes and Sketches in "St. Mary Overie," Southwark (Illustrated)	444	Sanitary Science and Preventive Medicine	457	York Architectural Association	471
The Sanitary Congress at York: Inaugural Address by Sir T. Spencer Wells	447	Architectural Association Saturday Visits	458	New Board School, Marlborne	471
		Workshops at Public Schools	458	Miscellaneous	471
		The Roman Baths of Bath	463	Prices Current of Building Materials	472

New Amsterdam.



HERE is no European city which shows more markedly than Amsterdam modern prosperity, mingled with remnants of the past. The numerous canals, with the roughly-paved and elm-shaded streets by their side, the houses above them with their storehouses at the top, mark the Amsterdam of the past. The various new buildings which have lately been erected, the increase of handsome dwelling-houses which are spreading out to the south and south-east of the town, near the Vondel Park, and the course of the Amstel, show very noticeably the material prosperity of Amsterdam. To some extent this increase of the town is the more interesting at the present time, because it may in some respects be attributed to the North Sea Canal. This important work has now been ten years in operation, and it has to a considerable extent made Amsterdam a seaport. It is true that in one sense Amsterdam was a seaport before the North Sea Canal was opened,—but the Zuyder Zee is full of sandbanks, and is little more than an inland lake, with next to no trade. The dead cities of the Zuyder Zee have been too well portrayed in M. Havard's work for it to be necessary to describe them afresh. But it is obvious that "dead cities" and a treacherous navigation for large sea-going vessels are not likely to do anything towards increasing the commercial prosperity of a town. Nor has the North Holland Canal a large or a direct enough route to the sea. But the fifteen miles of canal from the North Sea coast to Amsterdam have enabled the largest vessels to come right up to Amsterdam. The produce of Java and the East is landed in the very centre of the shops of Amsterdam. Hence the prosperity of this town by means of the canal has received an enormous impetus. The spot where the great gates admit vessels from the sea, a few years ago a heap of barren sandhills, is now beginning to be populated, and it is probable that in no long time, not only will fishermen in quaint dress, and seamen and excursionists from Amsterdam, be seen here, but that it will become a kind of Dutch Brighton,—a rival to the favourite Scheveningen. A train service and a steamboat service of fifteen miles will make it a suburb of Amsterdam.

Turning, however, to Amsterdam itself, undoubtedly the most noticeable building

recently erected has been the Rijks Museum, which was opened at the end of last year. It gives Holland what it wanted before, and what its great place in the history of art demanded,—a national picture-gallery. Within this gallery are now united, so far as pictures are concerned, the collections from the Trippenhuis, the Museum Van der Hoof, the Stadhuis, the Huischenhuis, and the Pavilion at Haarlem. The whole of these pictures now form a single collection, and a catalogue of them with fifty wood-engravings has been published.* The fact that the Van der Hoof pictures are separately numbered, and also that the pictures throughout the Museum are not placed in consecutive numbers, makes the catalogue a little difficult to follow: in every other respect it is an excellent compilation. As to the building itself, of which Mr. P. J. H. Cuypers was the architect, it must be confessed that it is disappointing. The site is excellent; there is ample space in front, but the building itself is neither dignified nor picturesque. It is large, in a way imposing, but commonplace in design, and the want of dignity is not compensated by the relief of the coloured tiles and the stonework which relieves the brickwork. The central gable is surmounted by a figure of Victory. The alto-relievo above the archway, 23 ft. in length, contains an allegorical figure of the Netherlands, who is surrounded by Wisdom, Justice, Beauty, and Truth, and is receiving the homage of the Dutch artists. Side reliefs also depict various allegorical subjects, but, as has been already said, these are, after all, but very subsidiary parts of the building when it is regarded as a whole. Internally the Gallery of Honour in the centre of the building is a fine passage, with cabinets at the side, but the decoration throughout is altogether disappointing. The walls of the rooms are for a certain height painted some subdued colour,—dark red or dark blue,—and the upper part above the pictures is decorated with various designs, most of which might aptly be described as fit for neat wall papers, but are altogether below the standard of a large National Gallery. The world-celebrated picture of Rembrandt, which is generally called "The Nightwatch," occupies the place of honour in the Rembrandt Room, which forms the end of the Gallery of Honour. This great picture, with its life-sized figures, therefore, is seen in the distance as the Rembrandt Room is approached from the Gallery. The Museum, indeed, has now made easy of access to the amateur the choicest collection of pictures by the Dutch masters in

the world, and its erection must thus be noted as an event of interest, not from an architectural point of view only, but from that of the history of European art.

The neighbourhood of the Ludsche Plein, as the "place" a little to the north-west of the Rijks Museum is called, is noticeable by its new handsome houses in French style. The Gymnasium, which may be seen between the Ludsche Plein and the Rijks Museum, was opened last year, and is another of the important buildings which have lately been erected in Amsterdam. It is in a semi-Classical style; that is, the main structure is of brick with much stonework of a highly Classical kind, and a portico surmounted by a Classical figure. This, again, though a striking building, also gives the impression of a want of grasp in the general design and of an attempt to make up for it by putting Classical adornment about the building. St. George's Hall, at Liverpool, may invite criticism as regards the propriety of its style for a commercial town in this century, but certainly it is of all modern buildings the truest Classical building, because it is Classical in conception, whereas one such as the Amsterdam Gymnasium is really only Classical in the decoration.

A building in its way of not less importance than those already referred to still further emphasises the growing importance of Amsterdam; this is the new Central Station, into which the several lines which converge at Amsterdam will ultimately run. It is placed at the north of the town, near the quays, and will thus be close to the various starting-places of the steamers. It is a building of considerable length, and distinctly striking in character, though simple in design. It consists of a central part, which in its turn is formed of a central tower and side towers, and the wings are considerably lower, stretching out east and west. The station, of red brick with stone facings, stands looking towards the town, and being on somewhat higher ground than it, with a considerable open space in front, it will prove to be a very satisfactory example of a well-designed station, and possessing considerable architectural effect. At the commencement of these notes we mentioned the extension of the town along the Amstel.

This part consists mostly of private residences; these again are mostly of red brick, without much picturesque effect, but sober, substantial edifices, with a certain quiet dignity, which causes them to harmonise well with the commercial character and general attributes of Amsterdam. The architectural features of Amsterdam are too well known to be dwelt on here; no one goes to Holland as he does to Flanders for the sake of the beautiful examples of Gothic architecture. But the

* Catalogue des Tableaux du Rijks Museum. Par Abr. Bredius. Publié avec l'autorisation de Son Exc. le Ministre de l'Intérieur. Amsterdam: Tj. Van Holkema, 1885.

cheerful sobriety of the domestic architecture of Amsterdam is in some respects not at all unworthy of consideration; and it is unquestionable that no one who wishes to keep himself abreast of the progress of modern architecture abroad as well as at home should fail to take an opportunity of becoming acquainted with the various recently-erected buildings in Amsterdam, of some of which a few brief indications have just been given, and which serve to mark the rapid progress of this remarkable city.

THE RAILWAY MOVEMENT OF 1886.

NINE main lines of railway radiate from London, connecting the metropolis with the chief ports and seaside towns of the kingdom. If to these lines we add the North-Eastern Railway, which forms an integral part of the system we are referring to, the aggregate length of trunk lines and ramifications amounts to 9,673 miles (we take the figures from the last published number of "The Index to the Railway System," 1879-80). By these ten lines Yarmouth, Dover, Brighton, Portsmouth, Southampton, Plymouth, Bristol, Liverpool, Newcastle, and Hull are connected with London in a system of inter-communication that stretches in latitude from Berwick to Falmouth, and in longitude from Ramsgate to Milford Haven.

This great network of lines, which forms nearly eight-tenths of the length of the railways of England and Wales, naturally divides itself into two groups. Of these the smaller, lying to the south and east, contains the Great Eastern, South-Eastern, London, Chatham, and Dover; London, Brighton, and South Coast; and London and South-Western Railways. It is 2,417 miles in aggregate length, and the lines which compose it, running chiefly through agricultural districts, derive only 8 per cent. of their gross revenue from the carriage of minerals. Their principal disadvantage is that the formidable cost of their London stations is divided over so short a length of railways, a fact which raises the capital cost of construction by nearly 10,000*l.* a mile above that of the northern lines.

The second group of railways includes the Great Western, the Midland, the London and North-Western, the Great Northern, and the North-Eastern lines. Their aggregate length is 7,256 miles, or close upon three times that of the southern group. While costing, as before intimated, some 10,000*l.* a mile less than the latter, their great disadvantage is that 25 per cent. of their revenue is derived from the carriage of minerals,—a business which is not only very poor remuneration in itself, but which, by keeping other traffic off the line, reduces the gross earnings per mile by more than 10 per cent. below that of the non-mineral-carrying group of railways.

The cost of the southern lines, thus denoted, averages 53,170*l.* per mile. The gross revenue is 4,521*l.*, or 8.3 per cent. on the capital. The co-efficient of working expenses is 51.4 per cent., and the resulting net profit is 4.04 per cent. on capital outlay.

The five Northern lines have cost on an average 43,632*l.* per mile. Their gross revenue is 4,064*l.* per mile per annum; 25 per cent. of which is derived from the carriage of minerals. This revenue is equal to 9.2 per cent. on capital, but the average coefficient of working cost is so far increased by the large proportion of mineral traffic as to stand at 57.1, instead of 51.4 per cent. of revenue. Thus the net profit divisible on capital is reduced to 3.95 per cent. all round.

Thus far the relative advantages and disadvantages of the two groups of lines are not widely different in their balanced results. But for more than ten years prior to that of which we have compared the analyses, a movement had occurred in each of the two groups, in opposite directions. The net profit of the Southern lines had been advancing, that of the Northern had been declining. The reason was that the capacity of the former for traffic, as they were not choked by the low-speeded

mineral trains, was so superior to that of the latter, as to allow of increment of revenue without corresponding increment on capital, while the reverse is the case with the lines that carry three descriptions of traffic. From 1871 to 1880 the average net return on capital on the Southern lines (omitting the London, Chatham, and Dover) rose from 3.78 to 5.16 per cent.; while that of the five Northern lines fell from 5.65 to 5.23 per cent. The result of the accounts of the last half-year shows an acceleration of the same double process.

In the half-year ending June 30th, 1886, the Great Northern was the only one of the five Northern lines which did not show a decrease in revenue. The balance of the loss on the five railways was 399,916*l.* for the half-year. Against this has to be set a saving in working expenses on three of the five lines, the increase in the working expenditure on the Great Northern being nearly as much as the increase of revenue, and the Midland showing increased working expenses with declining income. The balance of saving was 111,580*l.*; and the net loss, as compared with 1885, on the five lines for the half-year was 277,338*l.*, or 38*l.* per mile for the period.

During the same half-year the Brighton Railway showed a decline of 18,700*l.* in its gross revenue; allowing for which there was a gain of 31,672*l.* on the income of the southern group of lines. The working expenditure, at the same time had been reduced (with the exception of an increase of 14,300*l.* on the Great Eastern), the balance of reduction being 44,953*l.* This saving, added to the increase of revenue, shows a gain to the group of lines in question of 76,625*l.* for the half-year, which is equal to a net gain of 31*l.* per mile for that time. Thus while the non-mineral carrying lines show an improvement at the rate of 31*l.* per mile, the mineral carrying lines show a deterioration of 38*l.* per mile, for six months in each case.

This movement is further illustrated by the fall in dividend which, on the five northern lines, has occurred since 1882, in which year the normal growth of railway income was arrested. The dividend of the London and North-Western Railway has been reduced by 21 per cent., from 7 to 5½; that of three others of the lines by from 22 to 25 per cent.; and that of the North-Eastern, with its 36 per cent. of earning from mineral traffic, by no less than 40 per cent., or from 7½ to 4½. On the other hand, in the southern group, there had been a decline from 4½ to 3½ per cent. in the London and South-Western dividend while the Brighton and South-Eastern lines divided each ½ per cent. less, the Great Eastern ½ per cent. more, and the Chatham line rose from nil to 2 per cent. for its preference stock.

The double mode of comparison above adopted has a double value. To ascertain the real earning capacity of a railway the net percentage of revenue divisible over the entire capital is the true test. For the permanent investor this is the desirable information. But for the speculator, the rate of dividend, which applies to a portion of the capital, is the regulating feature. As to this, it should be borne in mind how much more favourable to the original or permanent shareholder the French distribution of capital has proved than that adopted in the United Kingdom.

Without attempting to foretell the future, it may be fairly concluded that so long as the determining causes remain the same the phenomena observed are likely to continue. Before the introduction of the mineral traffic on our trunk lines, working expenses were (in some cases) as low as 40 per cent. of revenue, and dividends reached 10 per cent. Each of these conditions still exist in certain cases; that is to say, that homogeneous traffic, running all trains at the same speed, and all stopping at the same stations, is yet worked at or below 40 per cent. of gross income, and is found, in well-known cases, to pay upwards of 10 per cent. dividend. But the average return on capital of the English railways is little over 4 per cent. per annum, and, as we have shown by unquestionable figures, the co-efficient of working expenses increases, and the net profit

consequently declines, in close proportion to the share borne by the mineral traffic in the production of gross revenue.

If the shareholders of the lines which are undergoing a marked and steady decline in their net profits, a decline explained and anticipated in the evidence before the Select Committee on Canals, in 1883 (see pp. 232, 233, 236, and 245 of the Appendix to the Report), are contented to see their property steadily decline, while that of their neighbours, who avoid unprofitable traffic, increases or at least remains stationary,—they are, of course, their own masters in the matter. But it is well that the facts should be put before them. And it may be stated, without any fear of contradiction, that any misfortune that, even if they do not directly spring from, yet accompany, neglect of the time-honoured canons of business, are apt to attract blame rather than sympathy when they can no longer be concealed. That the carrying value of one set of lines should decline by from 20 to 40 per cent., while that of another set of lines is substantially unimpaired, is a fact of unmistakable import. It is hardly credible that, in a people which used to be so eminently composed of men of business, this should go on year after year without any attempt on the part of those who are the losers to investigate the subject thoroughly. So long as the question is regarded only in the block,—so long as people only speak of the gross traffic of the railways of a country,—it is easy to throw the blame of declining dividends on uncontrollable causes. It is not, however, matter of opinion, but of fact, that those railways which carry in large quantities a description of traffic that can be far more cheaply carried by water, and that is carried by water in France, Germany, Russia, and, as a rule, wherever,—out of England,—water carriage is available, show a declining prosperity, while those railways that are nearly free from such traffic show a stable or an increasing prosperity. This has been long since brought before public attention, to the advantage, no doubt, of those persons who seek rather permanence of investment than speculative profit. In the last six months the movement has assumed more rapidity than heretofore. The fall of ½ per cent. in the London and North-Western dividend, and of 1½ per cent. in the North-Eastern dividend, while the Great Eastern and the South-Eastern dividends rise by ½ per cent. each, is an *argumentum ad crumenam*. It may, of course, be neglected, and the advice of those who call attention to it may be despised, but the facts which we have cited,—and there is an ample store of them,—are such as to render it highly probable that the argument will continue to be urged by the disagreeable advocacy of shrinking dividends until the matter is thoroughly investigated, whether as a mechanical question or as a question of account.

NOTES.

IN the House of Commons on Monday last Mr. Gent Davis asked the First Commissioner of Works if he would reconsider the matter of the proposed flights of steps which were to be intruded into Westminster Hall in connexion with the so-called "Restoration" of the Hall by Mr. Pearson. Mr. Plunket's reply was evidently in reality dictated by Mr. Pearson, and we can only describe it as exceedingly misleading. The substance of it was that the proposed stairs merely replaced stairs which had always existed in the same position. This is not the fact, and it is a very disingenuous statement. Capon's plan shows two symmetrically-arranged straight staircases at the north end of the hall, on each side of the doorway, and apparently concealed by screen walls. This is quite a different thing from shouldering a great staircase, with two flights at right angles, into the space on one side of the doorway. On the west side Wren's plan shows two very small and not noticeable staircases, the date and origin of which there is nothing to show. That

Mr. Pearson has recognised the advisability of paying some attention to criticism from outside appears to be implied by the statement of Mr. Plunket that the western staircase is to project 9 ft. 6 in. only, and not 15 ft. as shown in the officially-published plan. This is something gained, at all events. Of course, the real objection to the whole thing is the absurdly futile object for which these large staircases are to be made, to get into some rooms between the buttresses which it is pretended are a restoration, and on which the architect, by his own admission, merely wrote "committee rooms" in order to give some pretext of a use for them. It is, however, we fear, useless to appeal to a Parliament which is entirely indifferent to architectural subjects, and is ready to accept and to vote for anything which the First Commissioner of Works for the time being puts before it.

THE thirty-third number of the *Statistical Abstract for the United Kingdom*, recently issued, is an improvement on its predecessors, and contains some information of the highest statistical value. Among recent additions to the contents of the volume, which has grown from 173 pages for 1883 to 200 pages for 1885, is a return of the tramways of the United Kingdom, drawn up in the same form as the similar returns for the railways. The aggregate length of these lines has risen from 158 miles in 1876 to 811 miles in 1885; and the number of passengers accommodated from 146 millions in 1878 to 364 millions in 1885. The total capital has risen from 2,186,304 l. in 1876, to 11,617,586 l., so that a mile of English tramways costs considerably more than a mile of American railway. Working costs, for 1885, come to 75 per cent. on gross receipts, but still allow a net receipt of 5.41 per cent. on capital. The most encouraging feature in the return is the increase of the net profit on capital, which has risen from 4.62 in 1883 to the above-named figure. In 1879 the rate of profit was 4.85 per cent. The great defect in this table, as also in the railway tables which precede it, is the absence of information as to the number of men employed, which it is very desirable to know. This information is supplied with regard to our registered shipping. Exclusive of masters, 198,781 persons were employed in our merchant navy in 1885, which is a decline from the highest total reached, viz., 203,720 in 1872. But with the increase of steam navigation the number of hands required in proportion to tonnage is continually on the decrease. In 1871 there was one hand for every 28 tons of shipping; in 1885 one hand worked 37 tons of shipping.

ONE of the latest archaeological finds has just occurred in the neighbourhood of Bury St. Edmunds, the new sewerage works of which are being carried out at West Stow Heath, between four and five miles from the town. In digging a narrow trench the workmen cut through two pottery kilns of the late Roman period, similar to those which were excavated about six years ago by Mr. Frigg, a well-known antiquary of Bury, who believes that Stow Heath, now wild, remote common, had, at the close of the Roman occupation, a very considerable population, and that it was a suburb of the Roman station at Icklingham. It is well known that the centre of the western portion of the heath, known as Wildham, is occupied by a Saxon cemetery. The kilns in question, fragments from which will shortly be placed in the Athenæum Museum, were about 5 ft. in diameter, with walls 2 ft. 8 in. in height, composed of tempered clay, ruddy from repeated firings. The one was filled with blackened earth and bits of broken vessels which had been spoiled in the firing, and had been thrown aside as "wastes." Many of these were elegantly formed globular vases, with handles in buff and fawn coloured clay. The second kiln was more dilapidated than the first, but contained more interesting remains, the vessels being principally jars and saucers, and of a dark colour, leading to the inference that it had been used as a "smother kiln" for the production of black and slate coloured pottery. There was

also found a fragment of fine red ware, with coral-coloured glaze, forming part of a bowl, ornamented with the figure of a wolf-like animal. The progress of these sewerage works will be watched with great interest by antiquaries, for there is no doubt but that, in the various levelling operations for the construction of filter beds, numerous ancient sites will be met with and probably many Roman relics discovered. As the heath upon which the works are carried on is now the property of the Bury Town Council, there is every likelihood that a strict supervision will be exercised over the workmen, and that whatever is found will be carefully preserved.

MR. CHARLES W. HASTINGS has edited three little volumes which are of value as books of reference. These are "Water Works Statistics," the sixth issue; "Gas Works Statistics," the eighth issue; and "Gas and Water Companies Directory," the tenth issue. Of these, the first gives particulars in the case of 296 towns, tabulated under the headings of name of town, source of supply, gravitation or pumping, quantity raised per annum, assessment charge, meter charge, price per 1,000 gallons, number of meters in use, if constant service, and dividend. The information given under the third and fourth heads, however, is very small, and there is no indication of the incidence of the water-rate on the population, or of the difference in the cost of ordinary supply, and of sale for trade purposes. It is more than probable that the authorities decline to furnish this information without the stimulus of a Parliamentary order for an annual return. For the gas companies such Parliamentary returns are available, and supply (as we showed on June 19th last) tabulated totals which Mr. Hastings does not give. Thus, with the exception of twelve pages of foreign gas-works statistics, more information is to be derived from the Parliamentary return than from Mr. Hastings, and at a much lower price. "The Gas and Water Companies Directory" tabulates the date, Act of Parliament, capital, and dividends, of a large but uncounted number of companies, the names of principal officers, the populations, and the distances from London. But the necessity for purchasing three books, at the price of 10s., to obtain the information of which the greater part, viz., that relating to the gas works, is to be purchased from Messrs. Hansard for 1s. 2½d., is not to us self-evident. Still the books are very handy.

IT is to be hoped that a really liberal response will be given to the appeal of the Trustees for the preservation of the unique little church of St. Lawrence, at Bradford-on-Avon, which was built by the Saxon Bishop Aldhelm, and was alluded to by William of Malmesbury. Probably Aldhelm's original church was of wood, and although the actual date of the present stone building is unknown, there is no doubt but that it is one of the earliest of the kind in this country, and one of the most interesting, if only for its singular measurements. The nave is 25 ft. in length and as many in height, being therefore of unusual and almost disproportionate loftiness, while the chancel is only 13 ft. in length, and the chancel arch but 3 ft. across. St. Lawrence has in its lifetime narrowly escaped destruction, having been used both as a school and dwelling-house; but, fortunately it was saved from degradation by the late vicar, who repaired and replaced the altar in it, after discovering the chancel-arch and step during the removal of a stack of chimneys. Though the walls are of great thickness, they have developed a considerable degree of insecurity, which requires careful looking to, having been filled in with conglomerate, which has mouldered away in the course of ages.

A CORRESPONDENT, well known in the architectural world, writes:—"When I was over in Ireland I was greatly struck by the originality and beauty of the details of the Classical buildings in Dublin.—the Custom House, the Four Courts, the City Hall, the Queen's Inn, &c. I do not think that the

details of these buildings have ever been published; yet they are very remarkable. There are circular "landing-places," staircases, ceilings, corridors, &c., which struck me as being admirable examples of design. There is also some very pretty and ingenious planning and interesting construction. Would it not be worth while for some of the architectural students to go over to Dublin, measure, and make geometrical drawings of these buildings, or parts of them? It seems to me strange that they should have been overlooked. The detail is much more 'free' than our Classical work here, and yet it thoroughly escapes the wilderness of French or German eighteenth-century work. It is not unlike the work of the brothers Adam, but bolder."

THE Metropolitan Board of Works resumes its weekly meetings this week, after the recess. We see from the *agenda* paper that a letter has been received from the Home Office, transmitting copies of a letter from the Town Clerk of London, and of a Report of the Medical Officer of Health of the Port of London, complaining of the condition of the Thames as affected by the sewage of London, and stating that "the Secretary of State wishes to remind the Board of the terms of the letter addressed by him to the Board on 19th May last, and hopes to learn at an early date that the Board has adopted more effective remedial measures than those now employed"; also asking what objection there is to the immediate setting in hand of the treatment of the liquid residue of the sewage. We share the hope expressed by Mr. Matthews, but we are not very sanguine of its realisation "at an early date."

IT is much to be regretted that the narrow throat at the Holborn end of Leather-lane seems likely to be perpetuated by the rebuilding of the premises at the junction of that street with Holborn on their old lines, instead of seizing the opportunity to commence the operation of widening the thoroughfare. Of course the value of the frontage to Holborn is considerable, but public interests ought to have prior consideration in so important a matter as improving street communication. Other alterations in the neighbourhood might render Leather-lane eventually a thoroughfare of some importance; but the possibility of this development will be shut out for a good many years to come by the re-erection as now proceeding.

ARCHITECTS may be interested to know that in some quarters of the land that kind of immortality is being conferred on them which consists in the application of proper names as the distinguishing names of streets. Going through a new speculating builder's neighbourhood the other day, in the outskirts of a large provincial town, our eye was caught by "Butterfield-street" on the end house of a row of "desirable" two-storied dwellings. Any doubt whether this could refer to the eminent architect of that name was dispelled on reading at the next street-corner "Bodley-street," and on the same property we successively came on Wyatt-street, Paley-street, Goldie-street, and Nesfield-street. There may have been others which we missed; as the list stands, it is not easy to see what particular principle guided the selection; though the majority are among those generally regarded as especially "church architects." The names may have been selected from those who contributed to local architecture. It is a delicate compliment, at any rate, from a builder to the architectural profession, and it is to be hoped that eminent architects whose names are not in the list will not feel jealous. Their turn may come.

SPALDING, Lincolnshire, is ninety-three miles from London, by the Great Northern Railway. The charge made for the carriage of two tons of potatoes and delivery at Spitalfields Market the other day was 2l. 13s. 4d., being nearly 3½d. per ton per mile, which was 12s. 3d. more than the selling price of the vegetables. From Tonbridge to Bath is 137

miles. The sum of 5s. 9d. was charged the other day for a consignment of half a cwt. of plums from the former to the latter place. This is at the rate of 1s. 8d. per ton per mile. Under these circumstances it is not surprising that an arrangement has been made for sending fruit and vegetables from Sittingbourne to London by water, and yet fruit is just one of those things which can best afford to pay for speedy transport. There must be something thoroughly unsound in a system of charges which is thus prohibitory of the inland transit of vegetables. The same weight of plums could have been sent from America for 8d. This comes of the "policy" of the railway managers in charging on every item what they think it "can bear" without reference to either cost of carriage or convenience of home products. Such a policy means inevitable disaster.

THE TRIUMPHAL ARCHES OF THE ANCIENT ROMANS.*

SPAIN is a country possessing a great many remains of Roman times which would very amply repay an investigator on the spot, and their importance would justify the publication of an extended description. There are many triumphal arches still remaining, mostly of plain design and workmanship, but well deserving notice. One of the most interesting is at Copparra in Catalonia. It is a quadrangular building, having an arch on each face, with moulded architrave, pilasters, and impost. There are plain engaged composite columns not quite at the angles of the composition, but just clear of them. These occur to the front and back elevations, the two side fronts having small pilasters only. There are large pedestals on the ground level to each of the principal elevations, which once probably supported statues. There is a very low attic above the main cornice, with two rows of inscriptions.

The fine Roman bridge of Alcantara has a plain single arch spanning the roadway in the central pier, with plain impost and pilasters, but the whole, judging from Laborde's engraving, had been much altered prior to the Peninsular wars.

Another characteristic design is at Bara, also in Catalonia. The opening is lofty for its width, with a semicircular arch springing from moulded imposts. There are two fluted pilasters right and left, the end ones being returned to the side elevations. The projection of the pilasters is so small that the entablature above continues over them without break. A single line of inscriptions occupies the centre of the otherwise plain frieze. The order is Corinthian. The pilasters and jambs rest on a plinth of stonework boldly channelled. It stands in the midst of a plain, and a Roman road passed beneath it.

Another monument of much interest is the arch at the approach to the bridge of Martorell, near Montserrat. The great bulk of the bridge is now of later work, but the triumphal arch still stands, though in poor condition. There is in the centre a plainly-moulded arch springing from imposts and pilasters, while at the angles are returned pilasters, fluted, of the Corinthian order, the entablature being plain and simple, and there being but a blocking course above it instead of an attic. The composition, as in the former instance, stands on a plinth of deeply-channelled masonry, but here there is a moulded base in addition.

At Cabanes, outside the present city, are the remains of a bold single arch, formed of massive stones unmoulded. At present this striking monument consists only of the arch and its supports, there being two massive piers which have large moulded imposts and plinths carried around them.

The triumphal arch of Merida, in like manner, consists at present but of two arches of massive stones, one parallel to the other, and attached by masonry in large blocks, there being a plainly-moulded impost to the outer arch.

The proportion of these Spanish arches cannot be laid down to any one rule; each has been designed on its own.

The number of triumphal arches in Africa is large, and there appears to have been hardly a city which was not adorned by one or more. Several of these merit attention on account of

the purity of their designs, and from their remaining in fairly good condition they can be studied with additional advantage. The number remaining has never yet been determined, and, in fact, owing doubtless to the large amount of unexplored country, it may be doubted if the number is yet known. Several sites of Roman cities appear hardly to have been interfered with for many centuries; others have been covered with sand.

At Djémilah, the ancient Ciculium, the Roman city appears never to have been occupied by the Arabs, and the plans at least of the ancient buildings remain as they were left by the early inhabitants. A fine triumphal arch remains at the entrance to the Forum of the town, erected to the glory of the Emperor Caracalla, his mother Julia Domna, and his father Septimius Severus. The correctness of designating such an arch as this, erected away from Rome, by the title of an arch of triumph, is proved by the inscription itself over the principal opening, where, after giving at length the titles of the persons already named, it states that "this arch of triumph has been erected by virtue of a decree of the decurions." The design is a very effective one, there being a plainly-moulded central arch, two detached columns right and left of it (or rather indications where the columns had been), and as many pilasters; then, two plain niches with semicircular heads, one on each side with a column again at each angle. Enough of the attic, with the inscription, remains to show that the proportion was probably very similar to some already noticed. It was the intention of the Duc d'Orleans, in 1839, to have this fine arch taken down stone by stone and transported to Paris, and the order was actually given by the then Minister of War. It is in very shattered condition, and the next earthquake will doubtless bring the whole to the ground.

At Hammam, the ancient Assura, is another arch, of less pure, but still of very characteristic, design. It consists of a plain archway, having engaged columns which support an architrave and pediment, attached to the front of the composition, which terminates by larger columns at the angles, which have carried the main cornice. Above is an attic, now much ruined.

At Mokhtar is another arch, built of massive materials, of the Corinthian order, with highly elaborate ornaments. There is a central semicircular arch, and there were two niches left and right. It is apparent that the arch stood at the approach to a bridge over a ravine at the extremity of which it stands. The width is about 45 ft., and the thickness 12 ft. The whole of the upper portion is ruined. There is a second triumphal arch among the ruins of this town, also of the Corinthian order, with only a few decorations of a very simple kind. There is an inscription, in fragmentary condition, on which Dr. Davis read a dedication to the Emperor Trajan.

There is a beautiful arch at Hydra, in fairly good preservation, having been partly cased in later masonry. It has a plain unmoulded semicircular arch, without an ornamental keystone, and springing from a moulded impost. This is flanked by pilasters 2 ft. 4 in. in diameter, and plain detached Corinthian columns. There are pilasters just clear of the extreme angles, and there is an attic with a cornice. The sides are quite plain. In general design it is not unlike the arch of Djémilah, but it does not possess the side niches which occur there. There is a very legible inscription on the architrave, with a dedication to the Emperor Septimius Severus Pertinax. The extreme width is 48 ft., the thickness being 12 ft.

The arch at Tebessa is now the northern gate of the town, but it was originally detached, with four faces, one to each of the four cardinal points, with four columns to each. It is a fine monument, built of a fine grained limestone, and appears to have had the peculiarity of a small turret-like upper portion, also with four columns over each arch.* There are inscriptions on each architrave, and it appears to have been erected by Cornelius Egrilius in honour of Severus and Julia Domna.

At Statia is another arch, about 41 ft. wide, and 11 ft. 6 in. deep. There is a central archway, 18 ft. 6 in. wide, but the architecture is a poor specimen only of the Corinthian order. The name of Constantine the Great may be

* Mr. Graham's plate elucidates this peculiar feature. The enclosure contained a sculptured figure, and was surmounted by a square cornice.

read on the façade. A paved street still runs up to some ruined temples, the street having been flanked by pilasters; and an entrance is given into the square in which the temples stand, by another arch, which appears also to have been a triumphal arch, having a wide semicircular central opening, and two smaller lateral arches; the whole design being in excellent proportion and of the Corinthian order.

The Arch of Zana is a thin structure formed of a fine semicircular moulded arch springing from a bold pilaster, with a carved cap on each side. There is a somewhat stunted Corinthian column on each side, unfuted, around which the entablature breaks. The frieze is pultivated. The composition terminates by a width of wall surface beyond the columns, around which the entablature returns. Only a few stones remain of the attic. The arch stands alone in the midst of a ruined waste.

The Arch of Lambessa, believed by Mr. Graham to be the Hall of the Prætorium, is so much like a triumphal arch that it is included in this list. It is a large square building, perhaps the largest arch in Africa, formerly very much buried. There are three arches on each face, one large and two of smaller size, with a central arched opening over the central one. Small plain Corinthian striplike pilasters divide the arches from each other, and stand in tiers over each other, there being a small plain entablature above the ground-floor arches. That above, terminating the composition, is very much ruined, only the architrave and a few stones of the frieze remaining. This monument is built of rather moderate-sized stones, well put together.

At Sidy Abd Etabas is another monument, stated by Shaw to be a beautiful triumphal arch. At Tripoli is another, apparently a quadrilateral structure; but it is probable that the notices of the monuments already referred to in the old province of Numidia alone will be considered sufficient to call attention to the great number existing in this but little explored country, and to show that it has possessed more than the wild beasts and the Numidian marble which Phrygia believed were its only remarkable productions.*

In the provinces of Istria and Dalmatia, so rich in remains of the ancient Romans, are some arches which demand our notice. The foremost place must be given to the beautiful arch at Pola (illustrated), a monument which from its extreme elegance has attracted many an artist to its remote position. Not only did it cause the continuators of Stuart and Revett's "Antiquities of Athens" to make a long detour to include it in their work, but it forms the subject of some of the best plates in Alison's monograph of Pola. Many of the plates in Joseph Lavallée's "Voyage pittoresque de l'Istrie et de la Dalmatie" are also devoted to its illustration, while there are several other foreign descriptions. There is a central arch with moulded architrave, no keystone. The pilasters supporting the arch are carved all over their surface with elegant foliage. Two fluted Corinthian columns stand on either side of the arch, the entablature breaking around them. The frieze is enriched over the columns, but plain in the centre part of the inscription. There is a well-developed attic already alluded to, projecting equally over the columns and with a central projection over the centre of the arch, there being portions of inscriptions on the piers, &c. The soffit is covered with diamond panels and decoration. The names of Sergius Lepidus and of other members of the same family occur, and there is evidence that this arch was a tribute of affection by a wife to her husband's memory. The town side of the arch is free of buildings, but the opposite one is encased within the more modern walls of enclosure, and it now forms one of the entrances to the town. It is known by the name of the Golden Gate, a title equally given to the Roman gate of the Palace of Spalatro, to the old gate in the town walls of Frejus in the south of France, and some others.

* It will be remembered that two exceedingly interesting papers on "Remains of the Roman Occupation of North Africa" have been read within the last two years by Mr. Alexander Graham, before the Royal Institute of British Architects. (See "Transactions" of the Institute; and the *Builder*, vol. xlviii., p. 744, and vol. l., p. 741). The fine arch at Timegad is shown in the Institute's "Transactions," vol. i., new series, as at present and as restored. It has a central arch and two side arches. There are square panels for statuary above the latter, and the main cornice, which was horizontal above the main arch, has carved pediments over the panels, a design not previously noticed in any of the arches referred to by us.

* See pp. 333, 371, 403, ante.

In the neighbouring town of Zara is a little-known triumphal arch removed from the ruined city of Nona and rebuilt to form one of the town gates, being known as that of St. Grinnona. The inscription states that it was erected by Melia Anniana to the memory of her husband, Læpicius Bassus, originally in some public place or market, the word "emporium" occurring in the inscription. It consists of a central opening, spanned by a semicircular arch with a moulded architrave, no keystone, flanked by a plain Corinthian pilaster on each side. The entablature is well proportioned, of excellent workmanship, the inscription occupying the whole of the frieze in two lines.

No attempt at restoration has been made, and only the upper portion of the arch has been rebuilt, the result being that the pilasters project bodily at the line of the springing of the arch, and do not go down to the ground.

The eastern provinces of the Roman Empire do not appear, judging by what we know at present from existing remains, to have had a great many arches of the description under review. There is a good arch at Salonicæ, but the remains of the old cities of Asia Minor, and many other districts, are so little explored and so covered over with earth, that it is impossible to say what discoveries may not be made eventually. There is a gateway at Ephesus which probably was a triumphal arch, although forming a part of the entrance walls. The arches of Palmyra do not call for reference here, since their description would have to be a portion of that of their magnificent colonnades. In the rock-hewn city of Petra is an arch of moderate size, of Roman date, built up and not excavated. It is greatly ruined, but sufficient remains to show that it consisted of a central semicircular archway, flanked by pilasters, having the peculiarity of their faces being divided into square panels of small size, and filled in with carving.

One of the most remarkable arches existing is the well-known arch of Hadrian or of Thesus at Athens (illustrated), and with the notice of this monument we will close.

A semicircular arch, springing from a large capital to the pilasters supporting it occupies the central position. There is a mass of walling, each block being neatly channelled left and right, terminating in large solid pilasters formed of large stones. No cement or mortar is used, the stones being laid dry. The thickness not being great, the pilaster extends from front to back, there being a large capital and a bold entablature, the latter broken around the pilasters. There were Corinthian columns left and right of the arch, but they have disappeared. The peculiarity of the design is the unique upper stage. This consists of a pedimented window opening, so to speak, supported by fluted Corinthian columns. Right and left of this is another square opening, of less thickness, the entablature forming its top being supported on slender pannelled pilasters. The composition at present ends with these, the width of the upper stage being much less than the lower one. The whole is of Pentelic marble. It seems to be a remarkable circumstance that so many revolutions have occurred, and that more than eighteen centuries should have passed away leaving this fragile monument still standing.

LINCOLN'S INN-FIELDS: THE STORY OF A WALL.

THE recent destruction of two very old houses, together with the partial demolition of another, their next adjoining neighbour, in Great Turnstile, High Holborn, reminds us that an important chapter still remains to be written in the history of London. The circumstances indeed of their original erection are so little known that a brief sketch may be appositely given of the less familiar facts that concern their site and its surroundings. Standing at the bay window on the second floor of Sir John Soane's house, in Lincoln's Inn-fields, a prospect opens before us which, for the measure of diversity of its architectural and historical interest, is quite unsurpassed by that of any other area, of equal extent, in all the town. Immediately below we see the handiwork of Inigo Jones, of Winde, of Kent, and of Barry. On the left arises Jones's one achievement in the Gothic mood, environed by nobler buildings due to Taylor, Hardwick, and Scott. Members of the Inn are drilling on the very spot wherein their predecessors had been repeatedly forbidden

under strictest penalty to bear their bows bent, or to hunt the rabbits with dart or arrow,—the Coneygarth or garden which in the twelfth century William Coterell gave to St. Giles's Hospital in frankalmoin, and which a hundred years later was held of St. Giles's by the Hospitallers of St. John of Jerusalem. Others play at lawn-tennis in an enclosure,—no longer a jockey's training ground, and more jealously preserved than when Gay wrote his "Trivia,"—over which Sadler had gasconaded with the purse and Great Seal he had stolen from the Lord Chancellor Finch's house in Great Queen-street; where Babington was executed; and William Viscount Russell triumphed, as Burnet tells us, over death. The history of nearly four hundred years could be filled into the space that lies between the angle towers of Sir Thomas Lovell's gate-house of Lincoln's Inn and the *Alcove* of Street's great hall at the Courts of Justice. Regarding, then, the wide interval between Stone Buildings and Ancaster House, we may not unreasonably ask how did it come about that we have an uninterrupted view of the varied buildings which go to form Lincoln's Inn? Why has the fourth or eastern side of the Fields never been completed?

In the month of September, 1613, the County Justices received a letter from the Lords of the Privy Council for restraining certain proposed buildings in Lincoln's Inn-fields. The letter appears to have originated in an alarm taken by the students at "an intent to convert the whole field into new buildings, contrary to his Majesty's Proclamation, and all other public orders taken in that behalf, and to the great pestering and annoyance of the Society."* The interposition succeeded; for in respect of a specific encroachment contemplated by "a man of special quality, and much regarded by us all," we find them in October following writing to their good Lordships:—"It may please your Lordships to be advertised that in our absence this long vacation, upon attempt of buildings by the said Sir *** the whole Society, both of the barre and under (then in town), made humble petition to your Lordships . . . for the restraynte thereof, whereupon it pleased your Lordships to give strict order for restraynte thereof accordingly." But not more than five years have passed when a special commission is directed to Lord Verulam, Inigo Jones, "et alii, pro supervisione camporum vocatorum Lincolnes Inn Felde." The Commission sets forth the king's no small contentment that within these sixteen years of his reign more public works near and about his City of London have been undertaken and finished than in ages heretofore. Then reference is made to his Fields as being situate in a place much planted round about with dwellings and lodgings of noblemen and gentlemen of quality, as well as of the Inns of Court or others, which if they were reduced into fair and goodly walks, would be a matter of great ornament to the City, pleasure and freshness for the health and recreation of the inhabitants thereof, and for the sight and delight of ambassadors and strangers coming to our Court and City, and a memorable work of our time to all posterity. These, though, are deformed by sundry cottages and mean buildings, with other encroachments and nuisances. It goes on to authorise the Commissioners,—the Earls of Worcester, Arundel, and Pembroke amongst them,—to frame and reduce the Fields, both for sweetness, uniformity, and comeliness, into such walks, partitions, or other plots, and in such fashion, both for public health and pleasure, as Inigo Jones shall, with the sovereign's approval, design. Thus empowered, that architect begins along the western side, for long afterwards known as West or Arch Row, and from its southern corner,—close to a traditional relic of the Duchess of Portsmouth's dairy-house, the *soi-disant* Old Curiosity Shop.† There, just southwards of Portsmouth-place, and screened by the covered entrance into Lincoln's Inn-fields Chambers, may to this day be found one of his houses in its pristine state, marked with the Rose and Lily Queen's devices, and unfaced by the all-obliterating stucco of a later age. One of the earliest views of Arch-row is on the reverse of a silver medal, by G. Bower, struck to commemorate the destruction, 1688, of the Roman Catholic chapels in London. The Sardinian chapel (Duke-street) was sacked on December 10th, 1688. Lindsey or Ancaster House, Nos. 59-60,

plastered over, and its younger neighbour, Nos. 57-58, are, be it noted, of stone.

In the first year of Elizabeth's reign the clay embankment that separated the Inn precincts from the Fields was ordered to be replaced with one of brick, having gates therein; the walk beneath the trees in Coneygarth had been laid out in the preceding reign. It is important to state that at this time the ground which is covered by the now square consisted of two fields, respectively termed Purse-field and Cop, or Cup, Field. Purse-field lay to the west; Cop-field eastwards, abutting against the wall. These were probably separated by the pathway that passed from Great Turnstile to Duke (now Sardinia) street. The open ground beyond, stretching to the Via de Aldwych (since Drury-lane) and St. Giles's pond, at the top of Elde-street (Crown-street), clearly appears in Aggas's view, which is believed to have been surveyed circa 1560. In 1639 the Society are again in arms; one William Newton being the offender. They present petitions to the king and the queen, praying that notice be taken of Newton's project to erect a great building in the Fields, and that he be commanded not to proceed any further in the said attempt, there being as yet no foundation of any building by him laid. They urge how they would thus lose the fresh and open air which they then enjoy on that (the western) side of their house; that sundry inconveniences would inevitably arise especially in times of infection, to the great discouragement of the petitioners, disquieting of their study, and disheartening of others to be hereafter admitted into their Society. The consideration of Newton's case is referred to Sir John Finch, Chief Justice of the Common Pleas. In 1641 the House of Commons order, upon the benchers' petition, stay to be made of any further building in Lincoln's Inn-fields; and in 1642 a Committee of the House is appointed to certify to the Bench upon a counter petition by Newton. Falling in his suit, he ultimately has to content himself with building operations at the north-western angle of the Fields, namely, the modern Gate-street, towards Little Turnstile. This was originally Newton's building; westwards is still a Newton-street, leading from High Holborn, Nos. 206-7, to Charles and Parker streets. A petition is addressed to Parliament, 1656, by ratepayers of the parishes lying round about the Fields, complaining of the untoward state thereof. Their condition, together with the character of their frequenters (whose evil repute would seem to have been revived of late), formed a frequent topic for railleury and animadversion with our dramatists and other writers. Rufflers and Mumpers (or shamming cripples), ever ready to enforce charity with free use of their crutches; footpads, bowlers, wrestlers, horse-copers, beggars, gamins,—all contributed to confer notoriety upon a district which the orderly and better-disposed found it profit to shun. The petitioners' remonstrance extended to the Fyckett's, Purse, and Cup fields. One remedy suggested itself,—to resume the plan projected by Inigo Jones. Thus in the next year we find those persons who had interest in the Cup-fields inheritance agreeing to construct a continuance of the range of southern buildings (Portugal-row) eastwards, towards Lincoln's Inn Wall; and to make another range (Holborn-row), along the northern side, from the then newly-erected Newton's buildings (Gate-street) to the present Newman's-row, at the end of Great Turnstile and Garden-place. The Society were favourable to the scheme, provided that the central space was left open and duly laid out, and no interference made with their easement of the wall. Thereupon covenants were entered into for erecting the two ranges of buildings in commensurate proportions as to "front, height, breadth, and beauty with the Row called Portugal-row, or in a more firm and beautiful manner"; and for the levelling, planing, and planting of the inner space, &c. It was further stipulated that "for the future no buildings other than the said two ranges should be erected upon the said field." Moreover, the inheritors covenanted to set up in the middle of Lincoln's Inn wall, a large pair of gates, and stairs of freestone, having a fair and easy descent out of the Society's walks into the said field for the use and convenience of the students. They also convey to the Benchers the residue of Cup Field, upon trust, nevertheless that the Benchers should for their part execute to them

* See Dugdale's "Origines Juridicales."
† Vide the Builder, January, 1884.

a lease for 900 years under a small yearly rent, but with a covenant against the constructing any new buildings. In 1674 the Lincoln's Inn wall is raised, the garden enlarged, and beautified with the terrace walk along the wall. The "large pair of gates and stairs of freestone" are now represented, we take it, by the private wicket immediately north of Hardwick's Library and Hall (1843-5), but the steps have disappeared, for the entrance is level with the road and garden within. According to the volume "New Remarks of London, &c., collected by the Company of Parish Clerks:" 1732, "the terras-walk in Lincoln's-Inn-Gardens, and the chambers at the north end of Searl-square (New-square) in that Inn," stand within the bounds of St. Giles-in-the-Fields parish. On the front and back of No. 11 of these chambers are fixed the two boundary marks of that parish and of St. Clement Danes. Nearly all of New-square,*—*antique* Lincoln's Inn Little Fields, or Fyckett's Field, is included in the latter parish.

In Speede's Survey of 1720, and in R. Wilkinson's Map of 1799, the whole of the northern side of the Lincoln's-Inn square is marked as Newman's-row, so named from its builder, temp. Charles II. This had been previously known as Holborn-row, *vide* the "New Remarks" cited above; whilst it would seem to have resumed, for a while, its earlier designation about the middle of the eighteenth century, since we find "Holborn-row" in Baldwin's "New Complete Guide" of 1774-5, and elsewhere. Four iron posts by Garden-place render duty for the ancient turning-stile that passed foot-passengers from Newman's-row into High Holborn. That alley had formerly good renown for its milliners' and sempsters' shops. Cartwright, the actor, who gave a valuable collection of plays and pictures to Dulwich College, kept a shop here some two hundred years since, for the sale of Welsh flannels, friezes, and similar commodities, *teste* John Bagford, the well-known antiquary; and here Bagford himself started in business, but with no success on either venture, as shoemaker and then as bookseller.

Of the three houses to which we refer, No. 17 in the court, and No. 283, High Holborn, have been lately pulled down, whilst No. 16 (in the court) has been made more secure with new foundations and the removal of its second and third floors. The group claimed to form part of the Whetstone Manor, or Park, House, and in age, at least, confirmed this tradition. The walls were bulged and hollowed, the floors much out of level, and the side beams more or less out of truth. In one window of No. 16 remains of the original wooden mullions were discovered. The house had at one time a return front southwards. Mr. C. F. Hayward, F.S.A., the District Surveyor, took a scale drawing of one of the two wooden chimney-pieces,—5 ft. by 7 ft. 6 in.,—carved in early Jacobean style, and of good workmanship. We read in Cunningham that one William Whetstone was a vestryman of St. Giles-in-the-Fields, in the times of King Charles I. and the Protectorate. His name survives in a thoroughfare between High Holborn and the Fields whose infamous annals are familiar to us in the works of Butler, Shadwell, Dryden, and Lee.

NOTES AND SKETCHES IN "ST. MARY OVERIE," SOUTHWARK.

Stow in his Survey, speaking of the priory church of St. Mary Overie, now St. Saviour, says, "East from the Bishop of Winchester's house, directly over against it, standeth a fair church called *St. Mary over the Rie, or Overie*, that is, *over the water*. This church, or some other in place thereof, was (of old time long before the Conquest) an house of Sisters founded by a maiden named *Mary*. Unto the which house and Sisters she left (as was left her by her parents) the oversight and profits of a cross ferry or traverse ferry over the Thames; there kept before any bridge was built. This house of Sisters was after, by *Swithin*, a noble lady, converted into a college of priests, who in place of the ferry, builded a bridge of timber and from time to time kept the same in good reparations. But lastly the same bridge was builded of stone, and then in the year 1106 was this church again founded for Canons Regular."

* Serle-court, *alias* New-square, was completed about 1490.

Stow, in speaking of London Bridge, again refers to the priory of St. Mary Overie, stating that it was originally built out of the profits arising from the ferry, and that the priests built a timber bridge there, which was burned in 1136, but was repaired and newly made of timber in 1163. However that may be, the bridge of stone that stood till the building of the present structure was begun about the year 1176, and was some thirty-three years in building. How well it was built was practically tested by those who had the pulling of it to pieces.

wards became the parish church of that name and was subsequently made the south aisle of the priory church, as it now is. In 1273 Walter, archbishop of York, granted thirty days' indulgence to all who should contribute to the fabric of the church. This house was again burned, or, at least, much damaged by fire in the reign of Richard II., and was rebuilt in that of the succeeding reign, when Gower, the poet, is stated to have been a large benefactor.* This is the account given in Dugdale, and Stow is not content with merely giving the name of

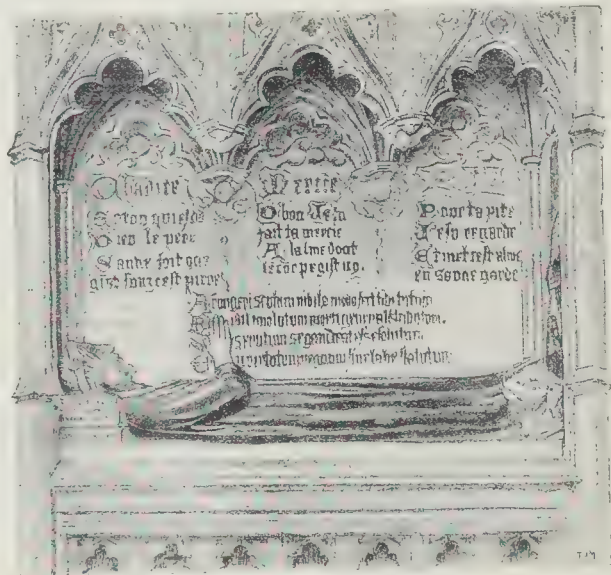


Fig. 1.—Tomb of Gower.

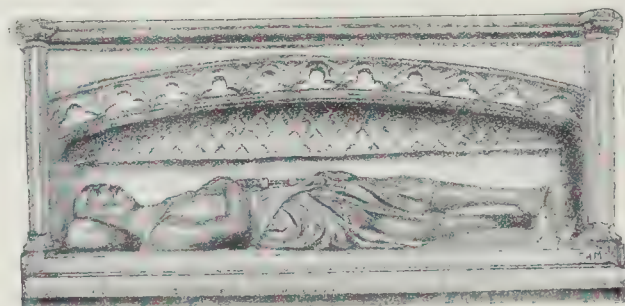


Fig. 3.—Tomb and Wooden Effigy.

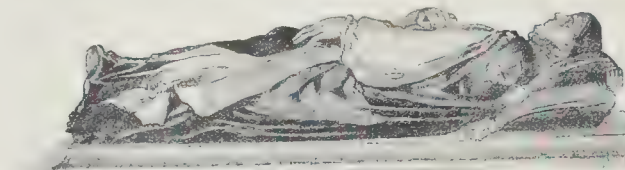


Fig. 4.—Monument to Bishop Andrews.

That the church was linked to the fortunes of the bridge or ferry there is little doubt, though in Dugdale's "Monasticon" the story which Stow gave on the authority of Linsed, the last prior, is denied. The priory was burned about the year 1207 (it is given 1213 in Dugdale, when the larger part of Southwark was consumed). "The Priory was rebuilt not many years after by the munificence of Peter de Rupibus, bishop of Winchester, so made in 1205, who also erected a spacious chapel, dedicated to St. Mary Magdalene, which after-

Gower as a benefactor, but goes on to say:—"John Gower, a learned gentleman and famous poet (but no knight as some have mistaken it), was then an especial benefactor to that work, and was there buried on the north side of the said church, in the chapel of St. John, where he founded a chantry. He lieth under a tomb of stone, with his image also of stone being over him. The hair of his head auburne, long to his shoulders, but curling up, and a small forked beard, and on his head a chaplet, like a coronet of four roses, an habit of purple, damasked,

down to his feet, a collar of essos of gold about his neck, under his head the likeness of three books, the first named 'Speculum Meditantis,' written in French; the second 'Vox Clamantis,' penned in Latin; the third, 'Confessio Amantis,' written in English, and this last is printed. 'Vox Clamantis' with his 'Cronica Tripartita' and others, both in Latin and French, never printed, I have and do possess, but 'Speculum Meditantis' I never saw, though heard thereof to be in Kent. Beside on the wall where he lyeth there were painted three virgins crowned, one of the which was named *Charité*, holding the device:—

'En toy qui es Fitz de Dieu le Père,
Savre soit, qui gist sous ces Pierre.'

The second writing, *Mercie*, with this device:—

'O bone Jesu, fait tu mercy
A l'ame, dont le corps gist ici.'

The third writing, *Pitié*, with this device,—

'Pour la pite, Jesu, regard'e,
Et met cest a me en savez garde.'

His armes, in a field argent, on a chevron azure, three leopards' heads gold, the tongues gules, two angels supporters; on the crest a Talbot.

The tomb was done up and the legends re-painted not many years since, but the angels are no longer visible, the devices being merely written at the back of the tomb as shown in the illustration (fig. 1). The tomb is interesting not

and all the church cleansed and beautified at the charge of the parish, anno 1703."

We will at one step come from 1703 to 1830, when the church was described by Ellis and Bandinel, in their edition of the "Monasticon." "The present Church of St. Mary Overey is a fine specimen of what is called Gothic architecture" (the peculiar vagueness in the use of the word Gothic is striking), "the whole building being in length 272 ft.; the breadth, including the two aisles, 61 ft.; the north transept 29 ft., and the south 31 ft. in length, built in the cross-form, like a cathedral, having a central tower resting on four columns. In spite of the two fires in the thirteenth century, it still presents some remains of its earliest structure, though the greater part was rebuilt in the reigns of Richard II. and Henry IV. The key-stones of the building are ornamented with the arms of the priory and other devices, amongst which are seen phoenixes rising from flames, evidently alluding to the restoration of the church after fire. The tower is 35 ft. square and 150 ft. in height. The roof of the nave is supported by twenty-six pillars, thirteen on each side. The Lady-chapel at the east end is 42 ft. in length, now used as the Bishop's Court; the visitations for the deanery of Southwark are also held in it. The front of the west end of the church has a range of small pillars forming niches. Before the late repair of this fabric began in 1818, under the care of Gwilt, a century had nearly

side windows of the aisles restored with new masonry; and the windows throughout filled with cast-iron lights instead of leadwork; in all which works the architect judiciously adhered not only to the ancient general design, but to the minutest detail, wherever it could be made out, fragments of moulding worked up in the masonry of the old building having in some instances served as models. The exterior of the choir having gone to entire decay on account of the softness of the stone which had been used, was rebuilt from a new design. The repair of the tower of the church cost 5,200*l.*, that of the choir nearly 12,000*l.* The transept and the bishop's court are still to be repaired."

Not all the troubles, however, that befel this priory church can compare with the act of vandalism that it was left this century to perpetrate. The whole of the nave west of the tower was taken down in 1838, and in its place was built the present structure (used as the parish church), then which nothing can be more architecturally contemptible, and yet one of the conditions of the rebuilding was, "The whole plan must combine a suitable Gothic building at a moderate expense, and be externally in unison with the works already done at the east end, or as near as possible." What we lost by the destruction of the nave may be seen from Coney's engraving of the church as it appeared in 1819. As the church now exists the new portion is several feet above the level of the old nave, and is entirely shut off



Fig. 5.—Tomb of Richard Humble.



Fig. 6.—Tomb of John Trehearne.

only because it commemorates one of England's worthies, but also for its intrinsic art value. There is an archaic simplicity about the figure which is more suitable to the purpose and situation than the monumental effigies of three centuries later, a good example of which can be seen in the north transept. The chantry in which he was originally buried has long since disappeared and his tomb is now in the east side of the south transept.

Styrie, who edited Stow's Survey, adds this very significant note:—"This is now a very magnificent church since the late reparation. It hath an huge organ, which was procured by voluntary subscription. The repair (it is said) cost the parish 2,600*l.* and that well laid out. The old monuments are all refreshed and new painted; a great deal of wainscoting. The workmanship of the arches and columns (which are very big) bespeak it a very ancient structure." He further says that a tablet hanging up by the pulpit recorded that "The church was laid throughout with stone, new paved and galleried; the great vault sunk, the pulpit and altar-piece erected, the communion-table railed and set with black and white marble, the choir enclosed by gates, the south and west windows opened and enlarged, the whole new glazed, the sixth and seventh bells cast, the chapel paved,

passed away without anything worthy of notice having been done for its preservation. It would appear from the date upon the nave that in 1734 some considerable changes were effected upon the exterior of the structure. The embattled parapets shown in Hollar's engraving of the church were then removed, and the external stonework cased over with brick. About the same time the northern front of the north transept was taken down, and a substitute of timber framing and geometrical tiles as an enclosure to two of the bays, which were left standing, were put up in its stead. The south transept was respited till the next year, when the same operation was performed as upon the nave; the rose-window was demolished; and the moulded tracery of the side windows, and the painted glass of knights in armour, of which a drawing is preserved among Nicholas Charles's collections in the Lansdowne MSS., removed. The tower had been substantially repaired and the pinnacles rebuilt in 1689. In 1818 the tower was again repaired, and the whole exterior encircled with cast-iron bars or ties, in three stages, so concealed as not to be distinguishable from the masonry. In 1822 and 1823 the choir was repaired and a very considerable portion rebuilt; the chapel of St. Mary Magdalene, on the south side of the choir, taken down; the

by a wall and window, so that the fine uninterrupted view from east to west is no longer to be obtained. Many of the carved bosses from the roof, which was (we regret to say) a

timber vaulting, are still to be seen piled up in two doorways that originally led from the choir to the Lady-chapel, two of which are given here (fig. 2). With the exception of George Gwilt, who so conscientiously and carefully restored the choir and Lady-chapel (the work seems to have been throughout a labour of love), from 1822 to 1832, all who had anything to do with the church gave a helping hand to alter and deface it.

1106 may be taken as an approximate date of the refounding of the church, Bishop Giffard building the nave. The priory seems to have been burned in 1207. Peter de Rupibus (de la



Fig. 2.—Bosses from Old Roof.

Roche), Bishop of Winchester, built the chapel of St. Mary Magdalene on the south side of the choir. This was destroyed in 1822. The nave was probably reconstructed by the same prelate. The choir, choir aisles, and retro-choir were somewhat later in date. On the 15th February, 1260, Henry de Wingham, Bishop of London, was consecrated by Boniface, Archbishop of Canterbury, in this church, which shows that a sufficient portion of the structure was then completed to allow of its being used for such a purpose.

The building was in progress in 1273, when much still remained unfinished, including the whole of both transepts, Walter Giffard, Archbishop of York, granting thirty days' indulgence to those who assisted towards its completion.

The church was still far from finished at the beginning of the fourteenth century, the upper part of the tower not being built much higher than the open gallery above the four large arches till long after that date. The north transept was built first, but the architecture of the south transept belongs to the reign of Edward III.

A fire damaged the church in Richard II's reign, and it was towards the reparation caused by this fire that Gower the poet was so great a benefactor.

The next casualty that befel the church was the fall of the roof of the nave in 1489. The roof was shortly afterwards rebuilt in oak, and consisted (as before mentioned) of imitation groined vaulting, lower in pitch than its predecessor, and the spacing of its bays entirely independent of the compartments below. The roof of the north transept was similar, and, like the nave, continued in existence till 1830. The south transept was possibly the same, but no record of it exists.

The final and culminating work of decorative art in the church was the magnificent reredos, the work of Richard Fox, Bishop of Winchester from 1520 to 1528. The two upper stages of the tower, viz., the ringers' floor and the belfry, were also added during the episcopate of Fox, the founder of Corpus Christi College.

The annual value of the priory at the time of its surrender was 566l. 10s., according to Speed, or 624l. 6s. 6d. according to Stow and Dugdale. The inhabitants of the two parishes of St. Margaret and St. Mary Magdalene were allowed to purchase the structure, and, by an Act of Parliament in 1540, the two parishes were united under the title of St. Saviour. The last prior, Bartholomew Fowle, was pensioned at the rate of 100l. a year, and eleven other "relygeuse p'rons" were likewise pensioned with varying amounts.

In 1559 certain "Popish" ornaments were sold towards defraying the expenses of repairing the church, and on the 31st of May, 1561, it was ordered "That all the church books in Latin be defaced and cut according to the injunctions of the bishop"; and in the following June it was ordered "That the rood-loft be taken down and made decent and comely, as in other churches in the city."

In 1689 the pinnacles of the towers were altered from their original design, and new vanes were set up. Other alterations were made, if we compare Hollar's views (1647 and 1661) of the church with the fabric itself.

In 1703 a Corinthian altar-screen, said to have been designed by Wren, with blazing fire-pots and volant cherubim, was put up so as to almost entirely hide the work of Bishop Fox. This was taken down and the reredos restored in 1833.

In 1830, when the approaches to new London Bridge were in progress of formation, the Bishop's chapel, which stood at the extreme east end of the church, abutting on to the retro-choir or Lady-chapel, was destroyed. The tomb of Bishop Andrews was removed to its present position on the west side of the Lady-chapel. This chapel, the original Lady-chapel, was of fourteenth-century character; its length was 34 ft. The present Lady-chapel was only saved from a like destruction by the tardy interest of the parishioners, 380 voting against its destruction and 140 for it.

Under the superintendence of Gwilt, who is buried in the Lady-chapel which he so lovingly restored, a large part of the cloisters and triforium were rebuilt in a most careful, accurate, and conscientious manner, the old work being preserved wherever practicable, and the detail of the new moulded and carved work, for which prototypes could be found, assimilating as nearly as possible to the old.

The transepts were restored in 1830, cement being used from motives of economy in the moulded detail of the interior instead of stone.

The old nave was finally destroyed in 1839, and there only remain the choir and Lady-chapel of the ancient fabric, and even much of this is overlaid or defaced by work of later times.

The reredos, as we have said, was much mutilated when the wooden altar-screen was set up, but was restored in 1834. The window above the reredos now existing is the one designed by Gwilt, the previous one, of the time of Henry VIII., having been taken down in 1824.

The only authentic record of old glass existing in the church refers to a three-light window on the east side of the south transept, figured in the Lansdowne MSS. in the British Museum. The design consisted of three knights holding shields and weapons, with heraldic shields and other devices around the figures. No trace of old glass now exists. The modern glass, of which there are several examples, is in no way noteworthy. That there was a good deal of painted glass in the church at one time is evidenced by the bill for repairing, re-leading, and re-painting broken pieces, which dates from 1605.

The altar-table is of oak, and is not a bad example of seventeenth-century work. It was the gift of Dame Joyce Clerke.

There is also standing in the choir a curious inlaid oak chest, intended for parish records, the gift of Hugh Offley, Alderman of London, and Mayor in 1556, and of Robert Harding, whose daughter Hugh married.

The elaborate wrought-iron chandelier, with its brass candle-holders, was given by Mrs. Dorothy Applebee at the end of the seventeenth century.

Besides the tomb of Gower already described there are several others that claim attention. The most interesting, as well as the most ancient, is the oaken effigy of a knight lying down cross-legged, with an animal at his feet. It is now painted a dull stone colour, and is a really fine piece of work, the face being particularly well carved. "The figure is attired in a complete suit of chain armour, being a hauberk with sleeves, capuchin, and chausses. The body is covered with a surcoat, which is crossed by two belts,—the one round the waist for sustaining the sword, the other across the body from the right to the left side to sustain the shield, which is now destroyed, although a fragment still exists on the arm. The head rests on a lozenge-shaped cushion. The legs are crossed, and rest on a mutilated lion. The hilt of the sword is broken off, but the position of the arms shows the knight held the scabbard with his left hand, and was in the act of sheathing his sword."

Since this was written the figure has been restored and the sword replaced. It is conjectured to represent one of the De Warren family, and dates about the reign of Edward II. A drawing of this figure is given (fig. 3). The canopy above it is not necessarily the one designed originally for this figure, as for a long time the figure was treated as mere lumber and allowed to be about the church where it could.

There is a *memento mori* effigy in the north transept, probably taken from the lower portion of the tombs of one of the priors, where such figures are usually to be seen. It is much mutilated.

The tomb of Lancelot Andrews, bishop of Winchester, born 1555, died 1626, a drawing of which is given (fig. 4), is now in the Lady-chapel. It represents a man in middle life, attired in a surplice with ample sleeves, and covered with a rich cope, on the left shoulder of which are engraved the cross of St. George and the Garter, with the motto of the order "Honi soit qui mal y pense," of which order the Bishop of Winchester is the prelate. The head is covered with a small scholastic cap. The figure is painted, as are most of the other monuments in the church. The following is the inscription on the tablet:—

"Sept. 21. Die lune, Hora matutina fere quarta,
Lancelotus Andrews episcopus Wintoniensis,
Meritis suis Limes crebris Christianis,
Meritis est.

(Ephemeris Landhana.)

Anno Dom. 1626. Ætatis sue 71."

Above are the arms of the See, impaled with argent on a bend, engrailed cotised sable, three mullets, or.

Stow says: "The monument of Bishop Andrews is in a chapel at the east end of the church, and his body lieth within the monument. He here refers to the Lady or bishop's

chapel, taken down in 1830." There were many more inscriptions on his tomb when Stow wrote, as he enumerates them in full.

The tomb of Richard Humble, a drawing of which is also given (fig. 5), occupies the easternmost arch in the north side of the choir. Before an altar are kneeling the alderman in his civic gown, and his two wives in the costume of the reign of James I. The arched canopy has of late years been painted to imitate marbles. The following well-known lines are on the dado of the altar tomb:—

"Like as the damask rose you see,
Or like the blossom on the tree,
Or like the dainty flower of May,
Or like the morning of the day,
Or like the sun, or like the shade,
Or like the gourd which Jonah had,
Even so is man, whose thread is spun,
Drawn out and cut, and so is done.
The rose withers, the blossom blisseth,
The flower fades, the morning hasteth,
The sun sets, the shadow flies,
The gourd consumes, and man he dies."

The figures are all painted in colours. The tomb to John Trehearne, gentleman prior to King James I. and his wife is also illustrated here (fig. 6). The monument is against the north wall of the north aisle, and consists of two half-length figures divided by a tablet bearing the following quaint inscription:—

"Had kings a power to lend their subjects breath,
Trehearne, thou shouldst not be cast down by death.
Thy royal master still would keep thee then;
But length of days are beyond reach of men.
Nor wealth, nor strength, nor great men's love can ease
The wound death's arrow make for those past these.
In thy king's court, good place to thee is given,
Whence thou shalt go to the King's court in heaven."

Those interested in heraldry will be glad to know that the "arms are a punning allusion to the name, characteristic of the age, viz., azure, a chevron between three herons, or, on a canton of the second, three bars surmounted by a lion rampant, gules. Crest on a wreath of his colours, a demi-gryphon holding a fleur-de-lis, or. Trehearne single; Trehearne impaled with gules, a fess between three lozenges, or."

There are tombs to William Austin and family 1633, to John Bingham, saddler to Queen Elizabeth and James I., 1635; and a curious monument in the north transept to a once celebrated pill-man, "Dr. Lionel Lockyer. He is represented as lying resting upon his arm, life-size, and in the dress of the time with a full curled wig and a strange uncomfortable expression on his face, the repose of death so characteristic of earlier funeral monuments being entirely absent.

What will attract the attention of most visitors are three stones in the floor of the choir cut with the names of John Fletcher, Philip Massinger, and Edmond Shakespear.

The record of the burial of the brother of the poet is as follows:—"1607, December 31, Edmond Shakespear, player, buried in ye church, with a forenoone knelle of the great bell, 20."

Of the first of three well-known names there is a memorandum in the Aubrey MSS. to this effect:—"In the great plague, 1625, a knight of Norfolk or Suffolk invited him into the country. He staid but to make himself a suit of cloaths, and, while it was making, fell sick of the plague and died. This I had from his tailor, who is now a very old man and clerk of St. Mary Overie's." The burial registries record his interment thus:—"1625. Auguste 29. Mr. John Fletcher, a poet, in the church." It is recorded by Langbaine of Massinger, "that he went to bed in good health and was found dead in his own house on the Bankside, Southwark." The announcement of his name in the register is simply:—"1639. March 18. Philip Massinger, a stranger, in the church, 2l. viz., the amount paid for his grave, knell, and funeral expenses. His fellow players paid a tribute to their departed friend by following him to the grave."

The bells, which were originally seven in number and were hung in the days of Prior Henry Werkeworth, 1424, were, in 1735, newly cast and made into a peal of twelve by Knight & Co., at a cost of 629l. 17s.

The "Builder" for Colonial and Foreign Postage.—Our foreign and colonial subscribers, as well as those at home who are in the habit of sending an occasional *Builder* to their friends abroad, will be interested to know that we shall in future print a portion of our issue, so far as the letter-press is concerned, on thinner paper, thus reducing the weight to something under eight ounces. For the illustrations we shall continue to use the same paper as at present.

THE SANITARY CONGRESS AT YORK.

INAUGURAL ADDRESS BY SIR T. SPENCER WELLS.

The ninth Autumn Congress of the Sanitary Institute of Great Britain was formally commenced on Tuesday evening, when

The inaugural address was delivered by Sir T. Spencer Wells, Bart., F.R.C.S., President of the Congress. In the course of it, he said:—

Any great sanitary improvement of the community must be the result of elaborate co-operation. We must have the combined action of the three great classes of investigators, legislators, and administrators, before we can effect any good result. And if we regard sanitary reform in these three aspects, we find that a great deal of the work of investigation has been done, and that the work of legislation is lamentably deficient; while the work of administration cannot advance beyond the limits of legislation.

As regards the work of investigation, we may safely assert that it has hitherto been for the most part personal, and that the waste of labour has been enormous. It is only of late that this Institute has come in aid. Three-fourths of the fifty years that Southwood Smith, Chadwick, Farr, and Trevelyan were at work, they were well-nigh single-handed. Perhaps the foundation of such a body as the Sanitary Institute may be enough for them to be proud of; but more must follow; and it is to be hoped that before long we shall have, for the sake of life and health, an organisation as powerful as that which protects our property and our liberties. The Institute must develop into something grander and more powerful. The Colleges of Physicians and Surgeons have done and are doing much useful work; but the work is done more for the individual than the collective good. Without interfering with them,—rather aiding them,—why should we not have a College of Health,—a College which would show our appreciation of the gift of life and our reverence for the Giver?

But, turning back for a moment, let us glance at what the advanced guards of sanitary science have already accomplished. It is bare justice to them from time to time to recount their services, and while we are encouraged by their success, we shall learn what remains for us to do. We have only to look carefully into the memorial volume of selections from the reports and writings of William Farr, published by the Council of this Institute at the suggestion of Dr. Gairdner, to find a revelation of the mass of ignorance, prejudice, and folly which our early reformers had to expose, and of the variety and extent of their labours. It is a record which is honourable to all, and to him whose writings it enshrines it may serve as a monument more eloquent and touching than any brass or marble. What did we know of vital statistics fifty years ago? It was in 1837 that our Registration Act came into operation, and certainly no one could have more ably worked it or turned it to better purpose than Farr. It was from his Reports that it first became generally known that our death-rate was too high. We now know that the measures indicated, and taken as necessary to lessen mortality, have been so effectual that a large part of the gain in twenty years in the average duration of life in this country since the beginning of this century may be claimed for the registration period; and there can be little doubt that, if the provisions of the Registration Act were more strictly enforced, the prolongation of life would be greater. Very few even of those well informed in sanitary matters are aware of the large proportion of the population now buried without the cause of death being properly certified. When Dr. Cameron introduced the Disposal of the Dead Regulation Bill in the House of Commons in 1884, he showed that in England and Wales more than 20,000 bodies in a single year were buried without any certificate whatever of the cause of death. In Ireland there were more than 4,000 burials under the same circumstances, while in Scotland in no fewer than 20 per cent. of the total number of deaths registered, the causes of death were uncertified. Even in Glasgow, not less than 9 per cent. of the total number of persons who died in that city in 1882 were buried without any certificate of the cause of death. Having learned the important results obtained by what we must confess to have been very imperfect registration, I desire in the strongest manner to urge attention to the neces-

sity for more strict observance of the provisions of the Act by the public; and for more careful and accurate certificates from members of my own profession,—a profession ever ready freely to assist the State when asked for information on any question affecting the public health and welfare.

Since the formation of the Sanitary Institute, although the progress of sanitary science has not been as rapid as we desire, yet its advances have been more readily measured. The annual meetings, the presidential and sectional addresses, and the papers read in the sections, have brought important movements under notice; and as the congress migrates yearly to new places, its information becomes more varied and trustworthy. We gather assurance of the generally improved moral and physical condition of the people. We find that infant mortality is lower; that education becomes more satisfactory as the principles upon which it should be conducted are better understood; that those who work are better paid, get wholesome food, and dwelling-places more fit for human habitation. Increasing intelligence has given a claim to political rights, and developed an interest in political questions. Thrift is more common, and savings banks more used. It is barely fifty years since the general introduction of savings banks; yet, by the last returns, more than 45 millions of money stand to the credit of depositors in these trustee banks; while in the Post Office Savings Bank, only established in 1861, more than 44 millions belong to the industrial classes of the United Kingdom. Thus a total of more than 90 millions now represents the results of the thrift of the people during the past half century. And co-operative associations show more and more, year after year, how well and quickly, when men begin to learn that life and health are worth looking after, they find out the means of taking care of themselves and of their material interests; and I think I am not going too far when I say that this Institute may be congratulated upon the success of what it has done tending to the recent diminution of drunkenness and crime.

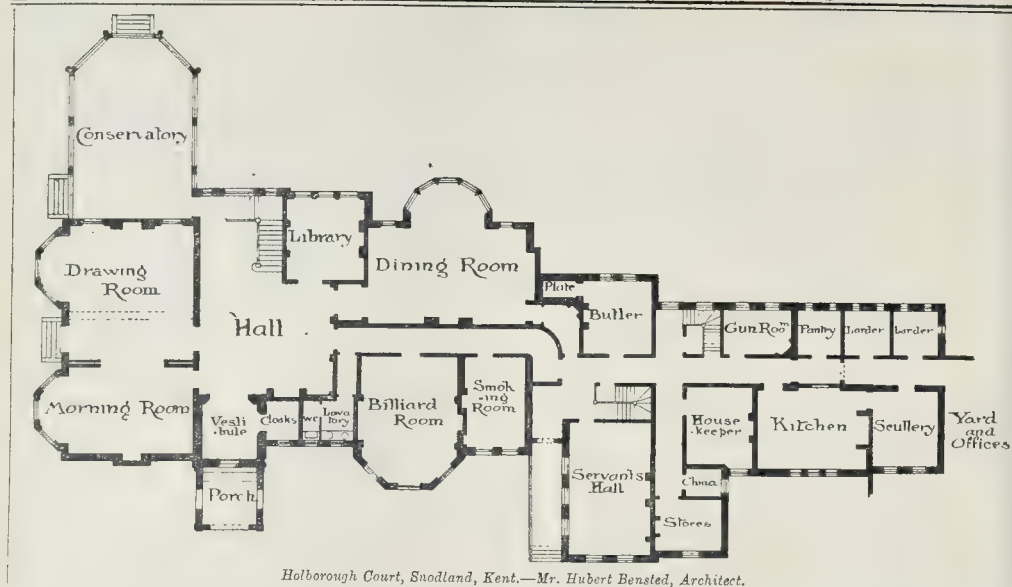
With all this encouragement we may look hopefully to the future, and consider what are the most pressing subjects of inquiry, and which is the way of conducting our investigations that gives the greatest promise of success. The field is vast, but, as we have seen, it is not impenetrable; and obstacles are sure to yield to steady and well-directed attack. Facing the difficulties, what is our attitude? Our representative meeting here manifests that we are numerous; our Institute shows a certain amount of aggregated working power; but it is more a nucleus than a complete organisation. It may be effective as an investigating, deliberative, consulting, and examining body, but it has no directorial power, no agency for carrying out practically the measures which its collective wisdom has indicated. Crowds of sanitary volunteers hover about it, and make desultory attacks upon weak points, often with much waste of energy. "What we want is a central power," as Lord Brabazon wrote last month in the *Times* (August 30), "which shall regulate and control local action, so that no town or locality shall be able to neglect the public health, or, in endeavouring to purify itself, shall poison its neighbour. We want a power which shall take a bird's-eye view of the whole question, and work not for the good of one locality only, but for the good of all." This is what we want, and what we must have some day. But, while we are waiting, an interim organisation of deliberative and administrative agency should be set up, as if a Ministry of Health were in power. The Local Government Board, too, with all its official completeness, like ourselves, may recommend, but cannot command. There seems to be a link missing between the knowledge of what is right and the power to apply it. This link is a Minister of Health. We have now only the elements of the organisation which I suggest; its formation is matter for consultation and arrangement, and probably might be accomplished without much delay. In the meantime, what are we to do? The last generation has done so much with means less efficient than we have at command, that we ought to do more than emulate the past. This Institute, united with the Parkes Museum, is bound, in my opinion, to induce all the others to make not only common cause, but joint action; or, failing in this effort, it may, by increased activity, in a short time

cover the ground which they now occupy. This would at once make plain the folly and waste of division. The process of amalgamation has already begun by the union of the Parkes Museum with our Institute. The National Health Society, the Ladies' Sanitary Association, the Cremation Society, the Smoke Abatement Institution, and others of a like kind must follow; while such societies as that of the "Medical Men qualified in Sanitary Science" and the "Society of Medical Officers of Health" would find themselves more fitly placed and more usefully employed as sections of one united body than they now are. The Conference of Medical Officers of Health, to be held tomorrow afternoon, is, I trust, the beginning of a closer union between this important class of officers and the Sanitary Institute.

The active working of such a large group of philanthropic societies shows how constantly the interest in all sorts of sanitary measures has been increasing during the last twenty years, and how much it has been in the power of such feebly-supported societies to do. . . . Of the many things which affect our comfort and well-being, some are national, some local, some residential. One of the most potent means of influencing the sanitary condition of a country is the judicious regulation of its forests. In Great Britain the Government all but ignores the subject of forestry. There is no school for teaching the science. Every proprietor is obliged to shift for himself, or to seek foreign help. And yet by looking at the state of things in Upper India, Palestine, and Russia, we may see what mismanagement leads to. Almost everywhere, man's ignorance and recklessness has worked evil by destruction of the forests. He has deteriorated the condition of the climate, taken away the productiveness of the soil, brought on famines and pestilence. We are not suffering to this extent. But negligence and mischief are inseparable, and to urge measures for the preservation of any climatic advantages we may still have, and the restoration of those we have lost, is assuredly work pertaining to a Sanitary Institute. My friend, Dr. Lyons, when in the House of Commons, did good service in pressing the importance of tree-planting, especially in Ireland, upon the attention of the Government. Unfortunately, he is no longer a Member of Parliament; but he still continues his efforts to prove that by well-directed management the whole of the timber and forest products now obtained from abroad, at an annual cost of some 32 millions sterling, might in time be furnished by our own land and labour, and that this economy would be attended by no less desirable changes in some of our climatic conditions.

Even the best-regulated communities are encumbered with things which they must get rid of,—human refuse, human remains. The one can be dealt with as best suits public convenience, but the other must be treated with reverence as well as security. In our "Transactions" already published, and in the forthcoming papers and discussions, you will find as much as can be told of what has been done through our instrumentality, and of the happy results that have followed. And if I may judge from the titles of promised papers, with illustrious names appended to them, upon the various aspects of sewerage, draining, the supply of water, ventilation, the purification of town atmosphere, lighting by electricity, and the extended application of gas to domestic purposes, this Congress will rival any others in the importance of the subjects brought forward. As regards the question of the disposal of the dead, I may refer you to a lecture of mine, which has been placed in your hands, with remarks upon it by Sir Lyon Playfair, Dr. Cameron, Sir Joseph Fayrer, and Mr. Seymour Haden, with two of the last letters written by the best of the Shaftesburys. Public opinion has been veering round since the publication of the Charge of Sir James Stephen. A custom known to be not illegal will be adopted by many who have hitherto been deterred by the fear of illegality, and the society which alone in England gives facility for it, is ready to perfect its accommodation, or to give place to any administrative body upon a wider basis.

When we come to speak of the question of legislation, we, as sanitarians, find ourselves in the same plight as the rest of the world loaded with good intentions. The waste of time and energy in Parliament in party struggles has banished all possible home legislation. We must bide our time, assured that, when this crisis of angry discussion of political complica-



Holborough Court, Snodland, Kent.—Mr. Hubert Bensted, Architect.

tions has passed, the turn will come for practical measures. We shall then settle down to a calm consideration of what is really wanted, shall have our chance of being heard, and probably get a good deal of what we ask for. Our demands will appear so reasonable, our work so useful, and our plans so feasible, that no committee will have the heart to suppress them, no Parliament the churlishness to refuse them. Only let us be prepared for the occasion, have our subjects chosen, our evidence forthcoming, our arguments marshalled, and our advocates ready. We shall have ourselves to blame if we do not make sanitary legislation the popular legislation of some sessions near at hand.

In his address to the last annual meeting of the Institute Captain Galton remarked that, "if legislation is not to be ridiculous, it must be accompanied by increased knowledge in sanitary matters on the part both of the persons charged with administering the Sanitary Acts as well as of the public themselves." This is the key to the whole subject of sanitary legislation. The various classes of persons affected by sanitary measures, or concerned in carrying them out, show different degrees of sanitary knowledge, from the zero of ignorance on the part of the public, the confusion of local boards, the self-acquired information of district surveyors and inspectors of nuisances, the results, whatever they may be, of a course of hygienic medicine among the medical inspectors, up to the accumulated science of the Institute and its allies, and the acquired experience of the Local Government Board. The one fact that stands out clear above all others is that there is no definite channel by which these stores can be disseminated and employed for instruction. The course of lectures given by the Professors at the London Colleges and at Netley are only intended for the use of medical students. There is no available public means of instruction in matters relating to health for the large body of surveyors, sanitary inspectors, and others whose actual duties are connected with public health; and nowhere at the present time is any systematic instruction given in practical hygiene to the general public. In the report of our council for this year it is stated that "the number of candidates for the examinations still continues to show a very rapid increase"; but it was only this year that, for the first time, a special course of lectures was arranged by the Parkes Museum to suit the requirements of persons preparing for the examinations of the Institute and other bodies which grant certificates. These lectures were given by well-known authorities, and no fewer than sixty-three candidates entered for the course. This alone shows how fully justified Captain Galton was in making this further observation; that if the Sanitary Institute

is to fulfil its functions of diffusing knowledge in relation to sanitary science, "it must not be content with holding periodical examinations; it must develop its educational character still further, and it must afford opportunities for students to qualify themselves for these examinations by providing lectures on practical sanitation, and by furnishing laboratories for research in sanitary matters." As regards the public, it will no longer do to trust to the voluntary efforts of the National Health Society, zealous and worthy of all praise as they have been. Such work may be suspended at any moment, and, to be certain and effectual, must be undertaken by some public body in an orderly and persistent manner. The ear of the public can be easily reached by suitable addresses and house-to-house visitation; their curiosity excited and their minds enlightened by the objects exposed for examination and explanation in museums. The Parkes Collection will inevitably grow into great importance, and arrangements can be made to secure its utility. But though teaching power can never be wanting among our members the puzzling problem is how to bring it to bear directly upon the masses. This is a point upon which I confess myself unable to give a prompt opinion. As one for solution by our collective wisdom it stands second to none. Yet, when we have instructed the public and embodied our contingent of qualified agency, how are we to make sure that the agents shall act efficiently upon the public? It can never be done without elaborate organisation, and no organised body can act without full legislative authority, and then only under a responsible chief. If it be expedient to have a military medical staff and a naval medical staff, with their grades of officers and all-powerful directors-general, for the comparatively small bodies of the combatants, why should there not be for the much more numerous civil subjects a civil medical service, equally authorised and as honourably appointed? Such a service would form an important department of a Ministry of Health.

There is one matter which I must speak of before concluding, and that is the importance of our having the unsectarian assistance of all religious teachers. Sitting as we do here under the shadow of the hallowed Minster which is the crowning and significant glory of the ancient city of York, one cannot but recall to mind how for successive ages its ministers have been the benefactors of all who came within the sphere of their action. In times of ignorance they spread light around them. In times of distress they gave succour to the needy and shelter to the homeless. In times of sickness and pestilence they were ever ready, at their own risk and peril, to visit either castle or cottage, with consolation for the troubled mind and remedies for the tortured body. And now, in these later

days they, and others allied with them in the same holy work, come among us laymen, trained up by them in the spirit of Christian charity, to second our attempts to work the good of the people, to instruct themselves in the principles of our science, and to add the benefit of their wisdom and experience to our efforts, with as much zeal and devotion as were ever displayed by any of the bygone generations of their revered predecessors.

With such objects in view, actuated by the same spirit of goodwill to mankind, and impelled forward by an equal energy, we may promise ourselves the attainment in due time of our desired end,—that of contributing to the real and stable greatness of our country, by giving to it a healthy and long-lived population; for we may rest assured that, in the words of Frondo, 'A sound nation is a nation that is composed of sound human beings, healthy in body, strong of limb, true in word and deed,—brave, sober, temperate, chaste,—to whom morals are of more importance than wealth or knowledge,—where duty is first, and the rights of man are second,—where, in short, men grow up and live and work, having in them what our ancestors called 'the fear of God!'"

[Other proceedings of the Congress will be found on another page.]

Illustrations.

A TERRA-COTTA FRONT, 17, OXFORD STREET.

WE give this week a sheet of illustrations showing the business premises lately erected from the designs of Messrs. Batterbury & Huxley, architects, of John-street, Bedford-row. The illustration of the terra-cotta and rubbed brick front is a reproduction of the drawing lately exhibited at the Royal Academy.

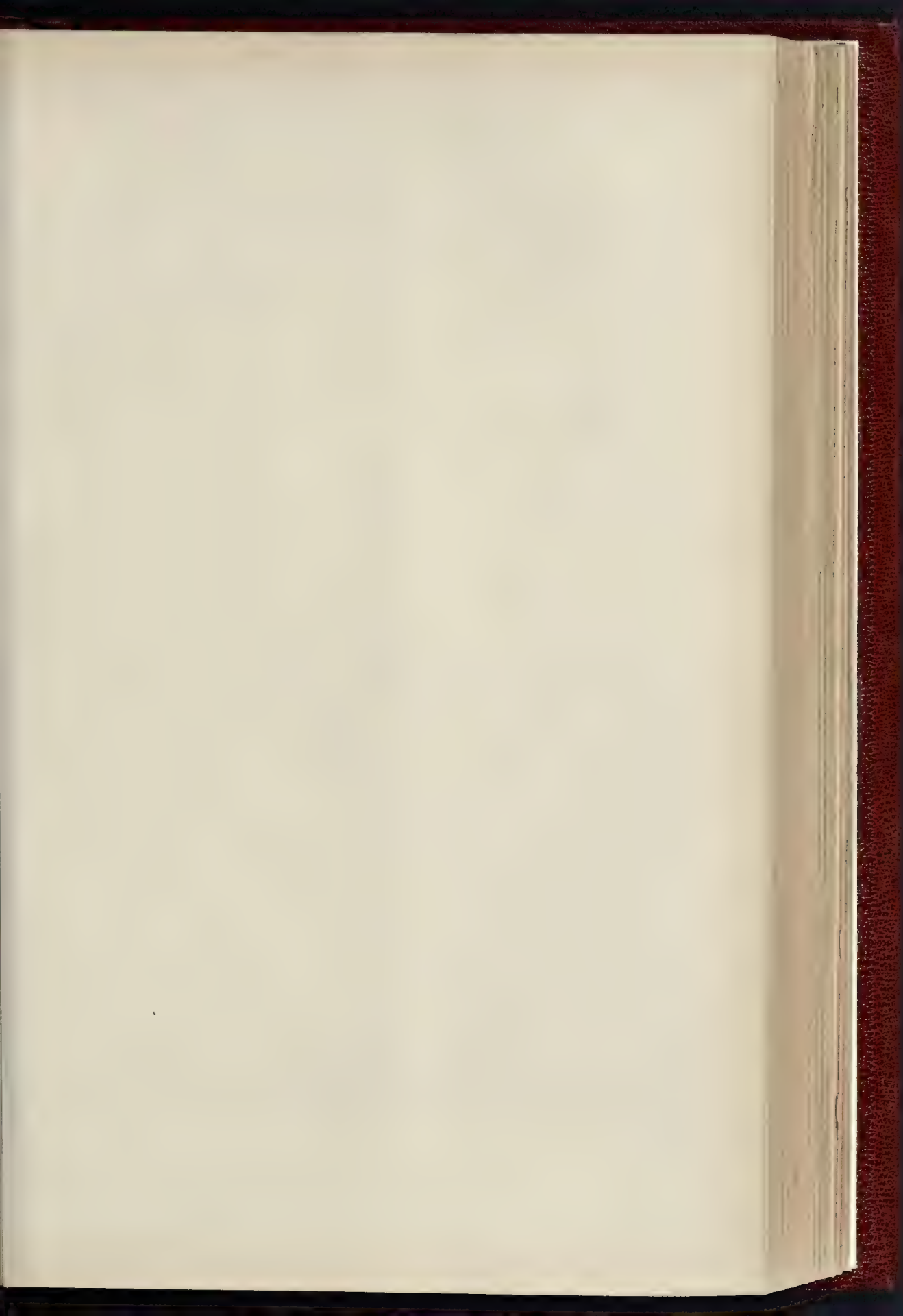
The builder was Mr. M. Manley, of Regent's Park. The terra cotta was supplied by Messrs. Doulton; Mr. Pain, of Highgate-road, having modelled the enrichments.

HOLBOROUGH COURT, SNODLAND.

HOLBOROUGH COURT, an illustration of which we give this week from a drawing exhibited in the late Academy Exhibition, has been lately erected for Major W. H. Roberts, J.P., at Snodland, Kent. It is built of red brick, with dressings of red concrete and moulded bricks.

The interior of the house is fitted to a great extent with wainscot enriched with carving by Mr. McCulloch.

The work was carried out by Messrs. Pryer & Co., of Maidstone, at a cost of 30,000*l.*, from the designs of Mr. Hubert Bensted, F.R.I.B.A., of Maidstone.





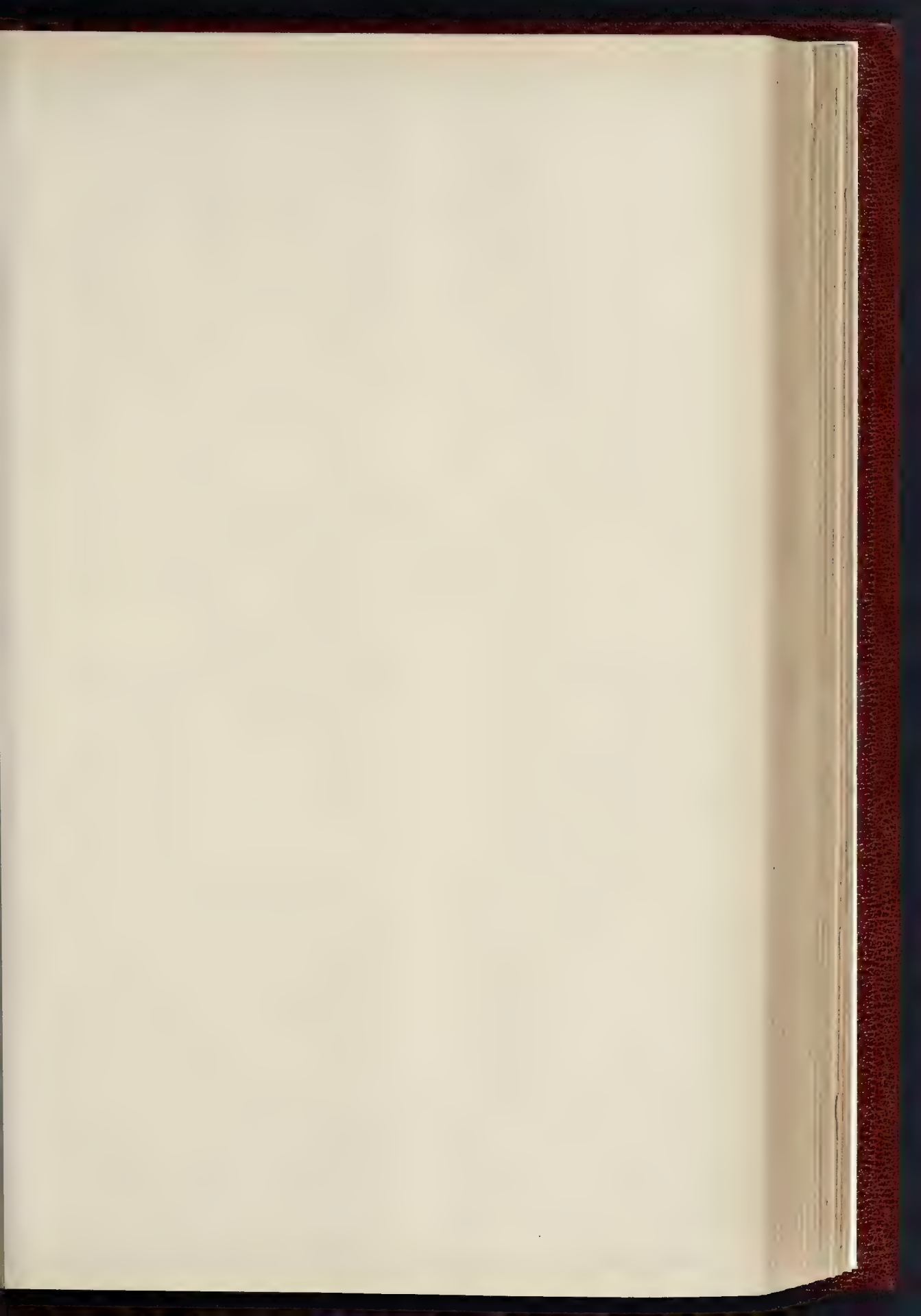
"RE. DEL. D. & S."

THE TRIUMPHAL
ARCH AT POLA, CALLED THE "P

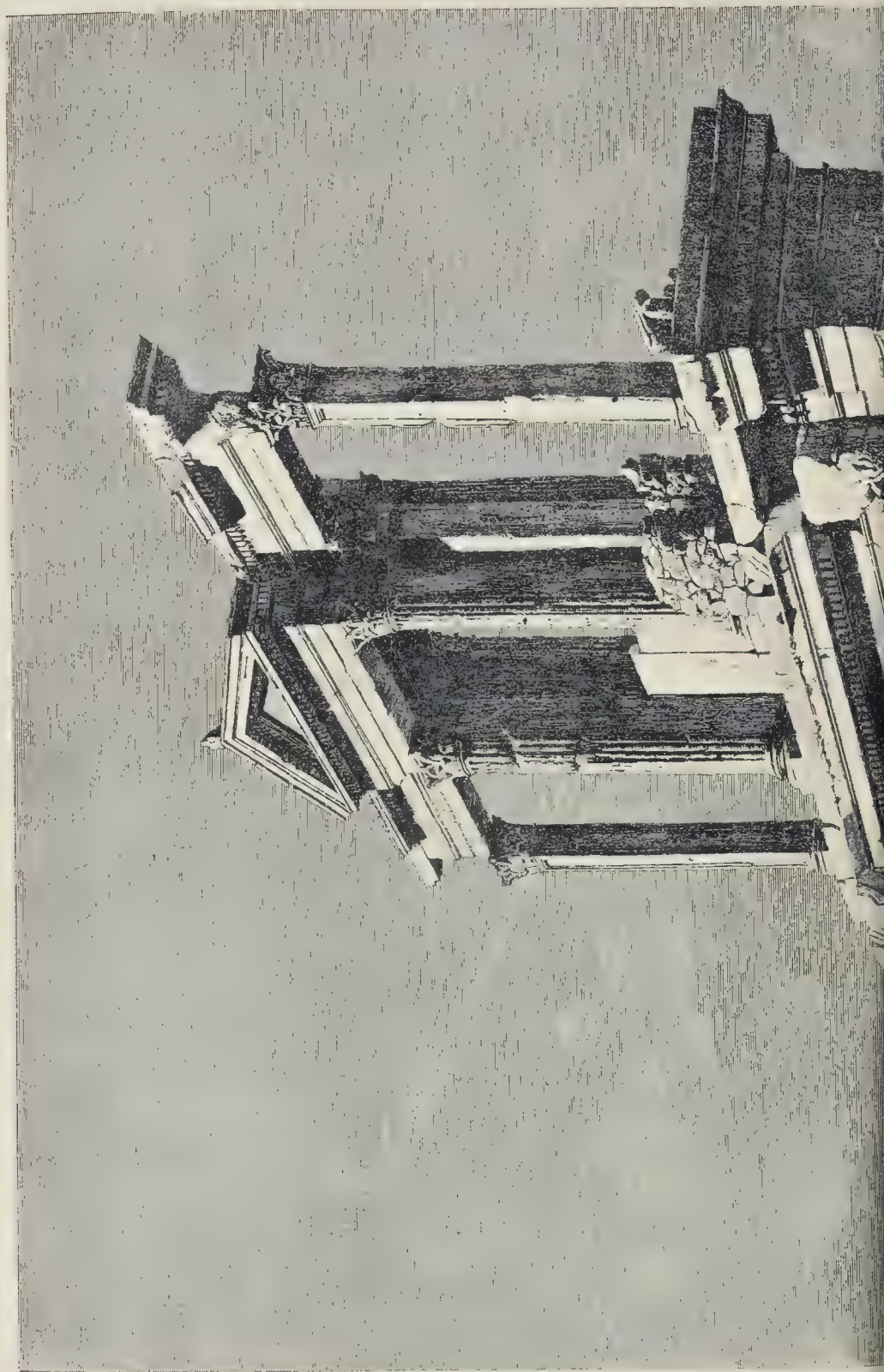


THE ROMANS.
From an Engraving by Masquelier.

Published by H. B. Brown, 101 N. 4th St.

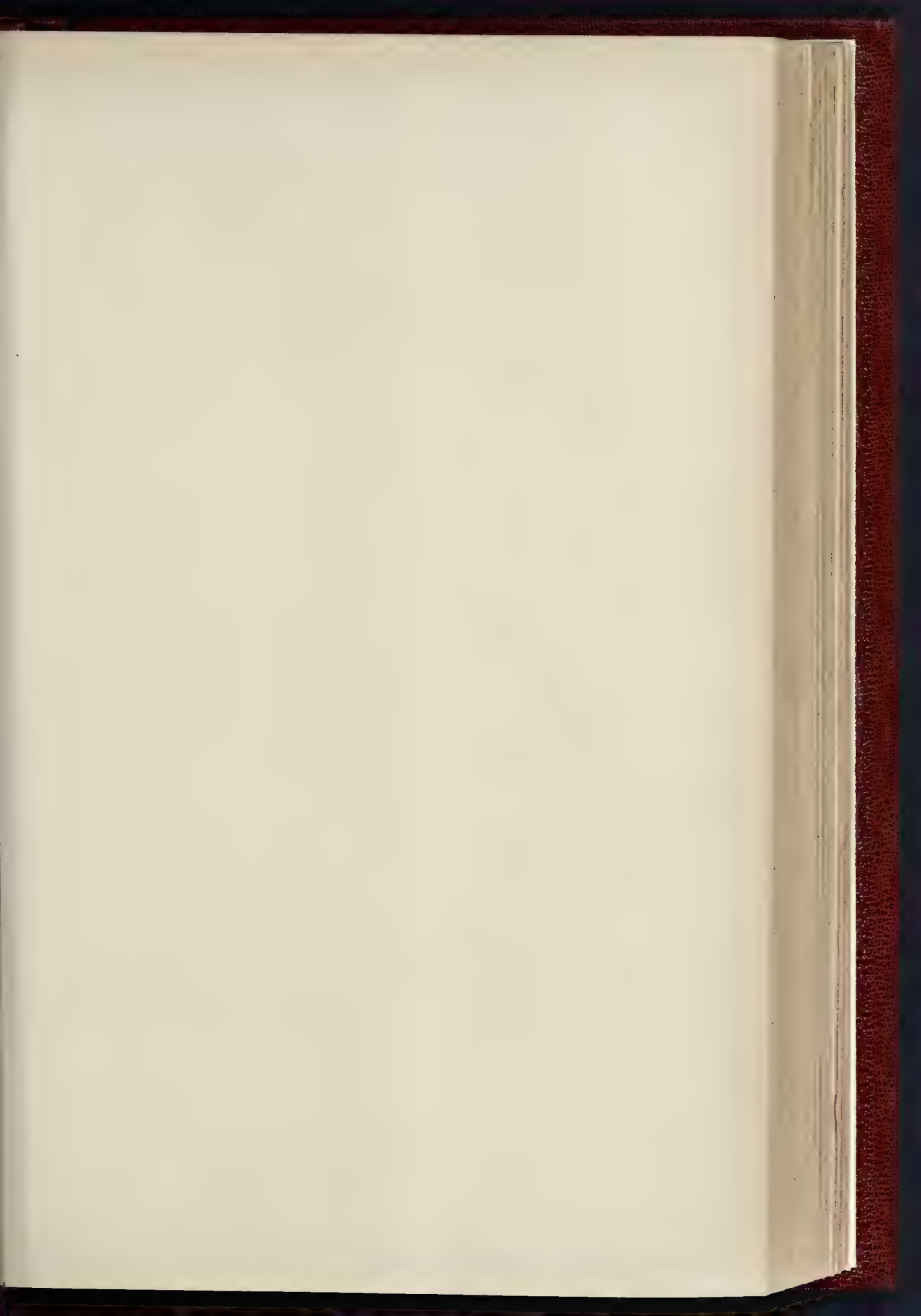


THE BUILDER, SEPTEMBER 25, 1896.





THE TRIUMPHAL ARCHES OF THE ROMANS.
ARCH OF THESEUS AND HADRIAN, ATHENS. From an Engraving by Andrea Gasparini.





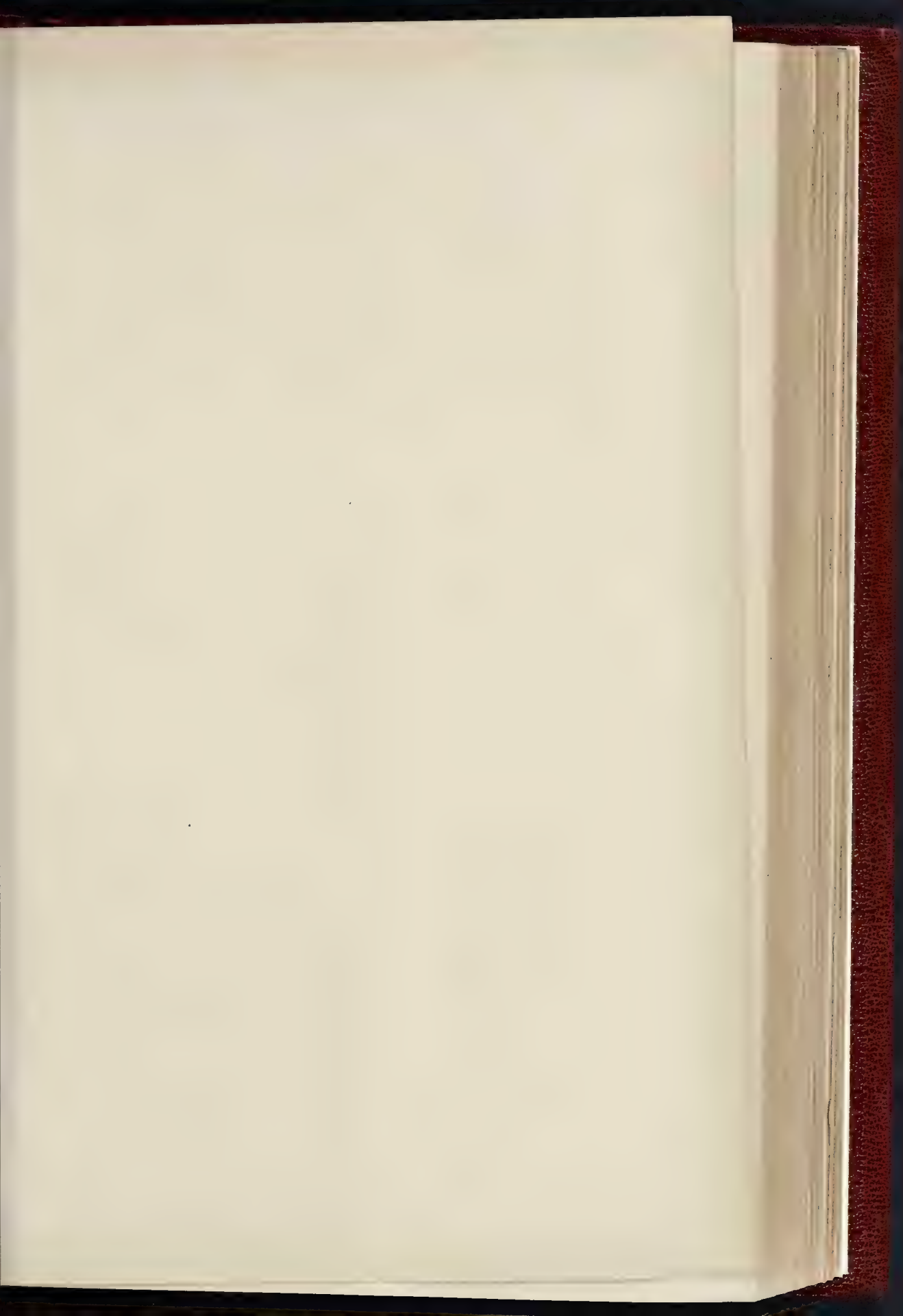
HOLBOROUGH COURT, SNODLAND, KE

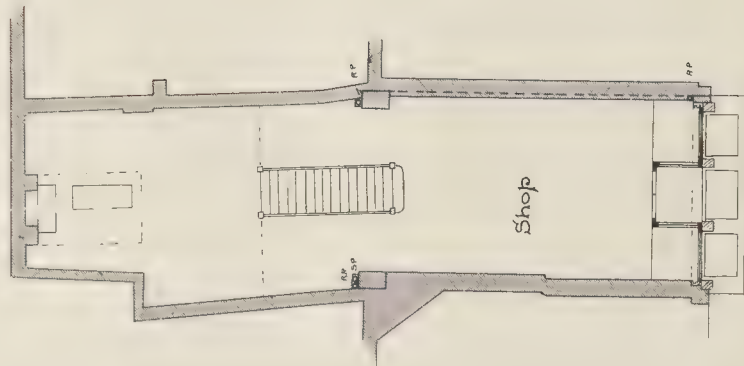
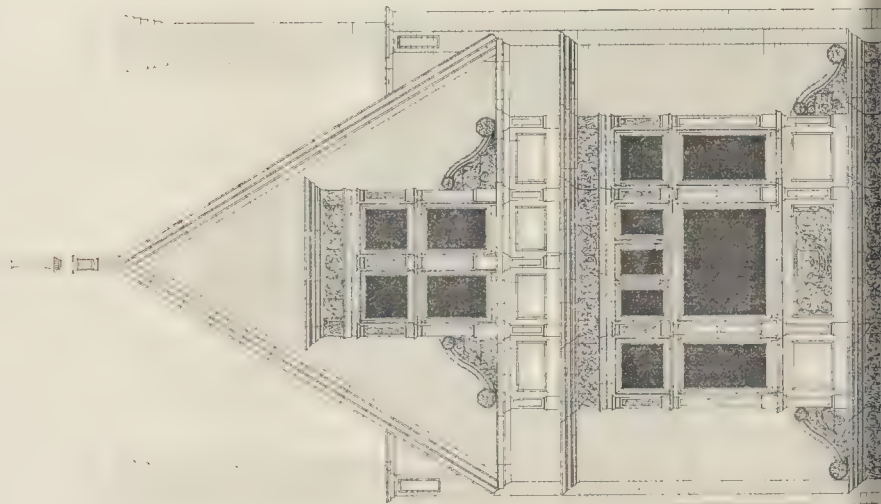
EMBER 25, 1886.



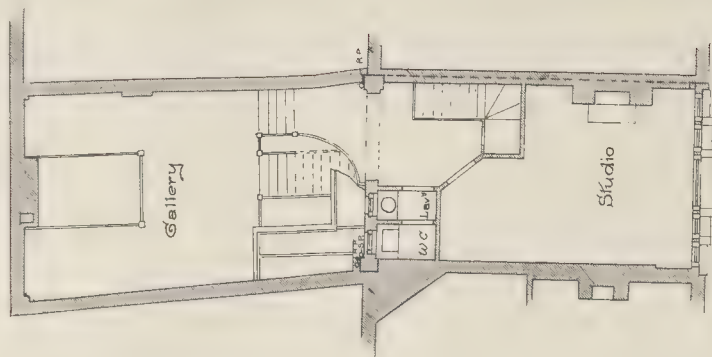
THE PHOTOGRAPH BY GEORGE A. HUNT, 112 MARINE BUILDING, SAN FRANCISCO, CALIF.

MR. HUBERT BENSTED, F.R.I.B.A., ARCHITECT.

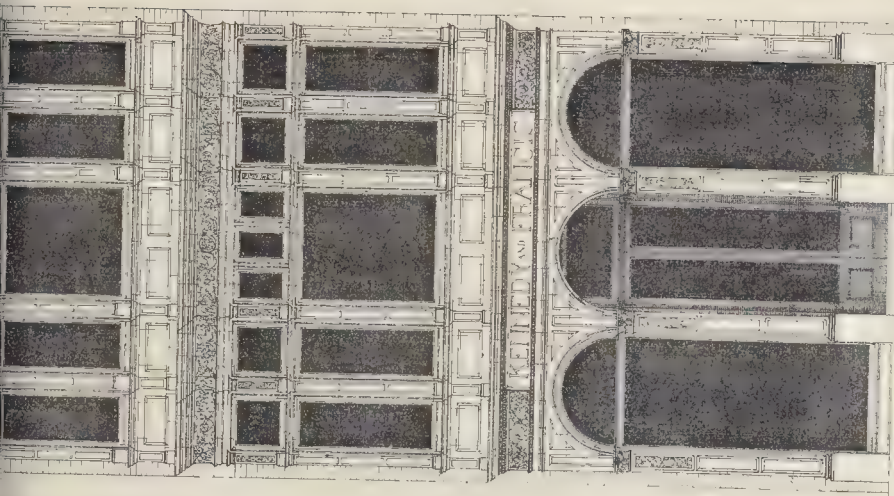




Ground Floor Plan



First Floor Plan



FRONT OF TERRA COTTA NO. 1 OXFORD STREET
Messrs. PATTERSON & HUNLEY Architects



GROUND FLOOR PLASTER



SOFFITE OF GROUND FLOOR ARCHES



GROUND FLOOR FRIEZE

SANITARY EXHIBITION AT YORK.

The Exhibition opened at York on Tuesday last, in connexion with the ninth Annual Congress of the Sanitary Institute of Great Britain, is a fairly good one, though it is, perhaps, not so large and hardly so varied in character as some previous exhibitions. Nevertheless, it may be regarded as a typical exhibition of most that is latest and best in sanitary materials and appliances, and as containing a good percentage of novelties, which, however, are not in all cases so ostentatiously displayed as to be seen without looking for. The chief of these which came under our notice during a necessarily somewhat hurried survey of the contents of the Exhibition are commented upon in the following lines, but before we pass on to speak of them in detail we must give a word of praise to the organisers of the Exhibition and to the exhibitors themselves for their business-like procedure and co-operation, whereby the Exhibition was quite ready for opening when the hour arrived. To promoters and exhibitors at other exhibitions we would say "Please copy." Nor must we forget to commend the judges for their assiduity in having, as far as might be, completed their work before the opening of the Exhibition, their decision as to certain exhibits being deferred for further experiment and trial. The judges on this occasion are Prof. W. H. Corfield, M.A., M.D. (Chairman); Mr. A. Wynter Blyth, M.R.C.S.; Prof. F. de Chaumont, F.R.S.; Mr. W. Eassie, C.E.; Mr. Rogers Field, B.A., C.E.; Mr. Henry Law, C.E.; Mr. J. Wallace Peggs, C.E.; Mr. H. Saxon Snell, F.R.I.B.A.; and Mr. Ernest Turner, F.R.I.B.A. A list of their awards, so far as they relate to matters of interest to our readers, will be found at the end of this notice.

The contents of the Exhibition are divided into five classes, viz., I., Building Materials, Machinery, and Construction; II., Water Supply and Sewerage; III., Heating, Lighting, and Ventilation; IV., Antiseptics and Disinfectants; V. Miscellaneous. These several Classes are subdivided into Sections.

In Class I. (Materials and Construction), the Wortley Fire Clay Company exhibit their excellent white and coloured glazed bricks and salt-glazed bricks. Hard by, Messrs. W. & R. Leggett, of Bradford, show their very handy, simple, and easily-worked appliances for opening firelight and skylights, including the patent "Apex" Firelight Opener, which is a new variety of Messrs. Leggett's appliances. It differs from other arrangements inasmuch as it requires no hinges or pivots. Leggett's "Security" bolt is well adapted for high doors and French casements; it shoots both ways at once, and its continuity is a safeguard against the warping of the frame. Messrs. Edward Smith & Co., of Coalville, have a small show of very good sanitary floor and wall tiles. Messrs. Wright & Co. of Westminster, exhibit the application of their capital fireproof "fixing blocks," by means of which joinery and woodwork of all kinds can be readily secured to walls. Messrs. Casebourne & Co., of West Hartlepool, are exhibitors of Portland cement in different stages of manufacture, and the Sanitary Dry Lime Company exhibit Williams' patent dry lime and mortar for sanitary and constructive purposes. Messrs. Thos. Wragg & Sons, of Swadincote, Barton-on-Trent, exhibit air-bricks, fire-bricks, and glazed bricks, and Messrs. Joseph Cliff & Sons, of Wortley, near Leeds, have some good white and coloured glazed bricks. The Docker Hospitals and Huts Factory Company exhibit (Stall No. 101) a "Docker" portable hospital for infectious diseases, the distinguishing feature of which is that the "walls" are composed of a series of movable framed panels covered with paper, felt, and canvas. The construction of such temporary structures would be facilitated by the use of the Willesden Waterproof Paper and Canvas, which is also made in a form specially adapted for its use as a damp-course (exhibited at stall 10). How far it would prove durable when so applied we have no means of knowing. In section 3, Messrs. Quirk, Barton, & Co. exhibit their laminated lead and lead-foil for damp walls. In Section 5 several varieties of sanitary flooring are exhibited by Messrs. M. C. Duffy & Sons and other firms. Decorative materials are shown in Section 6. These include some embossed majolica bricks and tiles exhibited by the Wortley Fire-Clay Company, and other exhibitors. In Section 7, "Machinery Adapted

for Sanitary Purposes," Mr. E. S. Hindley shows the "Alcázar vertical steam engine."

The exhibits in Class II., "Water Supply and Sewerage," constitute a very large and important part of the exhibition. In Section 1, Surgeon-Major Pringle, late of the Sanitary Department of the Bengal Army, again exhibits his "Sursam" automatic water purifier, which we described last year in our account of the Leicester Exhibition. There are other exhibitors in this section, but there is nothing specially noteworthy. In Section 4 there are a few exhibits worth special mention, among them Messrs. W. Phillips & Son's "Cerus" patent flushing syphon, which differs somewhat materially from most appliances of the kind, as will be apparent by a reference to the section of it which we published in the *Builder* for July 11, 1885 (p. 72). In Section 5 the same exhibitors show the "Cerus" sink, which embodies some useful improvements. It is made in one piece of salt-glazed or enamelled stoneware, with a rounded instead of square rim. The bottom is made with a fall, and has channels along the sides. Messrs. Joseph Cliff & Sons, of Wortley, exhibit the "Cecil" porcelain slop-sink, with flushing rim. In Section 7 Messrs. Phillips & Son show the "Cerus" patent closet, in which the basin and trap are constructed in one piece of earthenware. The closet is an attempt, and apparently a successful one, to combine the advantages of the "wash-out" and "valve" types of closet. Messrs. Joseph Cliff & Sons exhibit their "Dolphin" Closet, which is of the "pedestal" variety, and "wash-out" in action. Its designer has apparently been studying "grotesques," for externally the closet presents the appearance of what may be described as a dolphin-headed sea-serpent with open jaws, trying to swallow an enormous shell, this "shell" being the pan itself. The O-trap beneath the pan is a continuation of the body of the dolphin-headed creature. The closet is not meant to be enclosed by wood boxing, and the effect of its form is very much dependent upon the way in which it is coloured externally. But even in garish white and gold it is, perhaps, preferable to the ivy-clad-tree-stump-like "pedestals" which are being used for closets of this kind. Messrs. Doulton & Co., of Lambeth, exhibit, amongst other appliances of a kindred character, an improved trough closet. In Section 9, the same firm show their new patent self-adjusting joint for drain-pipes, which seems likely to meet some long-felt requirements. From tests that have been made at the Exhibition and elsewhere, it is clear that the joint permits of a considerable amount of flexibility, and therefore of the deflection of a line of pipes where necessary in order to avoid any unforeseen obstruction in laying. This quality of flexibility in the joints has the advantage that no ordinary settlement of the ground will permit of their leakage. The joint consists in the contact of two surfaces of Stanford's patent material, but differently distributed and arranged than in the ordinary form of the Stanford joint. By this new invention no joints have to be made after the pipes are put together, and the pipes are ready for use as soon as they are laid. For this reason the joint is especially serviceable for pipes laid in wet and treacherous ground, as the trench can be filled in as the pipes are put together. The pipes can be laid round a curve (the radius varying with the diameter of the pipes) without impairing the efficiency of the joint. No cement being used, none can remain (as is frequently the case) inside the pipes to cause obstructions.

We will complete our notes on the contents of this Exhibition next week.

The following, among other awards, were announced at the opening of the Exhibition on Tuesday:—

Medals.
Casebourne & Co., West Hartlepool, for Fajia's cement-testing machine.
Waterproof Paper and Canvas Company, London, for Willesden paper roofing.
Harris, J. F. & G., London, for Moulded wood decoration.
Docker Hospitals and Huts Factory, London, for Docker portable hospital.

Special Certificates.
The following have received Medals in previous years, and now are granted Special Certificates:—
W. & R. Leggett, Bradford, for opener for firelight and skylight.
Washington Lyon, London, for Lyon's steam disinfectant.
Cliff, J., & Sons, Leeds, for Imperial porcelain bath.
Morell's Sanitary Appliance Company, Manchester, for portable sifter-sifting ash closet.

Moule's Earth Closet Company, London, for Moule's earth closet.

Certificates of Merit.
Burn & Baillie, London, for galvanised cast-iron air-tight inspection chamber and drain-pipe.
Wortley Fireclay Company, Leeds, for salt glazed bricks.
Cliff, J., & Sons, Leeds, for Hall's hanging tiles.
Wright & Co., London, for fireproof firing blocks.
King & Co., Hull, for Fishbourne's tubular refrigerators.
Hindle, Norton, & Co., Oldham, for Acme door-check and spring.
Smith, E. & Co., Coalville, for vitreous floor tiles.
Adams & Co., York, for thirty-gallon combined flush-tank and grease interceptor.
Cliff, J., & Sons, Leeds, for white enamelled sinks.
Wortley Fireclay Company, Leeds, for white enamelled sinks.
Cliff, J., & Sons, Leeds, for white enamelled urinal floor channel.
Wragg, T., & Son, Barton-on-Trent, for Mawbey's joint for stoneware pipes.
Cliff, J., & Sons, Leeds, for "Simplex" reversible gully.
Wortley Fireclay Company, Leeds, for Simpson's street gully.
Bailey & Co., London, for Woodman's stoneware screw plug and collar for access to drains.
Burn & Baillie, London, for "Eclipse" apparatus for testing drain and other pipes.
Phillips, W., & Son, London, for "Bronzes" air-tight cast-iron manhole cover.
Cliff, J., & Sons, Leeds, for white and coloured glazed bricks.
Wortley Fireclay Company, Leeds, for white and coloured glazed bricks.
North of England School Furnishing Company, Darlington, for Westminster single desk, with sliding top, and convex support to the seat.
Cliff, J., & Sons, Leeds, for "Imperial" slop sink.
Burn & Baillie, London, for india-rubber expanding plugs for drain testing.
Potter, G. W., London, for "Siphosella" pipe fastening.
Trotter, H., London, for bib valves for hot and cold water.
Brathwaite, H. & Co., Leeds, for syphon action water-waste preventer.
Casebourne & Co., West Hartlepool, for Schabell's apparatus for the extinction of carbonate of lime in cement.
White, W. P., & Co., London, for Nicholls's hospital pan.

Exhibits selected for further trial.
With regard to the following exhibits, the judges are unable to give their decision until they have submitted the exhibits to a more complete and extended practical examination than is possible at the exhibition.
Adams & Co., York, for sewer ventilator and sewer gas deodoriser for manholes.
Casebourne & Co., West Hartlepool, for Portland cement.
Doulton & Co., Lambeth, London, for lavatory valves.
Gritten, C. E., London, for "Queen" filter.
Gray, J. W., & Son, London, for "Howatson" water softener.
Burn & Baillie, London, for combination bath fittings.
Wragg, T., & Son, Swadincote, for Hassell's safety filter.
Doulton & Co., London, for self-adjusting joints for stoneware pipes.
Bailey & Co., London, for Irving's filter.
Doulton & Co., London, for improved manganese carbon filter.
Cliff, J., & Sons, Leeds, for "Cecil" slop sink, with flushing rim.
White, W. P., & Co., London, for dry closets.
Æolus Waterspray Ventilating Company, London, for Æolus waterspray ventilators.
Hale, R. W., & Co., London, for exhaust and downcast ventilators.
Honeyman, J., Glasgow, for diaphragm ventilator.
King, P. P., & Co., Hull, for Phillips's ventilator.
Kirk, C., & Co., London, for exhaust, downcast, and chimney-breast ventilators.
Wright, E. G., Portsmouth, for "Reliance" chimney cow.
Maugen, P. A., London, for water-softening process.
Barstow, J., Pontefract, for combination water filters.
Magnetic Filter Company, London, for Spencer's magnetic filter.
Maugen, P. A., London, for Filtré Rapide.
Silicated Carbon Filter Company, London, for improved silicated carbon filters.

Exhibits classed under Lighting, including electric lighting, heating, and cooking apparatus, machinery adapted for sanitary purposes, laundry appliances, and furniture, are still under the consideration of the judges, whose names are mentioned in a previous column.

The Exhibition will remain open until including Saturday, October 16th, from ten a.m. to ten p.m. It is held in the large Exhibition Buildings of the York Fine Arts and Industrial Institute, Bootham Bar.

Institution of Civil Engineers.—The members of the Association of the Birmingham Students of this Institution, through the kindness of the manager, made a visit to the Sandwell Park Colliery on the 17th inst. They were met at the colliery by Messrs. Hughes and Lloyd, who conducted them round the pit, explaining the mode of working, including the mechanical haulage. Some experiments in working the seams (without the use of blasting) by means of Walcher's Patent Hydraulic Coal-breaking Apparatus were being made which were witnessed with great interest. Upon ascending to the pit's mouth the members were afforded an opportunity of inspecting the whole of the engines and machinery used in connexion with the works. Before leaving, a vote of thanks was accorded to Messrs. Hughes and Lloyd, and the members expressed themselves very much gratified by the manner in which the workings had been explained.

"THE INFLUENCE OF GROUND-WATER ON HEALTH."

THIS was the subject taken by Mr. Baldwin Latham, M. Inst. C.E., President of the Engineering and Architectural Section of the Sanitary Congress at York, for his address, delivered on Thursday morning. He said,—

In presiding over this section, which is devoted to engineering and architectural subjects, it is necessary that I should say that I have been requested to address you upon a subject which properly belongs to the Climatological Section, namely, upon the probable influence of ground-water on health. This request has no doubt been made in consequence of some observations which have been made in this city by Mr. North, the Medical Officer of Health, who has traced some connexion between an outbreak of typhoid fever which occurred here in 1884, and the movements of the subsoil water at that time.

Having devoted much time during the past eleven years specially to the study of the question of underground water, and having established and maintained a number of stations for observing the relative height of subsoil water in various parts of the country, and having also collected the past records which are available in this country and elsewhere, I am in possession of facts not easily obtainable, and am able, therefore, to draw some definite conclusions as to the probable influence of ground-water upon health. Having regard to what may be called historical records, great periods of drought clearly indicate a low state of the ground-water. In looking through ancient records there are some remarkable references to the influence of drought in producing disease. The influence of light in destroying noxious properties arising from decomposing matter is also clearly indicated, and it is pointed out that the effect of keeping back the waters of the sky and not suffering them to be poured down on the earth, would be that the noxious animals which live in the water will pollute it.

No inquiry into the question of the influence of climate on disease would be complete without reference to the labours of Hippocrates. It is curious to note in his works, written upwards of 2,000 years ago, that there are conditions recorded, attending healthy and unhealthy seasons, which are identical with the conditions which may be observed in this country at the present day. Hippocrates taught that all disease may be traced to natural causes, and he counted it impious to maintain that any one more than another is an infliction of the Divinity. He pointed out to his followers that if they wished to study medicine properly, in the first place they must study the seasons of the year, and the effects which they produce. He also stated that acute diseases occur in periods of drought, and that you could tell what epidemic diseases would attack a city either in summer or winter, and what sickness each individual would be in danger of experiencing. He went much further than our knowledge at the present time enables us to go; for he stated that the changes of the seasons may be predicted from the rising and setting of the stars, so that we should know beforehand what sort of a year is going to ensue. Hippocrates also pointed out the conditions affecting a healthy period. Rains in autumn, a mild winter, neither very tepid nor unseasonably cold, and rain in spring and summer, the year is likely to prove healthy; but if the winter is dry, and the spring showery, the summer will necessarily be of a fertile character. If, at the rising of the Dog-star, rains and wintry storms supervene, there is reason to hope that disease will cease, and the autumn will be healthy.

It is curious that a dry winter is often the precursor of disease, not at that time, but in the following autumn. As a rule, a short supply of rain in December has a most marked influence upon the stores of underground water, and a deficiency of rain in this month has probably a greater effect in influencing the future health of any particular district than it has in any other month of the year. As a type of a healthy season the present year is an example, and fully complies with the conditions laid down by Hippocrates.

It may be interesting to note that some years ago Dr. Laycock published an interesting account showing the incidence of disease in York, from which it appeared that this city was

always susceptible to violent outbreaks of disease, traceable to local sanitary circumstances combined with peculiar climatological conditions, and that there appeared the same incidence in the prevalence of the sweating sickness of 1550-51, the plague of 1604, and the cholera of 1832, to which might be added the typhoid fever of 1884.

The results of my prolonged investigations on the subject of ground-water in this country and elsewhere, clearly show that there is generally a direct parallelism between the conditions of health and the volume of ground-water. The years in which there has been a large quantity of ground-water present have invariably been the healthiest years, while those in which there has been a small quantity have invariably been the most unhealthy periods.

As a rule the lowness of the ground-water indicates the future health, and not the state of health at the particular time of lowness; that is, the unhealthy period, as a rule, follows the period of low water, the degree of lowness indicating the intensity of future disease, especially fever. In some cases an unhealthy period runs concurrently with the period of low water, but in all these cases there is clear evidence that percolation has recommenced before the unhealthy period takes place. These results are entirely confirmed by observations which were carried on in Paris between the years 1868 and 1883, and which have been collated and published by M. Durand Claye, Chief Engineer of the Municipality of Paris, with the object of putting all the facts and circumstances in connexion with the outbreaks of fever in Paris at the disposal of those who might choose to investigate the subject,—a course strongly contrasting with the conduct of some authorities in this country, who desire rather to hide the true facts from public view.

The observations which have been published by Professor Pettenkofer, and which were commenced in 1854, differ from the experience gained in this country, as he has shown that typhoid fever in Munich commenced with the fall of the subsoil water, and reached its greatest intensity with the greatest degree of lowness, and with the rise of the water there was a diminution of fever, a result exactly contrary to experience in this country. Professor Pettenkofer's observations, however, agree with the observations made here, in the fact that the greatest intensity of typhoid fever coincides with the periods of the greatest degree of low ground-water; that is, those years in which the subsoil water has fallen to its lowest level are those in which there has been the most fever.

With regard also to the experience in this country as to subsoil water it may be pointed out that there is clear evidence that the lowering of the subsoil water by artificial means will produce, and does produce, a tendency to the development and dissemination of typhoid fever. The effect of drainage works during their construction in lowering the subsoil water where precautions have not been taken to expedite and permanently get the water back to its proper level has been, in many instances, the cause of outbreaks of typhoid fever, but which at the time have been attributed to the construction of the sewer works and to sewer gas, even in cases where no connexions had, at the time of the outbreak, been made with the sewers.

It may also be pointed out that at the time of the outbreak of cholera in East London, in 1866, as to the cause of which there has been so much dispute, the very district which was most afflicted with cholera, had, at the time, its subsoil water unduly lowered by the construction of the main drainage works in that part of the metropolis, and on the completion of this work and the sewers being brought into operation the epidemic terminated. . . .

It is curious that in recent times, as a rule, there has been, every ten years, a marked period of low water; for example, in 1834-5, 1844-5, 1854-5, 1864-5, 1874-5, 1884-5. The lowest water in these series probably occurred in 1864-5. In 1844-5 the low water was not intense, but it was low compared with the period. In addition to these periods, there are other times of low water, and in investigating the subject it should be studied locally and comparison made with local vital statistics, for the largely-varying distribution of rain tends to equalise results when spread over large areas,

as it is rarely that the same conditions occur over extended areas at the same time.

I have been carrying on, as many of you know, very extensive observations at Croydon, and from the results there obtained have extended them into various geological formations in different parts of the country.

The register of Croydon goes back to the year 1539, and, with the exception of years in which there has been revolution or disturbing causes of a kindred character, the record is complete. A tabulation of the whole of the burials and baptisms, extending from this early period to a date overlapping that when registration of births and deaths commenced, clearly indicates that years of drought are, without exception, the most unhealthy periods. In 1539, the first year of registration at Croydon, there is a record that in this particular year the springs were remarkably low, so low that the River Lea was nearly dried up, and writers of that age remark on the great drought and heat of that period. In that year the number of burials recorded in Croydon was 50 and the number of baptisms 55, indicating a probable death-rate of 25.6 per thousand. In the following year on the rise of the water, the burials rose to 87 and the baptisms 72, indicating that the death-rate was nearly 32 per thousand. Coming to the period when we have rain-fall records, the year 1741 was a very dry time, the rain-fall at Lyndon for the year being 15.7 in., and in that year the burials in Croydon were 271, and the baptisms 113, giving a probable death-rate of 65.7 per thousand, while in the two years preceding this year the death-rate was 27.7 and 40.7 per thousand, and in the following year 24.2 per thousand. Coming to more recent periods, when we have the certain records collected by the Registrar-General, registration having commenced in the dry year of 1837, the death-rate at Croydon was 30 in the thousand, and in the following year a similar rate occurred. In the years of very low water, 1854 and 1855, we had death-rates of 26.84 and 21.14 respectively, while in 1851, the death-rate was only 18.72 per thousand. In the dry periods, 1864 and 1865, we had death-rates of 21.5 and 22.7 per thousand, while in 1860, a wet year, and one of high springs, the death-rate was only 17.27 per thousand. The year 1871 was another dry period, but the low water at Croydon was not so pronounced in this year as in most other years. The death-rate was not so high, viz., 18.89 per thousand, but in 1873, when the springs were very high, the death-rate fell to 16.59 per thousand. After the dry period of 1874-75, the death-rate rose again to 21.10 per thousand. From 1876 up to the beginning of 1884, there has been unprecedented high water, and during the whole of this period the country generally has enjoyed a high state of public health. The conditions, however, which have brought about this high degree of health, have been disastrous to the interests of the agriculturist, as the large quantity of water passing into the ground has washed away the fertilising elements, but it has secured for us the estimable boon of good health by removing the conditions which are the cause of much sickness, suffering, and death. . . .

It is clear to my mind, after the most careful consideration of this subject, that ground-water itself has no influence, either for good or evil, upon health, but that the lowness or highness of the water in the ground is the index of conditions which greatly influence the health of all communities. We have periods of abundance of water, and periods of low water with both healthy and unhealthy conditions. Ground-water has been shown by Professor Pettenkofer to be chemically more impure in periods of high water when the conditions were favourable to health than when there is a low state of the ground-water, and a condition unfavourable to health. The records also show that we have periods when rain has started into existence malignant diseases, while, on the other hand, we have similar heavy rainfalls accompanied by a high state of public health as in the present year.

The records clearly point out that it is not one circumstance alone which produces disease, but that there are at least three factors necessary for the production and distribution of disease, especially typhoid fever, viz.:—1. The elements which produce disease, such as a polluted state of the ground. 2. The conditions which are necessary for the development of disease, such as a period of dryness of the ground in those regions which water usually

occupies, combined with a comparatively high degree of temperature. 3. Conditions which will lead to the spread of the disease, such as the probable influence of a storm or rain in driving impurities out of the ground into our water supplies, or through the instrumentality of ground air passing into our habitations, and its reception by a population which is in a condition to receive such germs of disease. If any one of these conditions is absent, diseases like typhoid do not occur.

The long period of washing and purification which the ground has passed through since 1876, has generally so purified it from the producing elements of typhoid fever, that with the exception of occasional cases of impurity where the ground has become fouled from the leakage of sewage from the imperfect sewers into the ground, as in the case of this city, Beverley, Kidderminster, and some other places which had epidemics in the low-water period of 1884, the country has enjoyed immunity from diseases of this class. On the other hand, if we take a period when there has been marked low water for a number of years, followed by unusually low water at particular periods, these are the times when typhoid fever is most rife, as, for example, between 1854 and 1865, with the exception of the years 1860 and 1861, when we had a high state of ground-water. The intensity of the fever rates of 1865 and 1866 point out a lesson which ought to be learned by every sanitarian,—that we must keep the ground free from impurity, if we are to secure conditions which are essential for the promotion of health.

When we come to deal with local conditions preceding disease, we find that not only cholera and typhoid fever, as pointed out by Prof. Pettenkofer, are amenable to the conditions indicated by the highness or lowness of the ground-water, but probably all other zymotic diseases are influenced by the conditions which produce low ground-water, with the exception of diarrhoea. . . .

We must not, however, lose sight of other conditions which are at work, such as,—

(1.) *The influence of light.* It will be observed with reference to the period of percolation that it is almost parallel with the time the sun is below the horizon. The influence of solar light is well known in malarious countries, which may be traversed with impunity while the sun is above the horizon, but they become dangerous after night-fall. (2.) *The influence of temperature.* There is no doubt that, in winter time, many diseases are aggravated by the intensity of cold, but cold is not essential to the promotion of disease, especially in children under five years of age. This was shown by the late Dr. Farr, and in the volume recently published by the Sanitary Institute, it is pointed out that the death-rate of children in Norway is lower than that of England, while the death-rate of children in England is lower than in Italy, indicating that at this period of existence cold is not detrimental to life. When we come to isolate the deaths in particular months, and compare them with the periods of low water, it often happens that extreme low water in winter corresponds with periods of great cold, and low water in summer also corresponds with periods of great heat, and it is only at such times when we are able to discount these influences by comparing them with periods when we have a normal state of things with reference to temperature, and abnormal in regard to ground-water, that the influences measured by the ground-water are brought into prominent relief. . . .

A very marked circumstance in connexion with ground-water, and the period of percolation, is shown in the case of deaths of children under five years of age. While there may have been mistakes with reference to the causes from which a child dies, very little error occurs with regard to its age. I am of opinion that the proper way of estimating the sanitary state of any period in any district, is by taking the number of children under five years of age and calculating the deaths by the number living at these ages. The figures show, especially after deducting the deaths from diarrhoea, which are influenced by high temperature, that there is an almost exact parallelism between the period of percolation and that of deaths occurring at those ages, the smallest number of children dying in the month of June, and the largest number in December and January. Moreover, the death-rate from year to year fluctuates in a very marked manner with the fluctuations of

the ground-water. The most healthy periods in which there is the most ground-water, and the least healthy are those in which there is the least ground-water in any year. These results corroborate the strong relation which exists between the highness or lowness of water in the ground in regard to zymotic diseases. It also shows that there are influences at work, which can be measured by the quantity of water in the ground, which are destructive to young life, and which may be guarded against, as these influences indicate themselves many months before they begin to affect the population; therefore "to be forewarned is to be forearmed."

The fluctuation of the water line is an essential condition in the development of disease, especially typhoid fever and cholera. It has been pointed out by Professor Pettenkofer that in those districts in which the rivers are held up at uniform levels by weirs, the conditions are favourable to health, and in such districts cholera rarely becomes epidemic. In a great measure this is corroborated in this country by the state of health at our sea-side resorts, which being the natural outflow for ground-water, and owing to the uniform height of mean tide level, are without exception placed in a condition favourable to health. We have also the record in connexion with the city of York, in which it is clearly shown by Dr. Laycock, in his report on York, published in the first volume of the Health of Towns Commission, that previously to the construction of the lock at Naborn below the city, the tide used to flow up above York, and there were considerable variations in the level of the waters from time to time, but after the construction of the lock in question the health of York materially improved. The health of districts, such as the Wandle Valley, is proverbial. In the latter district there are a large number of mills in a comparatively short length holding up the water to a uniform level.

With such examples for our guidance it is clear that sewers may be of great advantage in maintaining uniformity in the water level. On the other hand, leaky sewers are liable not only to pollute the ground, but to cause considerably greater variation in the levels of underground water than would otherwise occur in various parts of the district. Good land drainage has a tendency to produce uniformity of water level, but this should rarely be attempted to be secured through the instrumentality of sewers carrying polluted matters. The influences which are observed clearly point out how important it is to guard districts against pollution of the earth. How little regard, however, has been paid to this point, for it is only within the last ten years that the importance of making sewers as water-tight as possible has received serious consideration, and still, in many parts of the country, sewers are being constructed without any regard to water-tightness and their other influences on ground-water. Moreover, a large number of burial-grounds have been established, in quite recent periods, in positions with respect to underground water which more or less exercise a baneful influence on the health of the localities in which they are situated. Cesspools, ash-pits, and middensteads are still permitted to poison the air, ground, and water. No wonder that the towns which possess the means of most readily polluting the ground have, without exception, the highest rates of mortality. There can be no compromise in sanitary matters. What should be the aim of all sanitarians is the preservation of the ground from all impurities, especially in districts where the soil is of a porous character, and, above all, no supplies of water for domestic purposes should be permitted to be taken from wells sunk in the immediate subsoil in populous places, and to secure the full measure of health, our houses should be so constructed as to prevent the admission of ground air into them.

SANITARY SCIENCE AND PREVENTIVE MEDICINE.

PROFESSOR F. DE CHAUMONT, F.R.S., President of the Sanitary Science and Preventive Medicine Section of the York Sanitary Congress, on Wednesday opened that Section with an address, in the course of which he said,—

The title of our section is that of "Preventive Medicine," or rather "Hygiene and Preventive Medicine." It may, perhaps, be well to consider what these terms mean, and

what we are expected to do or to concern ourselves with. The meaning of hygiene is now pretty well known as the art of preserving health, although the origin of the term is rather obscure, few perhaps having cared to trace it beyond the fabled daughter of Esculapius, by which myth I feel pleased to think that a compliment is being paid to Medicine by making Health its daughter. It certainly has not always been thus in more senses than one, for health is very far from favouring those who are continually consuming drugs, whilst medicine has not infrequently been deprived of what it has been justly entitled to, namely, credit for the efforts its votaries have made for the preservation of health and the checking of disease, even when against their own material interests. But what, you may ask, is the meaning of "Preventive Medicine"? Is it preventing disease by physicing people? or, is it to prevent the doctors from physicing people? Both of these proceedings might have their advantages, but they do not really explain our meaning. In the good old times, when the smuggler was a more common and (at this distance of time, at least) a more picturesque object around our coasts, the Preventive Service was in every one's mouth, and its duties were well known. Those duties consisted in preventing the introduction of contraband material into the country, material which it was believed would undermine the financial constitution of the country. So it is with our preventive medicine: it is a service the duty of which is to prevent the introduction, the slipping in (*entschleppung*) of contraband material into our bodies and undermining their constitution. Its functions are as old as,—may, older than,—history itself, although its development into systematic usefulness is a thing of yesterday; but so rapid has been its development that we even take upon ourselves to talk of the science of preventive medicine, hurrying up the question a little in our pardonable eagerness to progress. It must be admitted that a science, rightly so-called, is a very serious thing; it means a state of knowledge of causes and effects, precedents and succedents, antecedents and consequences, such that we may, with given data, confidently predict a result that shall never fail us. Tested in this way, how much true science have we got? . . .

We may, however, feel assured that in spite of all shortcomings on our part, partly arising out of inability to appreciate the essential points, but largely from actual ignorance of facts, we are entitled to speak of a science as existing, even although we may be most imperfectly acquainted with its laws. This imperfection becomes all the greater when we have to deal with subjects which are more and more removed from abstract principles, and are consequently more and more complicated in their action. And when we come to consider a subject like preventive medicine, whose existence depends upon the previous existence of other sciences, themselves confessedly imperfect, the difficulty becomes greatly enhanced, and the effective working on sound scientific principles seriously hampered. It must be quite obvious that progress in this direction is governed by our previous knowledge of the nature and the causes of disease, and that while these remain obscure, their prevention must be obscure too, and at best be reached in an empirical and haphazard way.

People are inclined sometimes to reproach the medical profession for not knowing more on these subjects than they do; but this reproach is not very just. In the first place, the profession as a whole consists of men who work hard for their living, and have little or no time for scientific inquiry, although it may still be said to their credit that even some of the hardest worked have found time to add valuable contributions to the sum of medical knowledge. In the second place, the inquiries themselves are exceedingly laborious and difficult, such that no one man or set of men could possibly carry out; and it not infrequently happens that it is only after a long series of observations, which had apparently but little individual significance, that the truth is perceived at last, and some clear-headed worker steps into the inheritance and enjoys the renown which is the outcome of the conjoint work of a former host of obscure but earnest labourers. Often, too, the eye of genius can penetrate the future and see, as in a vision, what can be proved and reduced to concrete fact only by long years, if not generations, of work, requiring for its

carrying out methods and appliances, utterly undreamt of when the idea was first shadowed forth. It is thus that we can trace a perception of the principles of modern pathology and practice in the writings and speculations of men of former ages, whose genius seemed capable for a moment of lifting a corner of the veil which concealed the future from the common eye.

In 1879, at the International Medical Congress at Amsterdam, there was a discussion in the Hygienic section on the subject of the examination of drinking-water. I maintained the necessity of supplementing the chemical by a microscopical examination in every case, in the hopes of obtaining in that direction information which chemistry seemed incapable of furnishing. Considerable experience had taught me what chemistry, in its existing condition as a science, could and could not tell us, and I felt that, whilst chemistry helped us a good deal, it was in all probability the microscope that would ultimately reveal to us, somehow or other, the germs of disease. I was interrupted by the author of the paper under discussion with the question, "A-t-on jamais vu un germe?" I was obliged to confess that I did not think any one ever had, or recognised it as such if he had seen one.

Now, as a test of progress in the seven years that have elapsed since then, it may be asked, "Would my answer be the same to-day as it was then?" The same, yes; but with a difference. It is true that we have the *Bacillus* of Anthrax and the *Bacillus* of Tuberculosis, the connexion of which with these diseases is undoubted, but it still remains to be proved that each is *chollera causa morbi*. On the other hand, *Chollera* *Bacillus* and some others less generally known, are by no means in the same position, for much has to be done and proved before they can be invested even with the comparatively established status of the two first named. Thus my answer would have to be something like this:—"We cannot positively affirm even now that a germ has been actually seen, but certain microbes have been recognised as being constant in certain forms of malady. Our methods of observation have also been vastly extended, and there is every reason for hope for the future." Since that time a powerful aid has come to the microscope, in the method of cultivations of minute organisms, *Reincultures*, as the Germans, who have done so much in this direction, have called them. By these means much information has been obtained, which neither chemistry nor the microscope unaided was capable of yielding, teaching us something of the life history of those remarkable organisms and their relations to each other, as well as to the more highly organised beings upon which they seem to prey. On account of the failure of the highest powers of the microscope to detect any signs of life in liquids, which later on gave undoubted proof of containing organisms, it was surmised that spores might be present, either so minute or with refraction differing so little from the media they existed in, that it was impossible to see them. Cultivation in nutrient media, aided by improved manipulation and methods of preparation and staining, has revealed quite a new world of living things. It has also shown that in this mikrokosm there is a reign of law as there is in the communities of our makrokosm, an antagonism of races as there is among men themselves, for some organisms which grow and flourish when cultivated alone, decay and perish in the presence of others, just as one race of men or animals seems to fade before the encroachments of another.

Taking advantage of this, attempts have been made, crudely and somewhat prematurely, to play off, as it were, one microbe against another, as in the proposal to fight the *Bacillus* of Tubercle by regulated inhalations of *Bacterium Termo*, the common microbe of putrefaction. These attempts have, up to the present time, resulted in failure; and this need not surprise us, for we do not know all the question yet, and we must creep before we walk. There seems, however, good reason to think that there is some foundation for the notion, and that the method may yield fruit hereafter. But these researches in this new branch of Bacteriology have led to still further considerations, for they have shown that most of the activity of nature is dependent on those minute organisms. This has long been known to be the case in ordinary fermentation and putrefaction, whilst the resemblance between

the action of disease-poison and the process of fermentation gave rise to the term "zymotic" (from *ζυμη*, a ferment), as applied to diseases which seemed to proceed with a quasi-fermentative process. It was also reasoning from those more familiar cases that led Pasteur and others to the investigations which have brought out such surprising results. There seems every probability that processes which were formerly looked upon as purely chemical, such as nitrification, are brought about by bacterial agency; and, indeed, this has been positively proved in the case of nitrification by the exhaustive experiments of Schützenberger and Warington. But even in the case of our own bodies, it is probable that all the changes, physiological as well as pathological, are dependent upon those minute workers, so that the terms "vital action," "vital force" used by older writers, were not such misnomers, after all, even allowing that those who used them had very little notion of how the said actions or forces worked or were evolved. We must thus look upon this bacterial or microbial underworld not as an utter enemy, but as a mighty agency for good or evil, as the case may be; we see that we could not exist without it, nor can we in some cases continue to exist in company with all of it. Our cue would seem to be to help the friendly microbes, and to fight those that are our foes. A good general rule, but how is it to be carried out? Clearly the first thing to do is to learn to recognise friends from foes, a process that can only be the outcome of long and careful experiment, such as is now being carried out both abroad and at home, in spite of much opposition and difficulty.

The methods of inquiry by the cultivation of organisms, as regards drinking water at least, have not yet produced much practical result, although sufficient evidence has been obtained to show that we are likely to obtain important information in that direction. But until we can go further in the recognition and detection of different organisms, and establish their connexion with particular forms of disease, we are working pretty much in the dark. But, as they say in German, "*verschoben ist nicht aufgehoben*"; and we may hope that further experience will give us more knowledge and more confidence. It is a fortunate thing, however, that we are less dependent upon this knowledge for the carrying out of prophylactic measures than might be supposed, for, even if we possessed it, it would not materially alter at present our course of action. It is shown that pathogenic bacteria (or what are believed to be so) propagate best under unhygienic conditions, light, fresh air, and pure water being inimical to them. It is also admitted, even by those who pooh-pooh the germ theory, or indeed any specific disease cause, that unhygienic conditions demand to be remedied, and that pure air, pure water, wholesome food, and the other conditions which make the sum of hygiene, are imperative if man or animal is to be maintained in health. The Committee at the India Office, which was assembled to consider the question of the *Comma* *Bacillus* and the report of Drs. Klein and Henesage-Gibbes, came to the conclusion that Dr. Koch had not proved the absolute connexion of the *bacillus* with cholera as an efficient cause, but at the same time they said that even if the contrary had been the case it would not in the meantime have altered things in so far as to compel the authorities to make any material change of procedure in the measures taken for prevention. Quarantine of all kinds was condemned as useless, and not only useless, but as in every way pernicious. There remains for preventive medicine, until we have far more extended knowledge of pathology and etiology, the steady path that is being already trod in the direction of providing for the purity of all articles of food and drink, of dwellings, of clothing, of persons; the supply of fresh air, and the immediate and complete removal of all refuse and effete matter. If to this we add a proper mode of life, both physically and morally, we may practically snap our fingers at both bacterium and bacillus. In the meantime, there are diseases among us which those measures seem as yet powerless to prevent, such as small-pox and hydrophobia. Under these circumstances, we should be foolish not to accept such help as vaccination, for instance, affords, although it might be difficult, even if it were considered necessary, to induce the public to be inoculated with hydrophobic matter, except under the terror produced by having

been actually bitten. These measures, however, are the adjuncts of hygiene, which aims at operations on a wider scale, by sterilising the soil on which the malignant microbe seeks to flourish, so he shall no longer consider suffering humanity to be his rightful heritage.

ARCHITECTURAL ASSOCIATION SATURDAY VISITS.

The Architectural Association on Saturday made an afternoon visit to Combe Warren, the residence of Mr. E. Currie, built from the designs of Mr. Devey.

The plan of the house is charmingly irregular, the rooms being arranged to focus on a dell in the grounds. The general arrangement is a saloon, approached from the entrance-hall by a corridor, which also connects the saloon with the conservatory. From this saloon the dining-room, library, and drawing-room are entered, and on the side is the principal staircase separated by an oak screen. On the first floor is a similar arrangement, the principal bedrooms being reached from this upper saloon. A curious feature in the design is that each room is treated in a different phase of architecture, the drawing-room being Elizabethan and the other rooms in later styles. The saloon has a wide carved oak chimney-piece, with seats in the chimney corners, and iron dog-grate and wood fire. Adjoining the dining-room is a summer dining-room open to the air. The walls of this alcove are treated with plain tiles broken into irregular shapes and set in cement, and rubbed to a smooth surface. The effect is good.

The chapel, which is off the service-corridor on the ground-floor, has also a room communicating with it on the first floor. The interest of the house is greatly enhanced by the valuable furniture it contains. There are some interesting specimens of garden architecture in the grounds.

The Dutch garden, laid out with tile walks and formal beds, has a wrought-iron railing and gates from a church at Derby. On one side of this is the orangery, and at the end an octagonal house has recently been built for the specimen bay trees. The walls of this building internally are decorated in sgraffito.

It is difficult to realise that the house is entirely modern, the different styles of the various buildings, and the irregular plan, all give it the appearance of an old house that had been added to at various dates.

WORKSHOPS AT PUBLIC SCHOOLS.

SIR,—I have read with great pleasure the article in your issue of the 11th inst. [p. 369], on the advantage,—I had almost written the necessity,—of workshops at public schools.

It is unnecessary to add one word in support of your advocacy of the knowledge of the use of tools as an important item in the curriculum of all our public and private schools, but while such knowledge may be regarded as an attractive and useful accomplishment to many of the boys educated at public schools, it is of far greater importance to the large number trained and educated at our public charitable institutions. It is the duty and object of these latter as much to train them in a way to earn their living as to impart a general education, and it can hardly be necessary to point out how conducive to this end is a knowledge of the use of tools.

Those who are engaged in the management of large charitable institutions will know how difficult is frequently the placing of boys in suitable situations on their leaving the charity. Trades in this country generally, and perhaps still more in the metropolis in particular, are already so over-stocked that even if young boys are apprenticed to cigar-makers, tailors, or shopkeepers, it is more than doubtful if they can earn their livelihood when the term of apprenticeship has expired. I believe it would be a far greater service to the boys if our great charitable institutions were to retain them till such age as would permit of their being sent to our Colonies or to the Western States of America, and in these new countries it is impossible to exaggerate the importance of a knowledge of the use of tools and the rudiments of plain and solid geometry.

I observe you write, "the use of the workshop would, of course, be confined to play-hours." I doubt if this should be at public schools, but I am strongly of opinion that it should not be the case in an institution designed to train boys

who are dependent on their own earnings for their livelihood almost immediately on leaving school. For such boys a large portion of the knowledge at present imparted at most of our orphan asylums is wholly useless. The population of many towns, the existence of which is never likely to concern them, the length of rivers, and the height of mountains in various parts of the world, are all details which are only acquired after the expenditure of an immense amount of time and labour by teachers and pupils, and are forgotten almost as soon as learned, without any loss to the pupil. Instead of this, how much more useful and how little more expensive would it be to impart to these boys some knowledge of tools, which would never be lost, which would be of far greater service when possessed, and the acquisition of which would be a source of attraction instead of an effort of frequently overstrained brain power.

Being myself firmly convinced of the value of such knowledge, I am erecting at the orphan asylum of my own community at Lower Norwood, with the sanction of the Board of Management, a workshop which is designed by Mr. Lewis Solomon, and which it is my intention to equip with benches, tools, and, later on, with lathes. The managers have consented to appropriate the requisite number of hours (probably some four or five per week) to the training of the boys to a knowledge of the use of tools both for wood and metal working. It is intended to appoint a competent instructor to attend twice a week to teach the boys in the workshop, and I am sanguine that the experiment will be of invaluable service to those who are instructed.

If it should be attended with the hoped for success, I shall endeavour to induce the Board of Management of the London Orphan Asylum at Watford, of which it is my privilege to be a member, to adopt the same course as we are doing at Lower Norwood.

I believe that if these two well-known orphan asylums were to be known to have adopted some such plan as I have here briefly described, the movement would gradually extend, and the orphan asylums of the country will thereby have gone far in practice towards that at which they aim in theory, viz., standing in loco parentis to the dependent and frequently friendless children who enter their walls.

BENJAMIN L. COREN.

30, Hyde Park-gardens, September, 1886.

THE ROMAN BATHS OF BATH.

SIR,—In your paper of the 11th [p. 370] are a few notes on the above. Enclosed are tracings showing the Roman work, as also the proposed new work. The state of affairs is briefly this. At what is termed "The King's Bath" establishment (adjoining the pump-room) there are eighteen baths and dressing-rooms, previously twenty-four, six having been destroyed in the excavations. It was then proposed to add to these by building six bath and dressing rooms on the Roman floor level, and twenty-two on the upper floor, 18 ft. above.

We urged that these basement baths would obliterate the Roman work, and that on sanitary grounds alone they should not be built, inasmuch as they would be below the level of the winter floods, and thereby deteriorate for long periods the atmosphere of the whole establishment; they would also be below the sewer level and render necessary the fouling the hot-water culvert.

We were met by the assertion that our plan of the Roman work was hypothetical, &c., which I answered by offering to uncover the remains free of expense to the corporation, if not found as my plans described. They have now, in great part, been uncovered, and the only portion I had described as possibly fragmentary, is much more perfect than could have been anticipated. The parts in course of destruction I have coloured on tracing, giving the bird's-eye view.

Take it you are acquainted with the large rectangular bath, possibly with the circular one also. The former, no doubt, served for natatorial sports and swimming exercises principally, but the circular bath, the caldarium with its hypocaust, prefurnium, and labrum, and are the very nucleus of the bathing system of the Romans, and yet are now being destroyed.

The Town Council and many of the Baths Committee wished the preservation of the remains, but the Chairman of the Committee and the architect (Mr. Davis) turned the scale adversely. It was arranged that the Society of Antiquaries should be asked to report upon the matter, and for that purpose Professor Middleton came down, but by some means the destructionists were alarmed, and, with scant courtesy (a term almost too mild), the Society was ignored, and an "independent authority" was sent for. But instead of having the pros

and cons before him, a grove of misrepresentation guided him, and the plan placed in his hands showed but a portion of the scheme. In addition to this, he was told these baths were absolutely necessary, and, equally so, they must be placed on this very site. So misleading was the information that we read in the Report, "None of the Roman walls, as I understand, are to be destroyed; and no parts essential for the understanding the original plan are even to be lost to view." But, sir, the day following that of Mr. Penrose's visit saw the hypocaust cut through for several foundations, and on these, in the caldarium, a chamber 29 ft. by 18 ft. 6 in. in course of construction, the walls of corridors, attendants' rooms, steam closets, and staircase; whilst the adjoining circular-ended bath is to be almost filled by the masonry necessary to support the superstructure; and the remaining area of its chamber occupied by steps, wheel-chair incline, and corridor. These are the reasons of the disputes you have "noticed from time to time," and now we ask your powerful aid, and that of your readers, in ensuring that all who come to see these remains, whether the numerous casual visitors or the cultured scholar, shall be able to pass from threshold to threshold, and find these chambers free of all encumbering rooms and staircases; so that at a glance they might recognise the complete and skilful plan, and by it learn the full arrangement of the bathing system of the Romans, how developed, as can nowhere else be seen.

RICHARD MANN.

. We expressed confidence in Mr. Penrose's judgment on the case; of course, if it appears that Mr. Penrose was not given correct information as to what was to be done, that alters the position. We have before expressed our opinion that the Roman remains at Bath are of quite exceptional interest, and that even some sacrifice of public convenience may be called for in order to preserve them. From a letter by Mr. Mann in a local journal, it appears that he is not properly informed as to Mr. Penrose's position and acquisitions as an archaeologist.

EPISCOPAL HERALDRY.

SIR,—I was disappointed on looking through Saturday's *Builder* to find that the subject of the armorial bearings of sees of recent creation had not been taken up, and hope some one will yet come forward and deal with it.

Consulting the "Newcastle Diocesan Directory," I found it impossible to decipher the charges of the Newcastle shield. On referring, however, to Burke it is thus emblazoned:—

"Per fess az. and gu. In chief, a representation of the cross of St. Cuthbert, or. In base, three castles, 2 and 1, arg."

Can any one say where the said cross is to be seen, or where there is an illustration of it giving any definite detail, and an idea of its size?

In the "Directory" illustration referred to above, it can only be described as a bad attempt at the ground-plan of a public fountain with four flights of steps leading thereto.

EXHAM PHILLIPS.

Manchester.

SANITATION AND FINANCE.

SIR, In your number of last week [p. 407], you mention the improvements being made in the sanitary arrangements of the houses at Chiswick under the superintendence of Mr. Ramsden. I quite agree that the alterations to the sanitary appliances are a great improvement to the houses, and of benefit to the occupiers; but how about the owners of the houses who do not receive one penny extra rent for this outlay, and who possibly have lost tenants who objected to remain while drainage alterations were in progress? No one seems to study them. The middlemen are looked upon as a sort of inevitable curse, instead of the real blessing they are, whether in the building trade as house-owners, or in any other occupation. In the Chiswick case I happened to act for, I believe, the largest house-owners in Grove Park, and my clients, beyond the actual loss caused by these sanitary improvements, are none the worse for the alterations. In another instance where I am indirectly concerned, a client who owns some fifty houses has had notice served upon him by the water company to alter all his fittings, at an outlay of about 250l. Here, again, my client obtained no benefit whatever from the alteration, and his difficulty is where to find the money, all his spare capital having just been expended in structural and decorative repairs and sanitary alterations to these very houses. The houses are already mortgaged to their full mortgage value, and his only resource is the money-lender at 60 per cent.

Surely some help should be given by the parish or other authorities, who should be compelled to lend, say, two-thirds of the outlay at an interest not exceeding 5 per cent., as is frequently repaid in roadmaking. Over and over again I have seen mischief occasioned by the public real or fancied improvements from this cause, and owners would willingly assist in making improvements if their good intentions were not crippled by the want of large sums of ready money.

L. S.

Sept. 21, 1886.

The Student's Column.

STONE QUARRIES.—XIII.

ABERDEENSHIRE GRANITES.—(continued).

KEMNAY QUARRIES.—These quarries are situated about seventeen miles north-west of Aberdeen, and the stone is worked on a very extensive scale.

The granite is quite different in appearance from any of that of the Aberdeen quarries yet described. In comparison with them it is coarse-grained, though, speaking of granites as a whole, it might be more properly called medium-grained. Its general colour is a speckled grey. The quartz is white and in a granulated condition, forming a great proportion of the stone. The felspar is also white, being minute in the ground mass, but in distinct and larger twinned crystals distributed throughout it. These crystals do not appear to lie in any definite direction, and this considerably adds to the strength of the rock. The mica is the peculiar feature of the stone: both black and white varieties being present, but not very abundantly. The black mica is rather small, the specks not being very close together. The white, or silvery brown, mica occurs both as small and large crystals, and some of the latter are quite 7 mm. across, and correspondingly thick. Moreover, the lie of the crystals appears to be tolerably regular, and they are of much use in aiding the mason in the determination of the direction in which the stone will most easily split. This is somewhat curious, as it supplies the want created by the felspar in this respect.

We may mention that in one of the Kemnay quarries a steam crane raises the stone from the bottom of the workings to the height of nearly 300 ft. The machinery in connexion with this quarry generally, is of a very novel and substantial nature.

The granite is largely raised for building and engineering purposes, having been used in the construction of docks at Hull, Newcastle, Shields, Sunderland, and Leith; and is now being utilised for the piers of the Forth Bridge.

Tom's Forest Quarries.—These quarries are about half way between Kintore and Kemnay. The stone is very similar in appearance to that from the latter place, except that it is a little darker in colour; the crystals are not quite so large. The mica is black, and not very abundant. Here and there this mineral occurs as conspicuous black flakes, but it is more often seen bordering the other minerals, especially the felspar. The quartz is not so granulated, and is much more easily distinguished by its transparent glassy lustre than that in the Kemnay stone.

The rock as a whole is compact, and is, no doubt, a serviceable material, capable of being comparatively easily worked.

Tyrebagger is a large and well-known quarry near Aberdeen. The stone which is of a grey colour, is composed of quartz, two felspars (orthoclase and oligoclase) and mica. Large quantities of kerb and paving-sets are annually raised.

Corrennie Quarries.—These quarries have only lately been opened, but are extensively worked. The stone is quite different from the ordinary Aberdeen or Peterhead, both in mineralogical constitution and appearance. It is of a salmon colour, and might be described as a crystalline granular mixture of quartz and felspar, much resembling some of the Archæan rocks of North Wales. When a large polished block of the stone is looked at, little black specks are seen here and there. These are either black mica or hornblende, as the case may be. The quartz in the Corrennie stone is mostly pure white, smoky crystals being the exception. Although at least half the stone is quartz, this mineral does not occur in very large crystals; several small and broken-up pieces are often found close together, and sometimes enclose one of the accessory minerals alluded to. The felspar is of a salmon-coloured tint. It is not porphyritic, though occasionally orthoclase crystals are seen, nearly 1 in. in diameter. The general appearance of the mineral is in small and jagged pieces, and it closely follows the quartz, filling up little cracks and spaces.

One of the peculiarities of the stone in this district is that the base of the Corrennie hill is composed of grey granite, and the uppermost part red. The grey rock contains much mica and hornblende, whilst the felspar, being pink and white, gives the stone a very charac-

teristic appearance. We notice that a slight porphyritic structure is set up near the junction of the two kinds of stone. Iron pyrites is found in the lowermost stone, but being the cubical variety, does not detract from its value.

A large quantity of the Corrennie stone is now being used in the erection of the new Glasgow Municipal Buildings, and in the Tay Bridge.

2.—The Peterhead District.

The outcrop of granite in this area is not very large, but the extensive and systematic manner in which the stone is raised has rendered it famous in the market, where it is known as "Peterhead" granite. In the greater number of the quarries there is a considerable "bearing" over the rock, varying in depth from 3 ft. to 20 ft. The first operation in removing the stone is to bore holes of varied depths, according to circumstances, up to 30 ft., having a diameter of 2 in. to 3 in. These are charged with powder for the purpose of dislodgment. The blocks removed are cut with wedges, as previously described. The rock differs widely in chemical and mineral constitution, according to the part of the mass from which it is obtained. As the greater part of the stone is polished its durability is thereby rendered very much greater than if it was left in the rough. Rain does not have an opportunity of accumulating in little dents and holes, thus giving the acids no time to act; directly rain beats against the polished surface it glances off again. We see, therefore, that not only does polishing greatly add to the beauty of granite, but it assists in preserving it from decay.

Longhaven Quarries.—The granite quarries on the Longhaven Estate are about five miles from Peterhead, and close to the sea. A range of granitic rocks faces the North Sea from Port Erroll to Boddam, a space of about four miles, and some of the most important quarries in Aberdeenshire are situated within these limits. The oldest quarry in the district is at Stirlinghill, which is on the Boddam Estate. Eight quarries are at present in full operation on the Longhaven property, with an average of twenty men at work in each: sometimes this average is considerably raised, according to the state of trade. Some of the quarries have been worked for about forty years, but the majority of them have only been opened within the last twenty years. They are quarries principally (almost exclusively) for blocks suitable for polishing. A brisk trade is, however, done by some of the quarries in providing principal stones for buildings in the neighbourhood, but a large amount of excellent building material is thrown into the sea, which affords a cheap and easy mode of disposing of superfluous stone. It is a pity this cannot be utilised in buildings in the cities of the south, where soft limestones and the like so soon decay. Surely it would pay for carriage?

The stone itself is of a red colour, and slightly differs in grain in some of the quarries. The quartz is very peculiar, and is a marked feature in the rock. It occurs as rounded crystals, some having a smoky appearance, others being white and transparent. Dark patches are seen on the stone, which, at a distance, might easily be mistaken for some distinct accessory mineral. A close examination, however, soon reveals the fact that they are quartz. The felspar is of a flesh-red colour and mostly orthoclase. In some of the coarser materials this mineral is in oval crystals of a milky white tint, and rarely yellowish green,—not unlike the light green felspar in some of the Cornish granites. It is very evenly distributed, and forms a large percentage of the rock. It has no tendency to become porphyritic, and as no twinning is perceptible, is not regular, and the crystals are much interlocked; the stone cracks with a splintery fracture, the felspar looking much broken up. This mineral is very hard, and is so completely crystallised as to render the stone more durable than it would otherwise be, even in spite of the presence of so much peroxide of iron. The quantity of mica present is very variable. Large blocks from quarries in the southern part of Longhaven occur, in which not a particle of this mineral is seen, and the rock then usually contains much hornblende, being, in fact, a syenite; and there is every gradation from a syenite through hornblende granite to granite properly so called. The mica, when present, is black. Hornblende occurs in very minute crystals, congregated together so as to form

dark green patches. It is a curious fact that when hornblende replaces mica in the Peterhead stone, the general appearance of the rock is not altered to an appreciable extent, so that, although the weathering of it must vary accordingly, the cause of the difference in durability would not, on a superficial examination, be suspected.

Notwithstanding the small area of granite on which these quarries are situated, the extent of unbroken ground suitable for quarrying in the district is still considerable. This is testified by the large and perfect blocks that come to light when a clearing is made.

The stone from the Longhaven quarries is used very extensively in London, whilst large quantities of it have been sent to America and other parts of the world.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,674, Flushing Cisterns, &c. W. H. B. Kimber.

The object of this invention is to prevent noise in the action of syphons in flushing cisterns. When the cistern is charged, the float rises and shuts off the cock, the cistern then being ready for use. When the syphon is started the float descends, opening the cock, admitting air and relieving the syphon before air can gather with the water at the bottom of the syphon. The action is thus rendered noiseless.

12,250, Chimney-pots, &c. R. J. White.

To prevent down-draught and to create greater up-draught in chimneys, the chimney-pot is formed with a tube or pipe inside it, which confines the air and causes a greater up-draught and prevents the down-draught. It can be made stationary or to swing round and take the full wind whichever way it blows.

5,235, Telescopic Ladder. W. O. Jenkins.

This is a telescopic ladder made in three parts, with the top and middle parts moved simultaneously by a rope or chain and a winch, worked on the lower ladder. It is designed for the use of house-painters, builders, and others, as well as for fire-escapes and such like uses.

7,674, Manufacture of Cement. H. Mathew (New York).

This is a further process to others previously devised by the same patentee, in which the process described indicates that the cement rock is ground previously to burning. In this process of manufacture the methods of grinding and burning, as used in making Portland cement, are closely followed. The natural cement rock is first crushed to a suitable degree of fineness, then alluvial clay is added to supply alumina and silica in proper proportions, and the ingredients are finally burned under agitation so as to form the double silicates of lime and alumina.

NEW APPLICATIONS FOR PATENTS.

Sept. 10.—11,542, B. Ludwig, Decoration of Wood, &c.

Sept. 11.—11,561, W. Gibbons and W. Sabell, Window Sash Fastener.—11,583, C. Joliffe, Purifying Air for Ventilating and Temperating Rooms.

Sept. 13.—11,590, E. Bauffeld, Indicating Apparatus for Water-closets, &c.—11,596, J. Deoley, Lavatories, Baths, Sinks, &c.—11,607, R. Lindsay, Fastenings for Window-sashes.—11,613, H. Macavoy and Others, Portland Cement.—11,621, W. Popplewell, Telescopic Ladders.

Sept. 14.—11,637, M. Macleod, Dry Glazing.—11,660, H. Hunt, Kitcheners.—11,679, T. Smith, Twist Nails, Spikes, or Screws.—11,682, A. Slatter, Indicator for Hotels, Factories, &c.

Sept. 15.—11,712, J. Porter, Wall Brackets, &c.—11,733, T. and R. Wood, Stable Fittings.

Sept. 16.—11,745, J. Macmellain, Windguards.—11,766, T. Carter and W. Tully, Producing Induced Draught in Chimneys of low altitude.—11,775, J. Helles, Tile Stove, &c.—11,782, A. Barratt, Screw-drivers.—11,792, Viscountess Cradock, Water waste Preventers.—11,798, R. Knight, Hot-water Pipes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

5,969, J. Rainer, Ventilator and Chimney Cowl.—9,797, W. Hammond and J. Turner, Fastening for Revolving Shutters.—9,895, G. Rayner, Retaining Catches for Doors.—10,199, S. Pratt, Fastening and Alarm for Doors, Shutters, &c.—10,573, J. Rankin and W. Palmer, Sash Fasteners.—10,857, H. Brand and W. Harper, Hinges.—10,913, P. Lapierre, Cooking Stove.—11,030, E. Northall, jun., Hinges.—11,092, F. Garon, Securing Door Knobs to Spindles.—10,182, J. and T. Breakeil, Preparation of Calcareous Stone or Marble for Decorative Purposes.—10,574, A. Drummond, Manufacture of Glass, &c.—10,836, J. Stow, Screw Fasteners for Windows.—10,876, J. Pawsey, Painting Brushes.—10,920, F. Henson, Bolts for Fastening Doors.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

11,771, J. Knott, Dovetailing, Mortising, Tenoning, Trenching, Grooving, and Moulding Machines.—13,766, W. Lindsay, Fireproof Floors.—13,841, H. Ashley, Cooking Stoves.—4,378, J. Barnes, Syphon Cisterns.—9,496, C. Bellamy, Plumbers' Blowpipes.—14,122, J. Spencer, Pair.—4,164, D. Breakell and T. Mallett, Soldering Iron.—10,526, 10,528, and 10,529, W. Alford, Knob Attachments.—10,330, A. Boulton, Water closets.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 13.

By BROWN & FOULKES.
Bucks, Marworth—Two freehold houses 2370
Freehold orchard, containing 2a. 3r. 2p. 600
Thirteen freehold cottages 836
Bucks, Wendover—A piece of freehold garden ground 22

SEPTEMBER 14.

By W. HOLLIER.
Russell-square—2 and 3, Keppel-street, 11 years, ground-rent 29l. 12s. 400
By J. S. BRIDGMAN.
Surrey, Caterham—A plot of freehold land 12

By H. RUTLEY.

Camden Town—77 and 79, Arlington-road, freehold
Euston-square—73, Euston-street, 33 years, ground-rent 6l. 1,700
Camden-road—4, Buldop-crescent, 62 years, ground-rent 8l. 425
Hampstead—1, Heath-villas, 75 years, ground-rent 6l. 180

By R. A. NORRIS.

Cornwall, Killerton—Two South Phoenix and Caradon Mine, 17 years 192
By W. R. NORRIS.
Streatham, Lewisham—The residence, Shanley Villa, 89 years, ground-rent 12l. 610

By J. HIBBARD.

Horton—15, St. John's-road, 36 years, ground-rent 18s. 105
Highbury—39, Fennell-road, 64 years, ground-rent 6l. 6s. 450

By F. HADRI.

New Cross—357, New Cross-road, freehold 1,370
Camberwell—8, North-terrace, 31 years, ground-rent 13l. 3s. 6d. 600
Lewisham, Morley-road—The residence called Cleveland, 73 years, ground-rent 13l. 12s. 6d. 670

By A. & A. FIELD.

10,000
Bow—1a to 1a, Stephen's-road, 75 years, ground-rent 20l. 1,815

By FAIRBROTHER, ELIAS, & CO.

Sussex, near Steyning—The mansion called Highden, and 47a. Or. 5p., freehold 30,100
Wappington Farm, near 43a. Or. 1p., freehold 12,200
Staplefield Farm, and 133a. 1r. 33p., freehold 6,050
Rudgwick, near—Hope Farm, and 186a. 3r. 21p., freehold 3,600

By J. H. HARRIS.

11,000
B. Highbury, near Oakhurst Farm, and 629a. 1r. 11p., freehold 9,000
Rowner's Farm, and Corn Mill, 87a. 2r. 6p., freehold 3,650
West Chillingham—Nyetimber Farm, and 189a. 1r. 28p., freehold 3,225

By J. H. HARRIS.

Southwater—Trawlers Farm, and 32a. 3r. 2p., freehold 3,700
Barnes—Balsheath and Longland Farms, and 785a. 1r. 3p., freehold 11,000
Holmwood and Great Holmwood Farms, and 294a. 1r. 27p., freehold 5,050

By J. H. HARRIS.

1,100
Lewisham, near 110a. 1r. 25p., freehold 740
The Manor of Nyetimber, with its rights, &c. 1,600
The Manor of Trenchard, with its rights, &c. 800
Enclosures of freehold detached lands, 19a. 1r. 33p. 1,400

By TOLPIN & HARDING.

Hackney—54, Weymouth-road, freehold 410
By WATERS & RAWLINSON.
Reversion to one-sixth of 9,018l. 7s. 10d. New Three per Cent. Annuities, and in various freehold properties at Wilton (Wilts), life aged 70 years 1,060

SEPTEMBER 16.

By E. SIMON.
Brixton—123, 165, and 167, Fernside road, freehold 39 and 32, Vassall road, 14 years, ground-rent 18l. 270
East Dulwich—1 to 5, Lacon-terrace, 92 years, ground-rent 25l. 620

By J. H. HARRIS.

1,000
Barnes—5, 7, and 9, Edward-street, freehold 850
Walworth—45 and 47, Hasted-street, 24 years, ground-rent 6l. 9s. 290
Peckham—A ground-rent of 25l. 4s. per annum, term 901 years, and 189, Shakspeare-road, 88 years, ground-rent 33l. 1,400

By LINMAN, SHARP, & HARRINGTON.

Blackfriars—71 and 73, Hatfield-street, 9 years, ground-rent 12l. 12s. 150
By C. & H. WHITE.
Blackfriars—Ground-rent of 12l. 12s., term 9 years Kennington—60, 62, 64, and 66, St. Mark's-road, 12 years, ground-rent 24l. 350

Obituary.—The death is announced at the age of seventy-three, of the distinguished Danish painter, Augustus Thomsen. His works were chiefly of a historical character, one of the best known being the frieze representing the "March of Alexander the Great," in the royal palace at Christiania.

Miscellaneous.

The Iron Spire of St. Stephen's, Vienna.—The tower of the ancient church of St. Stephen, Vienna, which is supposed to have been founded in 1144, was greatly injured by an earthquake in 1519, and it was necessary to restore it. In course of time it deviated out of the perpendicular to a considerable extent. An iron bar was carried through it as an axis for the support of the spire, which, having a considerable tendency to vibrate, might be considered as an element of destruction rather than of strength. Consequently the thin wall of the lower portion of the spire was reduced almost to ruin; and at length was in such a dangerous condition as to require rebuilding. The removal of the old spire was commenced in August, 1839, and in the following spring all the condemned parts had been removed. The mode of construction adopted in the restoration was novel and ingenious, the slight masonry of the spire being supported by means of a framing of vertical iron ribs, fastened at their lower extremities to a cast-iron plate or base, and united to each other at intervals by horizontal rings of rolled iron. These rings are made to project from the inner surface, so as to admit of a person ascending, with the assistance of ladders, to the top of the spire. All the wrought and rolled iron employed in the construction of this iron skeleton, the weight of which was only 123 cwt., was manufactured in the Government works at Neuberg, in Styria. The cast-iron plates or rings were furnished from the Government ironworks at Mariezell. In the autumn of 1842, when the whole of the masonry of the spire had been completed, the upper portion, consisting entirely of ironwork, was fixed. This also was attached to a strong cast-iron circular plate, similar in construction to that below. This portion of the framing, with the other ironwork employed in the spire, weighed about 80 cwt., so that the entire weight of iron was about 203 cwt. The new portion of the spire was connected to the old by means of an arrangement of iron anchor fastenings. The portion of the spire restored (*viz.*, from the gallery of the tower to the top of the cross) is about 182 ft. high, the cost having been about 130,000 gulden (13,000*l.*), of which sum 15,500 gulden were expended in taking down the old spire and in the construction of the necessary scaffolding.—*Iron.*

Guildford.—On Wednesday morning the Mayor and a number of members of the Urban Sanitary Authority attended, with the Medical Officer and the Borough Surveyor, at Dapdune Wharf, for the purpose of inspecting the arrangements made for applying Mr. Conder's iron process to the drain. The borough surveyor first filled three cylinders, which contained about seven pounds of sulphate of iron. Each cylinder is made of perforated zinc, closed at one end with porcelain, iron being found not to stand the chemical action. These were placed in a tank which was supplied with water from the town supply, and acted upon the sulphate of iron with the other ingredients used by the inventor. The liquid resulting was allowed to fall into the drain. After a short interval the party proceeded to near the outfall at Dapdune Wharf, some 300 yards distant, and a sample bottle was taken from the drain. Although there was an evident improvement in regard to smell, the characteristics of the contents of the bottle, as far as the eye could judge, had not materially altered. Mr. Conder had, however, stated that the sulphate should be given longer time, in fact some three or four hours, before its proper action would have been observed. After waiting about another twenty minutes or half an hour, another sample bottle was taken, with the result that a very marked change was observed. The chemical action was distinct and active, and the sediment settled rapidly and freely.—*Surrey Advertiser.*

New Board School, Harborne.—At a special meeting of the Harborne School Board recently, consideration was given to the competitive plans for schools in the district locally known as "The Cape." It appears that in response to the advertisement eighteen sets of plans were received. After a careful examination of these the Board decided to adopt those bearing the motto "Playground." The premium of 20*l.* offered by the Board for the second design in order of merit was provisionally awarded to the author of the design marked "Rex," the plans bearing the motto "Experience" (in blue letters) being highly

commended. The authors of these designs were afterwards found to be as follow:—"Playground," Mr. G. H. Cox, 23, Temple-street, Birmingham; "Rex," Mr. Daniel Arkell, 1, Temple-row, West Birmingham; "Experience," Mr. Fred. J. Gill, John-street, Smethwick.

York Architectural Association.—On Saturday last a party of members of this Association paid a visit to Sledmere, the seat of Sir Tatton Sykes, Bart. On arriving at Wharham from York, conveyances were in waiting to take the party over the Wold district. A short stay was made at Wharham-le-Street Church, where the Vicar pointed out the objects of interest, particularly the horse-shoe arch in the tower and the Norman font. From hence the party proceeded to Kirby Grindalyth, where they were met by the Rev. Newton Mant, vicar of Sledmere, and honorary member of the Association, who, together with the Vicar, described the church, which is one of the many churches on the Wolds restored by the munificence of Sir Tatton Sykes, Bart. The church, dedicated to St. Andrew, has an embattled tower at the west end, surmounted by an octagonal spire, which was blown down previously to its restoration in 1839. The turrets at the angles of the tower were added by the late Mr. Street. The brick nave of 1827 has given place to the new nave, designed by Mr. Street, who restored the whole church and erected the stone lych-gate. Leaving Kirby, the party, under the guidance of the Rev. Newton Mant, traversed the undulating country to Sledmere, and after visiting the vicarage and the school, proceeded to Sledmere House, where they were entertained to tea by Sir Tatton and Lady Sykes. At the conclusion the President (Mr. Pollard) moved a vote of thanks to Sir Tatton and Lady Sykes, and to the Rev. Newton Mant. This was seconded by Mr. W. G. Penty, and carried by acclamation.

River Tyne Improvements.—The Tyne Improvement Commissioners, at a special meeting held recently, in Newcastle, under the chairmanship of Mr. J. C. Stevenson, M.P., decided to remove Whitehill Point, at a cost of 30,000*l.*, with 24,000*l.* for a timber quay, and 36,000*l.* for staiths for the Backworth Coal Company. The removal of the Point has long been contemplated as an important work, but a colliery lease has hitherto delayed it. At the same meeting the Commissioners decided to spend 86,000*l.* this year upon river improvements. The following are the chief items:—On the piers, 30,000*l.*; towards the cost of removing Whitehill Point, 10,000*l.*; Albert Edward Dock, 10,000*l.*; removal of Friar's Goose Point, 6,000*l.*; dredging, 22,000*l.*.

Protective Resemblance amongst Antiquities.—A correspondent of the *Gardeners' Chronicle* shows how an accidental resemblance of a useless relic to a useful object has been the means of its careful preservation. He mentions an incident of the recent meeting of the Cambrian Archaeological Association, as reported in our columns. A so-called "stone pillory" was visited close to Llanrhidian Church. It is difficult to conceive of a "stone pillory," but the mystery vanished when the object was seen. The "pillory" was no other than a very ancient wheel cross (famously known as an Irish cross,—more common in Irish churchyards than in English), with the upper part broken off. A wheel cross is like a common gravestone with a broad-shouldered cross at the top, the arms connected by a stone circle, like a cart-wheel with four broad flat spokes, the spaces between the spokes being circular or rudely triangular holes. The two upper holes had vanished with the top of the Llanrhidian cross, the two lower had been utilised as holes through which drunkards' hands could be thrust previously to their being tied in position with rope. The whole relic would long ago have been destroyed had it not, when broken, borne an accidental resemblance to a "stone pillory" with two hand-holes. The piasina is sometimes preserved as a lard and butter cooler. Font-bowls are often preserved as troughs for pigs, altar-slabs for door-steps, early Christian memorial stones for gate-posts and for "rubbing stones" for cattle.

Association of Municipal and Sanitary Engineers and Surveyors.—A Northern District meeting will be held at West Hartlepool on Saturday next, October 2nd. Members will assemble at 11.30 a.m. in the Commissioners' Board Room (kindly granted for the occasion by the Chairman, Lieut.-Col. Cameron). The business to be transacted includes the election of a local district secretary. The following papers will be read and discussed:—(1) "The Construction and Maintenance of Macadamised Roads," by Mr. J. W. Brown, C.E., F.G.S., Town Surveyor, West Hartlepool. (2) "Sea Wall Construction," by Mr. H. Mair, C.E., Borough Surveyor, Hartlepool. The members will afterwards (under the guidance of Mr. Brown and Mr. Mair) visit Mr. Trechmann's Cement Works and the Sea Wall now in course of construction at Hartlepool.

The Building Trade of Sweden.—As an example of the slackness of the building trade of Sweden may be mentioned that last week at Stockholm a large quantity of good quality red bricks only fetched 1*l.* 6*d.* per 1,000, as against 3*l.* 5*s.* for the same quality a few years ago.

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS:

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Market Buildings	Carlisle Corporation ...	100 <i>l.</i> and 50 <i>l.</i>	Nov. 20th ..	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Lamp Columns	Willesdon Local Board ..	O. C. Robson	Sept. 28th ..	ii.
Guernsey Granite (Broken)	do ..	do ..	do ..	ii.
Making-up Road	Wandswoth Bd. of Wks ..	Official ..	do ..	xii.
Road-Making and Paving	Midland Railway Co. ...	do ..	Sept. 20th ..	xiii.
Ironwork for Bridges	Harrow Local Board ..	A. A. Langley	October 1st ..	ii.
Stoneware Sewer Pipes, Bricks, &c.	Aldershot Local Board ..	F. N. Cowell	October 2nd ..	ii.
Broken Granite	Lewisham Bd. of Wks. ...	W. I. Coulson	October 4th ..	ii.
Making-up Road	Tottenham Local Board ..	Official ..	October 5th ..	ii.
Fittings for Iron Buildings, Southampton ..	Com. of H.M. Works ..	De Pape	do ..	ii.
Alterations, W.C. District Post-Office ..	Com. of H.M. Works ..	Official ..	do ..	ii.
Broken Guernsey Granite	Croydon Corporation ..	Official ..	October 11th ..	ii.
Erection of Infectious Hospital	Kingston R.S.A.	do ..	October 12th ..	ii.
Reservoir, and other Works	Liverpool Corporation ..	Jacomb, Gibbon, & Woodroffe ..	October 13th ..	ii.
New Infirmary	Parish of Birmingham ..	G. F. Deacon	October 18th ..	ii.
Rebuilding Smeeth's Hydropathic Establishment ..	W. H. Ward	W. H. Ward	October 25th ..	ii.
Enlargement and Additions to Schools ..	School Bd. for London ..	G. H. Statham ..	Not stated ..	ii.
do ..	do ..	Official ..	do ..	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor	Salford Corporation	130 <i>l.</i>	October 9th ..	xvi.

Sale of a Building Estate in Kent.—The second portion of the Hawley Hill Estate, in the county of Kent, was submitted for sale on Monday last by Messrs. Baker & Sons. The estate, which occupies an area of between forty and fifty acres, is situated about midway between the Dartford Station of the South Eastern Railway and the Farningham-road Station of the London, Chatham, and Dover Railway, and is between two and three miles distant from the two stations. It stands upon very high ground, commanding a panoramic view of this portion of the county of Kent, both east, west, north, and south. Six roads, each 30 ft. in width exclusive of the footpaths, have been laid out on the estate, and altogether the number of houses and other buildings proposed to be erected on the estate is about 450. A numerous company left Cannon-street Station for Dartford, whence they started in wagoons for the estate. The sale took place in a marquee there. The number of lots offered was 139, and Mr. Baker, in submitting them, observed that in the neighbourhood were several large manufacturing establishments, and the demand for small houses was so great that the lower and less-attractive portion of the estate had been sold without even the publicity of a public auction, and that building operations were now rapidly proceeding. On the sale commencing, the first forty-five lots offered, having frontages varying from 34 ft. to 18 ft., and a depth of 100 ft., were sold at prices ranging from 6*l.* to 10*l.* each; a public-house plot, having a frontage of 50 ft. and a return frontage of 132 ft., realising 36*l.* Twelve plots, having frontages of 17 ft. and a depth of from 144 ft. to 160 ft., were sold at 8*l.* 10*s.* and 7*l.* each, whilst the remaining plots, having frontages of 17 ft. and a depth of 100 ft., realised 4*l.* and 5*l.* each, the whole of the plots offered being disposed of.

PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	ton	6	10	0	7	0	0
Teak, E.I.	ton	9	0	0	14	0	0
Sequoia, U.S.	foot cube	0	3	4	0	2	7
Ash, Canada	load	3	0	0	4	10	0
Birch	load	3	10	0	4	0	0
Elm	load	3	10	0	4	10	0
Fir, Dantsic, &c.	load	1	10	0	4	0	0
Oak	load	2	10	0	4	10	0
Canada	load	3	0	0	6	0	0
Pine, Canada red	load	2	0	0	3	10	0
" yellow	load	2	5	0	4	0	0
Lath, Dantsic	athom	3	0	0	5	0	0
St. Petersburg	athom	4	0	0	5	10	0
Wainscot, Riga	log	2	15	0	4	0	0
" Odessa, crown	athom	3	5	0	3	7	6
Deals, Finland, 2nd and 1st, s.d.	athom	7	0	0	30	0	0
" 4th and 3rd	athom	3	0	0	7	0	0
Rigs	athom	5	10	0	7	0	0
St. Petersburg, 1st yellow	athom	8	0	0	14	0	0
" 2nd	athom	7	0	0	8	0	0
" white	athom	7	0	0	10	0	0
Swedish	athom	8	0	0	15	0	0
White Res.	athom	7	0	0	17	10	0
Canada Pine, 1st	athom	17	0	0	30	0	0
" 2nd	athom	13	0	0	17	0	0
" 3rd, &c.	athom	8	0	0	10	0	0
" Spruce 1st	athom	8	0	0	11	0	0
" 2nd	athom	5	0	0	7	10	0
New Brunswick, &c.	athom	5	0	0	7	0	0
Battens, all kinds	athom	4	0	0	12	0	0
Flooring Boards, sq. 1 in., Free	athom	0	9	0	0	13	0
Second	athom	0	7	6	0	8	6
Other qualities	athom	0	5	0	0	7	0

TIMBER (continued).

	£.	s.	d.	£.	s.	d.
Cedar, Cuba	foot	0	0	3	0	0
Honduras, &c.	foot	0	0	2	0	0
Australian	foot	0	0	2	0	0
Mahogany, Cuba	foot	0	0	2	0	0
St. Domingo, cargo average	foot	0	0	4	0	0
Mexican	foot	0	0	2	0	0
Tobacco	foot	0	0	4	0	0
Honduras	foot	0	0	4	0	0
Maple, Bird's-eye	foot	0	0	6	0	0
Rose, Rio	ton	7	0	0	10	0
Balsa	ton	8	0	0	10	0
Box, Turkey	ton	8	0	0	17	0
Satin, St. Domingo	foot	0	0	7	0	11
Porto Rico	foot	0	0	8	0	1
Walnut, Italian	foot	0	0	4	0	0

METALS.

Iron—Pig, in Scotland	ton	0	0	0	0	0
Bar, Welsh, in London	ton	4	7	6	4	16
" " in Wales	ton	4	2	6	4	7
" Staffordshire, London	ton	5	10	0	4	6
Sheets, single, in London	ton	6	15	0	8	10
Hoops	ton	6	0	0	7	0
Nail-roads	ton	5	10	0	8	10
Copper						
British, cake and ingot	ton	43	0	0	43	10
Best selected	ton	44	0	0	44	10
Sheets, strong	ton	44	0	0	44	10
" India	ton	0	0	0	0	0
Australian	ton	0	0	0	0	0
Chili, bars	ton	41	2	6	41	10
Yellow Metal	lb.	0	0	3	0	0
Lead						
Pig, Spanish	ton	13	17	6	0	0
English, common brands	ton	13	12	6	15	17
Sheet, English	ton	14	0	0	14	2
Spelter						
Silesian, special	ton	13	12	6	13	15
Ordinary brands	ton	13	10	0	13	12
Tin						
Banca	ton	0	0	0	0	0
Bilbott	ton	0	0	0	0	0
Straita	ton	0	0	0	0	0
Australia	ton	102	10	0	0	0
English ingots	ton	105	0	0	0	0
Zinc						
English sheet	ton	18	0	0	18	5

OILS.

Linseed	ton	21	0	0	21	7	6
Cocoonut, Cochon	ton	33	0	0	33	5	0
Ceylon	ton	25	10	0	25	10	0
Copra	ton	0	0	0	0	0	0
Palm, Lagos	ton	23	0	0	23	10	0
Palm-olein Kernel	ton	0	0	0	0	0	0
Japaned, English pale	ton	21	15	0	22	0	0
" Brown	ton	20	5	0	20	10	0
Cottonseed, refined	ton	18	0	0	18	0	0
Tallow and Oleine	ton	25	0	0	25	0	0
Lubricating, U.S.	ton	6	0	0	10	0	0
" Refined	ton	8	0	0	13	0	0
Turpentine							
American, in casks	cwt.	1	8	6	1	6	9
Tar—Stockholm	barrel	0	15	0	0	15	6
Archange	barrel	0	10	8	0	11	0

TENDERS.

BETHNAL GREEN.—For the execution of certain works in repairs, new cistern, water-closet fittings, and external painting, at the Workhouse, Bishop's-road, Bethnal-green, for the Guardians of St. Matthew, Bethnal-green. Messrs. T. & W. Stone, architects, Great Winchester-street, E.C. No quantities.							
Sweeting	.....	21,875	0	0			
Hemmond	.....	1,354	0	0			
Wyre	.....	1,215	0	0			
Jackson & Todd	.....	1,121	0	0			
Godfrey	.....	989	0	0			
Thomson	.....	988	0	0			
Brown	.....	985	0	0			
Wood	.....	985	0	0			
Greator & Co.	.....	935	0	0			
Vigor & Co.	.....	837	0	0			
Wythe	.....	875	19	0			
Marshall	.....	810	0	0			
Simpson	.....	819	0	0			
Grigar	.....	834	0	0			
Hill	.....	829	0	0			
Salt	.....	820	0	0			
Lilley	.....	688	0	0			
Wilmot	.....	691	14	8			
Edwards	.....	622	0	0			
Peppatt	.....	559	0	0			
Church	.....	489	0	0			

BOW.—For the enlargement of Leopold House, Burdett-road, in connexion with Dr. Barnardo's Homes. Messrs. H. H. & E. Crook, architects, Tunbridge Wells:—
Kilby & Gayford £4,993 0 0
L. H. & R. Roberts 4,780 0 0
Chlor & Macey 4,791 0 0
Dowds 4,635 0 0
Johnson (accepted) 4,583 0 0

BRENTFORD.—For the erection of the Castle Hotel, is the High-street, Brentford, for Mr. John Brill, Mr. Fredk. W. Lacey, architect, Brentford. Quantities by Mr. J. Sargent, Holden-terrace:—
J. W. Faulkner, Old Kent-road £4,987 0 0
T. Hicock, Honslow 4,775 0 0
J. C. Tennant, Willesden 4,687 0 0
Landdown & Co., Richmond 4,489 0 0
A. Reed, Stratford 4,494 0 0
Gregory & Co., Clapham 4,476 0 0
T. Nye, Ealing 4,390 0 0
J. Dorey, Brentford 4,388 0 0
C. Maton, Kew 4,189 0 0
T. Brunson & Co., Brentford 3,919 0 0

CAPEL (Kent).—For infectious hospital, Capel, Kent. Messrs. H. H. & E. Crook, architects, Tunbridge Wells:—
W. H. Canty, Tunbridge Wells £3,239 10 0
Dore & Sons, Eastbourne 2,546 8 0
G. J. Jones, Tonbridge 2,800 0 0
Wallis & Clements, Maidstone 2,393 0 0
Denne & Son, Deal 2,387 0 0
J. Jarvis, Tunbridge Wells 2,380 0 0
P. Reeves, Staplehurst 2,297 10 0
Kirk Bros., Battersea 2,280 0 0
G. & F. Pean, Pembury 2,265 0 0
Davis & Leazer, Goudhurst 2,093 0 0
Miles Tuley, Fiddock Wood 2,070 0 0

EXETER.—For police-court, station, and cells, for the City and County of the City of Exeter. Mr. John Morgan Finn, architect, Exeter. Quantities by the architect:—
Woodman £8,350 0 0
Scadding & Son 5,190 0 0
Gibbard 5,189 0 0
Stephens 5,068 0 0
Gibson 5,040 0 0
Phillips 4,962 0 0
Gooding (accepted) 4,759 0 0

HEXHAM.—For new premises, Cattle Market, Hexham, for Mr. John Young. Mr. Henry Grieves, architect, South Shields:—
Wm. Bland, Hexham (accepted) £1,047 14 0

HOLLOWAY.—For alterations and bar fittings at the Mother Red Cap public-house, Upper Holloway, for Mr. James Baskett. Mr. Charles Young, architect, Strood Hill, Rochester. Quantities by the architect:—
Barton £216 0 0
Matlock Bros. 589 0 0
H. Smith 587 0 0
Jackson & Todd 569 0 0
Turtle & Appleby 548 0 0
J. Higgin, Forest-square (accepted) 489 0 0
[Architect's estimate, 499*l.*]

LONDON.—For works at the Unicorn Hotel, Norton Folgate, E.C. Mr. E. A. Lewcock, architect, Bishopsgate-street Within:—
Goodall £499 0 0
Steel Bros. 430 0 0
Jackson & Todd 410 0 0
Ravey 396 10 0
Walker 350 0 0
Danton 330 0 0

Goiffier's Work.
Price 247 3 6
Winn 238 10 0
Masterman 232 0 0
Christian 162 0 0
Steadman 125 0 0

Picteter's Work.
Pringle 46 0 0
Faddon 45 0 0
Heath 43 0 0
Phillips 39 0 0

LONDON.—For alterations at the Mitre Tavern, Chancery-lane, for Mr. W. Drew. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—
Hobson £1,426 0 0
Burman & Sons 1,200 0 0
Mark 1,169 0 0
Drew & Cadman 953 0 0
Jackson & Todd (accepted) 920 0 0

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY.

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

Vol. LI. No. 2278.

SATURDAY, OCTOBER 2, 1886.

ILLUSTRATIONS.

Santa Maria Del Fiore, Florence, showing the new Façade, as completed.—The late Professor De Fabris, Architect.....	481-485
Additions and Alterations to St. Ignatius Church, Preston.—Messrs. M. E. Hadfield & Son, Architects.....	488-489
Parish Church, Rossett, Denbighshire.—Messrs. Douglas & Fordham, Architects.....	492-493
The Tynte Pew, Chelvey Church, Somerset.—Drawn by Mr. R. W. Paul.....	496
Interior of Audlem Church, Cheshire, as Restored.—Messrs. Lynam & Rickman, Architects.....	497

CONTENTS.

The Position of Architecture at the Royal Academy.....	473	Parish Church, Rossett, Denbighshire.....	492	Stained Glass.....	503
Notes.....	476	Pew, Chelvey Church, Somersetshire.....	492	The Student's Column: Stone Quarries.—XIV.....	504
Letter from Paris.....	477	St. James's Church, Audlem, Cheshire.....	492	Books: Potter's Construction of Blos (Balsford); Smith's	
The Amsterdam Gale, Hoofden (Illustrated).....	478	Notes of the Sanitary Congress at York.....	499	Retrospections, Social and Archaeological (Hall & Sons).....	505
Sculptured Stones from St. Nicholas Church, Ipswich (Illustrated).....	478	Some Sanitary Exhibits at the Edinburgh Exhibition.....	502	Recent Patents.....	505
Further Notes of the Sanitary Exhibition at York.....	478	New Rivers or at Kidderminster.....	503	Recent Sales of Property.....	506
Fire Engines at the Colonial Exhibition.....	480	Episcopal Heraldry.....	502	Meetings.....	506
Obituary.....	481	House-Owners and Care-Takers.....	503	Miscellaneous.....	506
Façade of the Duomo, Florence.....	482	The Roman Baths of Bath.....	503	The Timber Export of Sweden.....	507
St. Ignatius Church, Preston.....	482	Church-Building News.....	503	Architectural Association.....	507
		School Building News.....	503	Prices Current of Building Materials.....	507

The Position of Architecture at the Royal Academy.



IN any attempt to thoroughly appreciate the alleged shortcomings of the Royal Academy, the recent comments on which have been various and severe, it should be borne in mind that little or nothing is really known, except to a few privileged persons, of the laws by which it is at present governed, or of the funds by which it is supported. For more than twenty years it has published no report and no financial statement. Since a Royal Commission took evidence about its affairs, and reported thereon to Her Majesty the Queen,—adding at the same time some recommendations of a serious nature respecting its future government and the requisite efficiency of its schools,—little official or absolutely authentic has been allowed to reach the public. In our attempt, therefore, to form an accurate judgment on the actual position of Architecture at the Royal Academy, we rely simply on the few papers it has as yet given to the world, and on what we have gleaned from the observations of its members, tested by that circumstantial evidence always open to men professionally engaged in occupations to foster which was, and presumably still is, a fundamental object of the Royal Academy.

One thing, however, may be regarded as certain. This Georgian institution, founded for the purpose generally of promoting the Arts of Design, and specially for the cultivation and improvement of the Arts of Painting, Sculpture, and Architecture, is now mainly dependent for its support on the proceeds of an Annual Exhibition, which is principally confined to pictures in oil, the work exclusively of painters. In the legitimate pursuit of income, the primary aim of the Royal Academy is to attract the public, who pay their shillings at the door of Burlington House for the purpose of being amused as well as instructed, and often in compliance with an old and a still fashionable custom. Vulgarly put, its stock-in-trade is the property of the painters. Comparatively few shillings are paid in order to see the Academy show of sculpture, still fewer to see the show of architectural designs. If a doubt on the latter point exist, it can be dissipated at once by a reference to the visitors' book of the Burlington Fine Arts Club during the period of its remarkable exhibition of architectural drawings by deceased

British artists. This was the best, the most valuable, and the most attractive, ever held, but the drawings remained for several weeks during 1884 in a perpetually empty gallery, admission to which was obtainable for the mere asking. We are confident that little or nothing is contributed to the chief support of the Royal Academy by the labours of its architect-members or of the profession generally, and those painters who openly aver that the Academy does not want the architects, and that it could do much better without them, have excellent reasons, from both a logical and financial point of view, for their candid opinion.

But, while we readily admit this, we are not at all disposed to concede that Architecture has no claim on the Royal Academy because the architects do not increase by their exhibits the periodical collection of shillings at Burlington House. Academicians and others who pretend to grudge the relatively small sum expended by the Academy on architectural education as it is understood there, and who think that Architecture thus gets more than it deserves, seeing that it hardly brings anything to the common exchequer, will do well to recall a few facts, which may be recited, perhaps, as much for public information as for the benefit of a particular profession. First and foremost there is that "instrument" of foundation, of which so much has been recently written, and in which architecture was placed on a footing at least equal to that of painting and sculpture; while under more than one clause of it, notably clauses VIII. and XX., Architecture was invested with privileges of an ascendant character. By means of that instrument the Academy has enjoyed a monopoly which endured for a century, almost unassailed, which even now is not much or irretrievably weakened. By means of that instrument the Academy was housed for a like period, first at the cost of the Sovereign and afterwards at the cost of the taxpayers of this country, and it has since been permanently endowed with a site for its present buildings in the very heart of fashionable London, at a further outlay of a considerable sum of public money. Does any one suppose that the Royal Academy, without that instrument, could have netted from its exhibitions alone, and after paying all expenses attending the same, the sum of 267,583*l.* between the years 1769 and 1859? Or that, in 1860, the Academy would have possessed 122,600*l.* invested in Government annuities? Would it even have survived 1780 if its annual deficiencies had not been met in those early years by grants from the Privy purse? In fine, its prosperity during a whole century, the records of which up to the year 1859 have been published, was mainly due to the

possession of that instrument, a document, to use the words of the Royal Commissioners of 1863, possessing the force of a solemn and public declaration, by the original members of the Society, of its main objects, to which the succeeding members, from time to time, have become practically parties,—a document in which the due rights to be accorded to Architecture were clearly and faithfully expressed.

But how did the Council and the General Assembly of the Royal Academy fulfil their obligations in this respect? Certainly not in accordance with the spirit of that instrument on which the fortune of this Academy, principally consisting of painters, was made. During a hundred years the architect-students were left to pick up as best they might an acquaintance with draughtsmanship in the "antique" school, and, under conditions, in the "life" school, which schools were intended for and used by a few painters and fewer sculptors. Prizes were given, it is true, for architectural designs and drawings, but no instruction in architecture was imparted. It was only in 1870, after the Royal Academy had been a century in existence,—profusely living during that period under the shadow, so to speak, of an instrument some of whose main provisions it ignored,—that an architectural class was formed and a master appointed to conduct it. Mr. R. Phené Spiers was the first to do duty as architectural instructor at the Academy, and until 1876, a period of six years, he remained sole instructor. It was only then, after 107 years of corporate reflection, that the architect-members were induced to take their turn of duty as "visitors" in the new architectural class.

Yet, though the educational provisions of the instrument of foundation have been woefully neglected, and some even allowed to lapse, other provisions have been varied and developed in accordance with the changing spirit of the times, the spread of knowledge, and the value of money. The number of members, which was fixed not only by the instrument, but also by the diploma and other early documents, has been largely augmented. The one annual exhibition, which was originally fixed to continue for a period of one month, now lasts three months; and winter exhibitions are held. The salaries of the Treasurer, the Keeper, the Professors, and other officers, which were prescribed by the instrument at amounts of 100*l.*, 60*l.*, 30*l.*, &c., have been enormously increased. But other provisions of the highest importance to the arts of design, and especially to architecture, have not been allowed to develop in a similar proportion. On the contrary, the Chair of Perspective and Geometry, which was ordered to be held by an Academician, has not been occu-

pied since the late Mr. Knight, R.A., left it, more than a quarter of a century ago, and a portion only of the duties pertaining to that important branch of an artist's education has been relegated to a "teacher of perspective"; while the Chairs of Architecture and Sculpture, one vacant since the death of Mr. Street, R.A., in 1881, the other since the retirement of Mr. Woolner, R.A., in 1880, are still unfilled.

The best architect-members of the Royal Academy have not always acquiesced in a condition of things which tends to maintain the elevation of a few at the expense of the many, by depriving their younger brethren of educational advantages to which, under the original instrument of foundation, the latter have a just claim. Soon after the results of the first great International Exhibition in 1851 had made known to the people of this country their deficiencies in the arts of design, and while France was preparing to hold her first International Exhibition in 1855, the Royal Academy appointed a sub-committee, consisting of Sir Charles Barry, R.A., Professor Cockerell, R.A., and Mr. Philip Hardwick, R.A., to consider the subject of architectural education. These experts, all now deceased, reported on the 11th of March, 1856, and their report, which is said to be the work principally of Sir Charles Barry, was first brought to light through the persistence of the present Earl of Wemyss (then Lord Elcho), at a meeting of the Royal Commission of 1863. The heads of their scheme of education, divided into two courses of study, are here given:—

COURSES FOR THE STUDY OF ARCHITECTURE.

I.—Elementary Teaching.

1. Geometry, Trigonometry, Statics, Hydraulics, Hydrostatics, Chemistry, Optics, Acoustics, Geology, and Mineralogy; and Mechanics, as far as they relate to the powers and forces applied to the purposes of construction.
2. Nature and Property of Materials used for Construction, and Ornamental Purposes.
3. Principles of Construction.
4. Drawing, Perspective and Isography.
5. Drawing from the human form, from the life, and from casts.
6. Freehand Drawing from natural objects, with reference to Decoration.
7. Conventional treatment of such objects as are applicable to Architectonic Decoration.
8. Drawing and Modelling of Ornament.
9. Drawing of the elements of each recognised Order or Style of Architecture.
10. Drawings of the best works of the Greeks, the Romans, the Mediaevalists, and the most eminent masters of the Revival of Classical Architecture.

II.—Fine Art Teaching, or the Higher Branches.

1. Principles of Form, Proportion, Harmony, Expression, Outline, and Stability in Composition.
2. Principles of Ornamentation.
3. Principles of Colour in Ornamentation.
4. Iconographic and Orthographic rules, and systems of Composition, employed by the Greeks, the Romans, and the Mediaevalists in architectural design.
5. Studies of Composition in the several distinctly recognised Styles in ancient and modern times.
6. Principles of the application of Painting and Sculpture in architectonic decoration.
7. Principles of the application of High Art in Painting and Sculpture, in combination with Architecture.
8. Exercises upon designs of existing works, except works of living artists, with reference to the correction of what may be at variance with the true principles of art.
9. Original Composition, emanating from the use of new materials in construction, and the omission of all that interferes with convenience and durability in the old or recognised Styles, or that may be incompatible with modern habits, fashions, and requirements, or unsuitable to the climate of the country in urban or suburban districts.

The Report suggested that the whole of the first part, namely, the Elementary Course, should be conducted outside the Academy, by accredited institutions for teaching Art and Science, and that certificates of competency granted by such institutions to architect-students should be a qualification for their admission to the Royal Academy schools. In those schools, only the Higher, or really academic, Branches of study, it was suggested, should be taught, whereby, we may be permitted to add, the architectural class would become something more than a mere drawing-class, and the Academy be enabled eventually to turn out reasoning architects rather than

mere clever proficient in draughtsmanship. The Report also recommended, among other things, that the students' drawings offered in competition for prizes should be publicly exhibited prior to any decision upon them, and that the prize drawings should be hung at the Annual Exhibitions, with an appropriate notice of them in the catalogue. A further recommendation that the Gold Medallists and Travelling Students should thereby acquire a right of membership in the Academy, as a class, with certain privileges, seems to show that even in 1856, the want of sympathy or direct connexion between the Academy schools and the Academy itself was felt and deprecated, at least by a thoughtful and business-like minority of the members.

It may be asked why the Royal Institute of British Architects, of which the Queen, though not the "great prime mover," is the gracious patron, has remained apparently silent on a subject of such vital importance to its constituents, and it may not be generally known that the Institute has moved in the matter, officially in 1859, and unofficially on many occasions both before and after that date. At a special general meeting, held on April 11th, 1859, at the old rooms in Grosvenor-street, it was resolved to make a formal communication to the Council of the Royal Academy with respect principally to the establishment of a systematic course of education, and the terms of the letter to be sent were then agreed to. The letter, bearing date, April 14th, 1859, was signed by the Hon. Secretaries, the late Mr. C. C. Nelson and the late Sir M. D. Wyatt, and in the brief reply, which was received some few days afterwards, the Secretary of the Royal Academy stated that it would receive the attention "due to a communication emanating from so distinguished a society." The arrangements therein detailed, which the Institute desired to see carried into effect, if possible, by the Royal Academy were:—

1. A larger proportion of architect-Academicians and architect-Associates to be appointed.
2. Powers of independent action to be given to the architect-members upon matters connected with architecture.
3. The provision of means of instruction in their art to be provided for architect-students, equivalent to those afforded by the Royal Academy to students in any other branch of the fine arts.
4. A more systematic scheme of general instruction in all branches of the fine arts to be brought into operation, and more efficient tests by examination, or otherwise, of knowledge and proficiency in practice.

The first point,—the increase of architect members,—the Institute conceived essentially due to the great extension which had even then taken place in this country in the study and practice of architecture and its subservient arts of design. This increase of representation was asked for in 1859. Three years afterwards the Royal Academy consisted of sixty-six members (Academicians and Associates), of whom forty-six were painters, eight sculptors, five architects, and seven engravers, and in May of the present year there were seventy-three members (Academicians and Associates), composed of fifty-nine painters, seven sculptors, five architects, and two engravers.

The second point,—independent action,—was deemed indispensable, to prevent the architectural element being rendered powerless through its remaining on all occasions a small minority.

The third,—architectural education,—was asked for as a right which it would be incompatible, to use the words of the letter, with the comprehensive objects for which the Royal Academy was originally instituted to refuse; and the request was not refused. Eleven years afterwards an architectural class was founded and a master appointed, as we have previously stated. But the subjects taught are almost elementary in their character, and tend to reduce the architect to the level of a draughtsman, or, at best, a decorator. There is no thorough study of composition and planning at the Academy. Even descriptive geometry, stereotomy, physics, the principles of construction, are there ignored or passed over as subjects which should have been or should be acquired in day or boarding schools,

or in the offices of professional practitioners. As a matter of fact, the time deemed sufficient for the present Academic course would not suffice for any serious studies. The architectural class only works in the evening for two hours, and during three evenings only, making in all six hours a week, for a portion of the year. Besides the "Visitor," who is either an Academician or an Associate, the teaching staff consists of only three gentlemen, namely, one Teacher of Perspective, one Master in the Class of Architecture, and one Teacher of Modelling. The six lectures on architecture, archaeology, or what not, delivered annually, are of little use to the students, seeing that few of them take any notes, or, indeed, pay any attention to the lecturer, and none are afterwards examined in order to test the value to them of the unpopular exercise which they have endured.

The fourth,—a general elevation of academic art teaching,—was asked for because, said the Institute, it was unquestionably demanded by the public for students in architecture if not in all other departments of the fine arts.

This letter is printed in the usual report to the general body of members, which was adopted at the annual meeting of the Institute of Architects in 1859. It was therein stated that, in the event of the Royal Academy failing to provide a more active curriculum than it had hitherto considered necessary, the Institute would endeavour to originate some movement in the matter. "The subject," to quote the words of the report, "is obviously one of such extent and gravity that any useful action can only be set on foot by the very hearty concurrence, not of the Council or of the Institute alone, but of the whole body of architects practising in the United Kingdom." Now, at that time the Institute of British Architects numbered 293 professional members. Twenty-seven years have since elapsed and it numbered, at the close of last year, 1,269 persons, of whom 1,098 were professional members, and unless the hopes and expectations of the present hour are destined to meet with disappointment and disaster, the profession may yet, before much time has passed away, make its voice heard even at the Royal Academy on behalf of the great and pressing needs of architectural education.

The dissatisfaction felt by sculptors, architects, and others with the manner in which the Royal Academy, composed almost exclusively of painters, has executed the trust reposed in it, was apparently shared by the Royal Commissioners of 1863. They expressed, in their Report to the Queen, a deliberate opinion "that the constitution of the Academy should rest on a wider and more liberal basis, and that it should be made more useful than it is at present (1863) in promoting art, and in aiding the development of public taste." They proposed to increase the number of Academicians from forty-two (the present total) to fifty, the additional eight to be architects and sculptors; and to increase the number of Associates (now thirty-one in all) to fifty. An additional class of lay members, to consist of distinguished persons not artists by profession, who should have certain duties assigned to them, was also suggested, making a grand total of 100 professional and ten non-professional members. They also recommended that the president should in all cases be nominated from among the Academicians irrespective of the branch of art that he might happen to profess; that there should be, besides, two vice-presidents, as honorary officers, who should be selected from the other two main branches to which the president himself did not belong, so that in all cases Painting, Sculpture, and Architecture should be represented either in the president or in a vice-president. They further recommended that an annual report of the proceedings of the Royal Academy should be published, with a statement of its income and expenditure duly audited. But the desirability or the reverse of acceding to these apparently novel propositions is still under consideration, and, as far as the reform of such details of administration goes, the Royal Commission of 1863 has laboured in vain.

The recommendation that rooms should be

set apart for the exclusive exhibition of Water-colour drawings, engravings, and architectural designs, respectively, was accepted, but only some twenty years after it was published. The desired additions have, however, been made in one instance to the detriment of the room used by the class of architecture, which, from a sanitary point of view, has been injured thereby.

The recommendations of 1863 in respect to teaching were of the highest value, but the Academy has not yet adopted them. The Royal Commissioners expressed the opinion that there should be a General Director of the Schools, not necessarily a member of the Academy, who should receive a salary sufficient to secure the services of a first-rate teacher; that all candidates for admission into the schools should be required to pass an examination as a test of their general education; that there should be periodical examinations of the students to test their progress in the schools; that instruction should no longer be entirely gratuitous, and that some moderate fees should be imposed.

But the most important recommendation of these Royal Commissioners had reference to the "anomalous and ambiguous position" held by the Academy under the instrument of 1768, in lieu of which they thought that the Crown might be asked to grant a Royal charter. They were of opinion that the Academy should be viewed as a great national institution for the promotion of art, and that, by the grant of a charter, as well as by the rules which it should frame, its public character and duties should be distinctly recognised and defined. In this the Royal Commissioners were strongly supported by the wording of the memorial presented in November, 1768, to King George III., praying him to grant the instrument on which the fortunes of future Academicians were to depend, and by the King's reply. "We only beg leave to inform your Majesty," said the memorialists, "that the two principal objects we have in view are the establishing a well-regulated School or Academy of Design for the use of students in the arts, and an annual exhibition open to all artists of distinguished merit, &c." To which the King replied that he regarded the culture of the arts as "a national concern." Before the instrument of foundation was conceded the order of precedence was (1) school and (2) exhibition; for a hundred years after the concession it was (1) exhibition and (2) school; and at the present time the order of precedence, as laid down in the original memorial and the instrument it brought forth, is still reversed.

Nor do we quite see how the hostile movement now being directed by painters against the Royal Academy will advance the cause of art-education generally, and the cultivation of painting, sculpture, and architecture in particular. If the attempt of Messrs. Clausen, Crane, and Holman Hunt to start a new and "national" exhibition succeed, it must injure, in more ways than one, the exhibition by which the Academy is now mainly supported. To reduce the number of shillings obtained for admission to this annual show, and from the sale of catalogues, must inevitably weaken and ultimately destroy the teaching powers of the Academy,—at least while the present system of gratuitous instruction lasts. Even as it is, the receipts from this main source of income are believed to have fallen off, and it may be inferred that it is the already active competition of ambitious rivals which has made itself felt in the select records of Mr. Horsley's mysterious charge. Indeed, every well-to-do picture-dealer has now an art-gallery, for admission to which gate-money is often paid, and it is an apparently profitable practice on the part of distinguished painters to hold special exhibitions of one or more of their works, to see which is deemed quite as necessary to social salvation as the exhibition of the Academy itself. We cannot therefore honestly welcome any further division or distribution of such annual shows, feeling convinced that this country is over-exhibitioned already, and that, at no distant date, both man and woman kind, not having the earlier fear of society

before their eyes, may refuse, partly in the interests of that organ, to survey an acre of wall space covered with pictures however excellent, and even urge, perhaps, that such laborious delights are not worth the headache they involve.

The outlook is, therefore, not promising. If the so-called reform of the Royal Academy is to be preceded by an attack on its chief means of existence the students rather than the members will probably have to meet deficiencies, and an attempt to mend the Academy in such a fashion will end it,—unless, indeed, a higher idea of duty and greater powers of self-abnegation are thereby engendered in the General Assembly of Burlington House than outsiders deem possible.

But what of the present condition of things? Is it so good for architects that they at least can afford to do nothing to risk or to injure it? Apologists assert that if the representation of architecture at the Royal Academy is meagre and inadequate it is because there are few fit for the honour of election, and that if the Chair of Architecture has been vacant for years it is because there exists no one qualified to fill it. The assertion is audacious if not impudent, but it is made and maintained, and, if true of British architects, must be equally true of British sculptors, seeing that their position at the Academy is even worse than that of the former. If, however, sculpture and architecture do not flourish here as they do in other countries,—if they are not so advanced here as even painting is,—the Royal Academy, controlled since its foundation by an overwhelming majority of painters, cannot escape its due share of blame in the harsh indictment. Its very existence, if it does not effectually promote the main objects of its institution, exercises a deteriorating influence and prevents others from attempting to promote them. No School or College of architecture can be successfully founded in this country while the Academy enjoys its full rights and partially fulfils its obligations. Meanwhile do Englishmen quite appreciate what is implied by the assertion recently made, that the schools of the Continent are "swarming" with English students? The French Ecole des Beaux-Arts and other less famous institutions of the kind in Europe are maintained in high perfection by the State, that is, by the taxpayers of the several countries respectively. Before a foreigner can be admitted to the Ecole des Beaux-Arts he has to obtain from the Ambassador or Consul of the nationality to which he belongs a letter of recommendation, and he thus applies, almost in the name of his country, for gratuitous education to be accorded to him at the cost of the people of another country. Surely the historical "*civis Britannicus sum*" of Lord Palmerston forms a sorry prelude to this modern abasement of British subjects. On the other hand, it is a British artist's best chance of future success if he have talent, and such is the good feeling, so general the *bonne camaraderie* in these Continental schools, that no Englishman or American is ever tauntingly reminded even in joke of the free privileges he is often quite unconsciously enjoying. Nevertheless, we own to an uneasy feeling when the Paris correspondent of the *Times* states, as he did the other day, that there is a fresh proposal to exclude foreigners from the Ecole des Beaux-Arts. We ask ourselves how many foreigners have been received into the schools of the Royal Academy, or, to be more cautious, whether any have ever applied for admission there.

What, and where is the remedy? How enforce the claim which, as we have urged, architecture has on the Royal Academy? How obtain the redress for past shortcomings which is its due? The Academy strictly regarded is neither a national institution nor a public body, amenable to Parliament or to the Privy Council, nor is it a mere private society. It is a privileged company of seventy-three persons with the Queen in Her Majesty's personal capacity as its absolutely acting head. "The Sovereign is the great prime mover of the body of the Royal Academy," and "The Academy can do nothing without the sanction of the Sovereign,"—such were the statements

made to and accepted by the Royal Commissioners of 1863. The Queen signs the "minutes" of the Academy, and consequently, in pursuance of the constitutional dogma, it has done no wrong and can do none. To complain of what the Academy has done or left undone is to prejudice the action, and cast a doubt on the wisdom of the Sovereign, and hence loyalty is dumb. The Royal Commissioners of 1863 perceived this plainly enough, and when they advised the granting of a Royal charter, in lieu of the present instrument, their object undoubtedly was to relieve the Sovereign of undue responsibilities, which, instead of being exclusively personal, should be shared at least by the Lords of the Privy Council. It is only by such a change as this that the prayer of Messrs. Armitage, Davis, Holl, Wells, and Woolner, Royal Academicians; and of Messrs. Burgess, Dicksee, Moore, Morris, and Oakes, Associates,—namely, "*That the present anomalous position of the Royal Academy should cease, and that its constitution should assume a truly national character*,"—can be granted. That prayer was publicly made to the Royal Commissioners of 1863 by seventy-seven artists, including those above mentioned, and others equally distinguished who are now deceased, and the memorial (agreed to on the 23rd of May, 1863), of which it formed a part, was presented by Mr. Armitage, R.A., who has always taken an active interest in intermittent and almost vain attempts to mend the institution.

The chances of the acceptance by the Academy of such patriotic advice are small and remote, doubtless, if pocket and personality are to maintain their sway, but great and immediate if the Academy have at heart the true promotion of those interests for which its instrument of foundation was granted. But no charter, no Act of Parliament, will ever concede the powers and privileges that the Academy has been enabled to exercise since 1769. As we have shown, the instrument, unlike a Royal charter, is not an immutable deed of institution. Some of the rules in the "Abstract of the laws and constitution," published in 1863, were distinctly opposed to certain provisions of the instrument of 1768. Under the instrument itself the Council of the Academy are given powers to frame new laws and regulations, and there is no proviso that they shall not be at variance with the spirit or principles of the instrument. In any application for the grant of a Royal charter or even for registration under the Science and Art clause of the Companies Act, 1867, neither the Privy Council nor Parliament would entertain the following (which are part of the original instrument), namely:—

XXII. The Council shall frame new laws and regulations; but they shall have no force till ratified by the consent of the General Assembly, and the approbation of the King.

XXIII. Though it may not be for the benefit of the Institution absolutely to prohibit pluralities, yet they are as much as possible to be avoided, that His Majesty's gracious intention may be complied with, by dividing as nearly as possible the emoluments of the Institution amongst all its members.

When it is also considered that under the 26th clause of Section II. of the constitution (as published in 1863), "All business relative to the Royal Academy, which is to be laid before Her Majesty, after it has been settled by the Council in the usual form, shall be presented to the Queen," &c.; and again, that, under the first clause of Section VII., "No sum exceeding 50*l.* sterling shall be granted by the Council within the term of one year . . . without . . . the sanction of the Queen," it will be felt that the decisions of Burlington House are little less than Royal decrees, whence there is no appeal, except by an outrage of the proprieties, and whereby the Royal Academy is placed above the Law and Parliament.

Ramsgate.—A new building for the Albion Club, Ramsgate, is being erected on a prominent site, facing the sea, from the designs of Messrs. Pugin & Pugin. Mr. Martin, of Ramsgate, is the contractor.

NOTES.

THE endless St. Alban's dispute is going on in the *Times* still, Precentor Venables having now replied to Lord Grimthorpe's last. The dispute might be cut down to very narrow dimensions if any correspondent of the *Times* had the perception to see, and the sense to say, the precise truth in two words, which is simply this: that Lord Grimthorpe's position, that a modern architect has the same right to add to an old building as an ancient architect, and that in so doing it is reasonable to assimilate the new work to the design of the old, is perfectly logical and rational; the sole mistake being the idea that he, Lord Grimthorpe, is qualified to do it. That he is not, what he has already done amply proves, in spite of the support of the irrepressible quantity surveyor whom the *Times* has elevated into an art critic. But as long as thirty-nine out of every forty of those who are called educated Englishmen cannot tell good architectural detail from bad, the nonsense published on the subject in daily papers will probably be believed. The *Times*, in a "leader" on the subject, never ventures even to raise the question whether Lord Grimthorpe is a competent person to be entrusted with the restoring, architecturally, of a cathedral; that is too insignificant a matter to trouble about, or else the *Times* is too much under the thumb of Lord Grimthorpe to venture to do so. If it were not for the rather serious question of the maltreatment of a great building which is involved, the whole thing, between the absurd vanity and temper of Lord Grimthorpe and the style and æsthetic accomplishments of some of the other persons who are allowed to lecture to us on architecture in the *Times*, would become too ludicrous for any serious comment.

MR. HENNIKER HEATON'S letter to the Postmaster-General in regard to the establishment of a penny intercolonial postage seems to us to be conclusive in regard to the advantages and the financial possibilities of such a reform. Speaking comparatively, there is nothing more to stand in the way of it than there was to stand in the way of the establishment of the national penny postage system. Experience has shown, over and over again, that in matters of general public interest or necessity low rates and large custom give the best returns, because the increase in the custom is always greater in proportion than the direct loss by lowering the rates. Mr. Heaton puts the matter in a nutshell when he says:—"There are in Australia two millions of people,—English-born subjects to the Queen,—that is, one half of the population. These write to their friends at home one letter each in two years, whereas friend writes to friend in England forty letters a year. It follows that the British-born inhabitants of Australia should send at least 40,000,000 letters home every year (that is, half the average English correspondence) for every million letters they send now. This even at the penny rate would mean a large increase of gross revenue, which would go far to meet, if not extinguish, the expected deficiency." We confidently expect to see the penny system for the colonies adopted at no very distant date.

IT is with great gratification that we note that the Richmond Vestry has, after a good deal of "doubtful disputation," been empowered to borrow 15,000*l.* to complete the purchase of the Duke of Buccleuch's estate, and thus preserve that peculiarly rich and beautiful view from Richmond Hill unspoiled. The question was something much more than the ordinary one of keeping an open space or preserving a park; the view from Richmond Hill, probably owing to a peculiar combination of extent with richness of effect, is so specially fascinating, and the praises of it are so interwoven with English literature, that the defacement of the site by being cut up into building land would have been, as has been truly said, a kind of national loss; and we rejoice that the spirit of speculative utilitarianism has for

once met with a check, and that it has been thought worth while to pay something to secure some of the beauty still left in this crowded country.

WE are informed that the "Temple Bar Reconstruction Committee" is complete, and will soon hold its first meeting. The object of the Committee is to collect facts and bring them before the Corporation and influence them to do something definite with the arch without further delay, and also, as we understand, to make some suggestions as to sites on one of which the arch may suitably and effectively be erected. We hope that wherever it may be put up, it will be in some position in which its ostensible use as a gateway or entrance to some domain may be kept up. A foolish suggestion was made to us, in a letter which we did not think it worth while to print, that the arch should be rebuilt in the wide part of High Holborn, on the City boundary, in which case it would have stood merely as a meaningless monument, put to no use, and with the traffic running on each side of, instead of through, it. Erection on any such site as that would make the structure, which is really a gateway, an absurdity. It must be placed where it will have its proper architectural meaning. While wishing the committee success in their endeavour to get something done, we cannot help observing that it is exceedingly discreditable to the Corporation that such a movement should be necessary in order to induce them to do what duty and inclination alike ought to have prompted them to attend to long ago.

THE *Times'* correspondent in Burmah, in a recent communication, made the very pointed remark that with the increased civil staff recently sent out to Upper Burmah, and the large reinforcements which had arrived, the state of the country might soon be improved if the necessary public works were promptly undertaken. "It is a matter of great importance and urgency to commence the laying of the projected railway. It would provide employment for thousands now driven to lawless courses by want, and it would convince the Burmese that our occupation was a permanent one." Of late years, unfortunately, we have seemed always desirous to convince annexed States of the reverse, and that we only want to get away again as quickly as possible. Improving the means of communication is one of the very first and most obvious as well as one of the most beneficial methods of reclaiming a half civilised dependency, and it is to be hoped the work suggested by the *Times'* correspondent will be undertaken, if practicable (which only those on the spot can judge), without further delay.

THE Ecclesiastical Art Exhibition in connexion with the Church Congress to be held at Wakefield next week, will include nearly four hundred objects of ecclesiastical art, including silver, embroidery, crucifixes, rings, medals, &c.

WE have received four etchings* by Mr. C. Cattermole made from oil paintings of his own, representing "Hoghton Tower, Lancashire,—James I. on his Journey to London"; "The Battle of Preston Bridge, 1648"; "Whalley Abbey,—Abbot Pasten led to Execution, 1537"; and "A Preston Guild in the Seventeenth Century," the latter including a representation of an old building in the Market-place at Preston, which formerly stood on the site of the present Town-hall. The Whalley Abbey subject shows a restoration of the Abbey,—a restoration on paper with which theorists need not quarrel,—and the bridge in the Battle of Preston Bridge, of which portions only were left, is restored from data supplied by other bridges in the neighbourhood. The designs, as reproductions of old Lancashire scenes and events, are very spirited, and the etching free in execution, in the true etching style, entirely distinct from engraving.

* Published by Mr. Walmsley, Kensington-place, Blackburn.

THE letter from Mr. B. L. Cohen which we published in last week's issue gives prominence to the important fact that at the Jewish Orphan Asylum at Lower Norwood this gentleman is erecting a workshop and equipping it with benches for the instruction of the boys in the use of tools. In the article which we published on September 11th on Workshops in Public and Private Schools, we endeavoured to point out how desirable it is that workshops should exist in all such schools. In schools such as orphan asylums, which may be properly regarded as intermediate between our primary and our public and private schools for the upper classes, such workshops may be considered not only as being desirable, but as absolutely necessary. The service which will be rendered to the lower middle classes if Mr. Cohen can successfully establish workshops at Lower Norwood and at Watford, will be incalculable, and we would fain hope that this gentleman will not wait for the experiment to be put in practice at Norwood before urging on the Board of Management at Watford the necessity of establishing a workshop at the London Orphan Asylum. England is very backward in the matter of technical instruction, and the individual efforts of energetic and influential persons are of the highest value in urging on the needed movement.

AMERICAN papers state that the Egyptian obelisk in the Central Park, New York, is not so thoroughly protected by the treatment with hot paraffine which it received last autumn as many thought it would be. The process consisted in heating the stone, and applying a mixture of paraffine, creosote, and turpentine. The obelisk had previously been carefully gone over, and pieces supposed to be loose, on testing with the hammer, or where there were cracks, were removed. It now appears that the stone is again in some places flaking off, or showing slight signs of slow disintegration, although such action is only perceptible on careful examination. The disintegration is said to be the result of insufficient trimming off of the surface of the stone, to remove imperfections before the paraffine compound was applied. On the other hand, the result is attributed to the application of heat to the stone before putting on the paraffine. It has been decided to do nothing further in the matter for the present, until it is seen to what degree the preservative process will be actually effective for a longer period, although in the end it may be found necessary to enclose the stone by a light glass structure. It would be interesting to know how far Cleopatra's Needle, erected on the Thames Embankment in 1878, has been preserved by the protective coating applied to it in May, 1879. We are not aware that a report on the subject has been published.

ABOUT thirty months since it was reported that the ancients and commoners of Clement's Inn, London, had sold their real estate to one of their own body for 6,500*l.*, and had shared their real property, such as plate, wine, furniture, &c., amongst themselves. It was also said that the Bank of England would take over the Inn hall. But premises for a branch of the Bank, in connexion with the new Law Courts, are to be erected in Fleet-street, between Bell-yard and Chancery-lane, and over the site of Apollo-court and the Cock Tavern. The Inn hall is now occupied by the "Monotype" Printing Company, Limited. On March 12th, 1884, was sold for twenty guineas the Earl of Clare's gift to the Inn, the negro supporting a sun-dial, which had long stood amongst the flower-beds eastwards of the Garden House, and now reappears in the Inner Temple Gardens as what two of our daily papers call "A relic [*sic*] of Clement's Inn." Cunningham says the statue "was brought from Italy, and is said to be of bronze," and then quotes Ireland to the effect that it was painted black by some ingenious persons who had resolved to make it a blackamoor. But a blackamoor it has always been. It is made of lead, and bears several traces of repair in that metal. The figure rests upon its right knee

and left foot; both hands are uplifted,—but not, as is often averred, in supplication,—the right thumb being fixed in a slot in the rounded stone that carries the sun-dial. The dial-gnomon, which is not yet set in position, is dated 1731. To our mind, the appearance of the figure would be improved were it raised a foot higher above the pathway where it has just been placed.

It appears that some of the competitors in the Carlisle Markets competition have been stipulating for the appointment of a professional assessor. The Corporation have declined to bind themselves to employ one, but from the wording of the City Surveyor's reply it is evident that the stipulation has been made by a considerable proportion of the competitors. Why do they not all combine to demand it? The effect produced by even the partial combination of architects who have pledged themselves not to compete unless professional assistance be employed in judging of the drawings, shows what a reform might be secured in regard to the conduct of competitions if architects would only be unanimous.

WE have been shown a model of a method of hanging window-sashes, by Mr. Thomas Robson, builder, of Scarborough, by which the upper and lower sashes are hung as balance-weights to each other, the upper sash dropping as the lower one is raised, all boxing and weights being dispensed with. The idea is, of course, by no means new; indeed, a patent was taken out for something very similar a good many years ago, which never seems to have come much into operation, perhaps through not being sufficiently simple in construction and action. Mr. Robson's is simplicity itself, the sashes being merely hung to each other by chains passing over pulleys turning in a metal box let into the top casing, and though some persons may object to a window which cannot be opened at the bottom without opening at the top also, in nine cases out of ten it is so desirable that it should be open at the top as well, and so much trouble is saved by being able to open both sashes by one operation and without stretching up to the top one, that the method ought to find considerable success.

WE were recently invited to put before the public a so-called sewer-gas destructor, invented by Mr. Hartley Fewson, a description of which, with an engraving, was sent to us. Mr. Fewson seems to be dissatisfied with our notice, and has addressed himself to other journals, urging that it would surely have been "kinder to humanity" to have courted inquiry and the opinions of able men, by publishing a letter he addressed to us, than to have gone out of our way to write the thing down without due inquiry or knowledge of it. We had no such intention as "to write the thing down," and as to "due inquiry" into the invention, we were supplied with the facts upon which to judge of it, and when Mr. Fewson has had a little experience with his invention, practically applied, he may come even to thank us for our note on the subject. We limit what we say of this invention to its ostensible purpose of destroying the gas,—or foul air, as we prefer to call it,—of sewers. We can conceive that the apparatus may be highly appropriate for the destruction of some gases in some situations, but, as we pointed out, it is not applicable to sewers; and having stated the reasons why we came to that conclusion, we thought we had done justice both to Mr. Fewson and our readers. We may add that Mr. Fewson's own letter to us, which we declined to give space to, was so vague and rhapsodical in style, and in the claims which he made for his invention, that its publication could certainly not have benefited him in the estimation of practical people.

Worthing.—The Worthing Local Board have received permission from the Local Government Board to borrow £2,000, for the erection of new public offices, to designs prepared by Mr. Walter Horne, Town Surveyor.

LETTER FROM PARIS.

THE 1889 Exhibition continues to be the great question of the moment. With its mobility and unreasoning enthusiasm, the Parisian public imagines that the first stroke of the pickaxe on the Champ de Mars will dispel, like an enchantment, the industrial crisis which presses so heavily on industry and commerce. It follows impatiently the preparatory phases of the great operation entrusted to M. Alphand, who, on his part, shows no lack of energy. But he has to combat with all kinds of administrative delays, and progress is slow.

Nevertheless, M. Bonvard's plans for the French and foreign pavilions are prepared, and the contracts for the ironwork will shortly be assigned. Those for the masonry of the Palais des Beaux-Arts and the great machinery gallery will follow in due course. Trial borings are being made already in the ground of the Champ de Mars, which was turned up in 1878 and not very well filled again, and is consequently rather difficult to deal with. The terrace work may be commenced about the end of October, and that will occupy six or seven thousand hands. On the other hand, the financial part of the question seems in a way to be settled. The proposals of the three Directors-General, originally stated at forty-nine million francs, are now reduced to the still respectable total of thirty-eight millions, without prejudice to the three millions held in reserve for unforeseen claims. There will remain, therefore, out of the forty millions allotted for the operation, an overplus of two millions, which it is proposed to employ on a series of exhibitions on the banks of the Seine; ships of all kinds and periods, lacustrine and marsh dwellings, rustic architecture of ever so many times and countries. In short, the river, which has contributed but little to the *déclat* of previous exhibitions, will be on this occasion one of the principal centres of attraction.

The only blot on this fair picture is always that unhappy tower of 300 metres. The Minister of War will not have it at any price in the centre of the Champ de Mars, which is the only really available place for manœuvring troops; and people are beginning to perceive that this enormous mass, which will be only 30 metres from the French and foreign portions and the art galleries, will entirely crush the architectural designs of MM. Formigé and Bonvard. But before modifying the scheme, to which the minister concerned appears to cling as if it were a portfolio, the experiment is to be tried of having a captive balloon pinioned at a height of 300 metres, whence will descend to the level of the Champ de Mars four ropes marking the angles of the proposed tower, with flags attached to mark off the stories, and thus it is proposed to form some definite realisation beforehand of the scale and effect of the tower.

The delay in the completion of the Hôtel des Postes and of the construction of the new Bourse de Commerce is due, like so many other delays, to administrative inaction. The delay in the latter work is a matter about which the commercial world is much exercised. But, if the Government discontents the public by delays of this kind, private enterprise on the contrary is very active, and carries on its work with praiseworthy celerity. The Gare St. Lazare, of which we have several times spoken, is progressing very rapidly, the work of the architect keeping pace with that of the engineers. In eight or ten months the administration buildings will probably be opened, and also the immense "Halle des Messageries," designed by M. Clero, to whom we owe already the fine bridge stretching away from the Place de l'Europe. This goods station, at the angle of the Rue Berne and Rue St. Petersburg, is a very remarkable work of engineering. The wagons are raised to the height of the two railway lines (for there are, so to speak, two stories) by great hydraulic lifts. The framework supporting the platform is entirely of iron, and rests upon piers of stone, resembling those of the Pont de l'Europe. The total cost of this construction, including the hydraulic lifts, will be 3,600,000 francs. We shall have occasion to speak later on of the buildings that are being carried on by the architect, M. Lisch. The main pavilion of the Rue de Rome is already completed, and the building which will form its pendant will shortly be commenced at the angle of the Rue d'Amsterdam.

The same activity is now apparent in the

works at the Church of the Sacré Cœur, built by subscriptions, which have now reached the amount of nearly eighteen million francs. The centerings in the apsidal chapels are just about to be struck, and very shortly all this portion of the church will be delivered over to the faithful. As a temporary screen will be provided to shut off this completed portion from the rest, there will already be a "practicable" church able to seat 2,000 persons.

In order to consolidate the treacherous ground of the Butte Montmartre, and prevent any further subsidence, the department of "Direction des Travaux" has undertaken the construction of a retaining wall, not far from the church, resting on twenty-four concrete piers of 2.50 metres diameter, connected by vaults of masonry. In two or three months this will be sufficiently consolidated for M. Alphand to commence the transformation of the site into a fine park of 20,000 square metres in extent, with lawns, shrubberies, and fountains, overlooking Paris, and offering a promenade as picturesque as that of the Buttes Chaumont, and much more central. Work in Paris seems to be reviving a little, and this regained activity will be much promoted by the new loan voted by the municipality for works of architecture and road-making. Among the projects in the latter department is the prolongation, to be almost immediately undertaken, of the Rue Monge, between the Place Maubert and the Quai Montebello. In this street is to be erected the statue to Louis Blanc, the model for which was in this year's *Salon*. There is also talk of important works on the Canal St. Martin, especially the construction, between the Place de la Bastille and the Seine, of a bridge which will unite the fourth and twelfth arrondissements, to get rid of the circuitous route which has now to be taken to get from the Boulevard Bourdon to the Boulevard Contre-scarpe. The Municipal Administration intends also to open, on the 1st of October, an important architectural competition for the construction, in the Rue des Martyrs, of a new higher grade school for girls. Lastly, the École de Médecine, rebuilt from the designs of M. Gissain, is progressing fast, and before the end of the year the celebrated Museum of Hygiene, known under the name of the Musée Dupuytren, will be installed adjoining the laboratories in the new buildings, and all the work of the École Pratique, with the exception of the department of free instruction, will be in working order in the course of the ensuing year. Of the École de Médecine proper there will then only remain to be accomplished the construction of the portion situated at the angle of the Rue Hante-feuille and the Rue de l'École de Médecine, which the Administration hopes to finish in 1888.

We have several times expressed our regret at the disappearance of some of the interesting remnants of Old Paris before the pitiless march of street improvement. We can for once thank the Administration for rescuing from imminent destruction an old building, the curious church of St. Julien le Pauvre, situated behind the old Hôtel Dieu. In this long-disused building a permanent Museum of Hygiene is to be established, at an expenditure of 50,000 francs. This project will preserve a monument affording a very good example of the style of the twelfth century, the demolition of which was threatened, to the despair of artists and archaeologists.

The approaching transformation of the Church of St. Jean de Beauvais into a chapel of the Greek Church, for the use of the numerous Roumanians domiciled in the Quartier Latin, will preserve from otherwise probable ruin another very interesting monument on the left bank of the river. This church, the first stone of which was laid by Charles V., in 1370, has remained unoccupied since the expulsion of the Dominicans, who took possession of it in 1866, and at that time restored it with considerable success.

The Musée de Cluny being now found too small for its purpose, the court formerly called the "Cour des Thermes" has received a glass roof and is transformed into a new and large gallery, which is at present in process of being decorated and otherwise prepared for use. The Luxembourg has re-opened its doors, having been enriched with a certain number of new works, among which we are glad to find the "Bataillon Carré" of M. Protais, the "Immortalité" of M. Longepied (of which an illustration was published in the *Builder*, June 19 of this year), and the "Pro Patria" of M. Peynot.

On the other hand, the impressionist picture by M. Rafaili, "Chez le Fondeur," purchased from the Salon the year it appeared there, looks oddly out of place in this mostly choice gallery.

Versailles being a kind of suburb of Paris, we may mention here the new synagogue which has been built there through the munificence of Madame Furtado-Heine, who has had the work executed at her own sole cost. It is designed by M. Aldrophe, the architect of the synagogue in the Rue de la Victoire in Paris, of which we gave an interior view some little time since, and is in the same kind of Byzantine Romanesque style. The cost of the building has been 400,000 francs.

The annual "Envois de Rome" have arrived at the Ecole des Beaux-Arts, and will be exhibited during the month of October. The architectural section of the works comprises a capital of the Temple of Mars Ultor by M. Despony, a restoration of the Palatine by M. Deglane, the vestibule of the Villa Madama by M. Esquie, and a sarcophagus at Fano, and some drawings of ornament, by M. Redon.

THE AMSTERDAM GATE, HAARLEM.

This picturesque old gateway, under which the traveller passes on his way to or from Amsterdam by road, is all that remains of the old city walls and fortifications that withstood the long siege by the Spaniards in 1572-73.

In front of the main and most interesting side is the canal, from the edge of which rise the two turrets flanking the entrance gateway. Up to the level of the bridge over the canal these turrets are square in plan, and here rise from the octagon to the circle, the lower part pierced with loop-holes for musketry, with two windows at a higher level. Above a stone string are small pilasters to take the segment arches forming the octagon, at which level the roof springs. The roofs of all the turrets are steep, and covered with diagonal slating on the sides next the Amsterdam road, and plain slating towards Haarlem. Entering, we see the massive old doors and stairs to the upper story.

The main portion is roofed by a steep hipped roof, with octagonal turrets at the angles of the wall towards Amsterdam, and small pilasters sailed out on the one towards Haarlem, the side parts covered by lean-to roofs with octagonal turrets on the angles, with stone corbels and terminals. The gateway is built almost entirely of brick, with stone bands and stone in arches. The brick used being much smaller than the English, eight courses rise about 14 in. Our illustrations are reproduced from sketches by Mr. F. T. W. Goldsmith.

SCULPTURED STONES FROM ST. NICHOLAS' CHURCH, IPSWICH.

We illustrated not long since the design of the tower of the Church of St. Nicholas, Ipswich, which has been in part rebuilt and strengthened, under the direction of Mr. E. F. Bishopp.

We now present our readers with sketches made by Mr. Bishopp of the remarkable sculptured stones which exist in the above church. They were found many years since, having been used as old building material, and they evidently formed portions of some much older structure than the existing church. Short notices and sketches of the sculptures have appeared from time to time, more or less exact, but they have never been given in such ample detail as we are now enabled to do through Mr. Bishopp's careful sketches.

The sculptures belong to a class of early work which, notwithstanding all that has been written on Saxon art in England, remains all but unrecorded. They are sufficient in their defaced and mutilated condition to show that the hands which designed the elaborate Saxon manuscripts were able to reproduce, and did reproduce, much of the same work full size for the stone carver. They show, too, that the two classes of design did exist, and that what we may find drawn on parchment, we may expect to find sculptured in stone. The sculptures are all of Saxon date, but in our present slender knowledge of such works, no actual century can be stated with probable certainty.

Figure 1 was undoubtedly the tympanum of a semicircular-headed doorway, having the figure of a boar, well outlined, but not deeply



The Amsterdam Gate, Haarlem.



Fig. 1.



Fig. 2.



Fig. 3.

sculptured. Around it on an outer band is a defaced inscription in Saxon capitals, sunk in the stone, which may be read "In dedicatione ecclesie omnium sanctorum." The sketches indicate but feeble traces of the inscription. The Saxon date is proved by the Saxon lettering.

Another Saxon inscription recording a dedication to All Saints, which, like this, appears to have been brought from elsewhere, exists at St. Martin's, Canterbury.

Figure 2 consist of three separate fragments, but of very similar design. The central slab shows an elaborately-draped personage who stands beside a Latin cross which is on the dexter side of the figure. He holds a scarf in his hands ready for passage over the neck. The cross is inscribed with, doubtless, the name of the figure, but now not sufficiently perfect to be deciphered.

The other two figures are, perhaps, ecclesiastics. One is certainly so, as is attested by the costume and the cross staff held diagonally by the right hand. The cross beside the figure has been almost entirely cut away. The cross of the third compartment of our sketch is all but perfect, but the figure has become very obscure. It is inscribed OSTOLVS.

Figure 3 shows the combat between St. Michael and the Dragon. The Saint holds sword and pear-shaped shield; the adversary has its tail entwined in a manner familiar to all students of these early works.

Between the figures an inscription in Saxon capitals can easily be read, which may be given in English:—"Here St. Michael fights against the Dragon." The lettering to the left of St. Michael is illegible.

These sculptures, if they stood alone (which they do not, for they belong to a class numerous enough if all the examples were brought together), are sufficient to show that carved figure subjects were employed in the decoration of Saxon churches; also that their sculptors must have been familiar with the use of the chisel, although the existence of so simple a tool at this early date has been denied in recent years.

FURTHER NOTES OF THE SANITARY EXHIBITION AT YORK.

We resume our notes of this Exhibition* by reverting for a moment to the new self-adjusting joint for drain-pipes to which we made reference last week. The section given (fig. 1) shows the varying contour of the surfaces in contact,—one surface being flat and the other rounded or curved. These surfaces, as we mentioned last week, are of Stanford's patent material, and are close fitting. The surfaces of the patent joint are, it will be seen, keyed on to or into the surfaces of the pipes, which in all other respects are of the ordinary spigot and flange make. In putting together pipes provided with this new joint, the spigot end of the pipe is just smeared with a little Russian tallow, and the pipe is then fitted into the socket of the pipe already laid, this work being within the capacity of any careful though not necessarily skilled workman. Although, for the preservation of an adequate and proper fall, drain-pipes should, of course, always be laid on as permanent and as unyielding a bottom as possible, settlements in the ground will at times take place from various causes, and it will be a great thing accomplished if by this flexible system of jointing for drain-pipes Messrs. Doulton have succeeded in ensuring that, within certain limits not likely to be generally exceeded, a line of drain-pipes may sag or bend without breaking, and without sagging or leaking at the joints, and consequently without causing pollution to the ground through which it passes. Messrs. Thomas Wragg & Sons, of Burton-on-Trent, exhibit, with other sanitary stoneware, Mawbey's patent sanitary pipes, in which the joints are made without the need of resorting to what is truly described as the difficult and risky system of caulking, as with ordinary pipes,—a process which, to be efficiently carried out, requires more perseverance and care than are always displayed by the pipe-layers. The joint is a very good and simple one, and the pipes are stated to cost very little more than the ordinary socket-pipes. Another drain-pipe joint well worth the attention of visitors is Hassell's patent safety pipe-joint, which is exhibited by the same manufacturers. It

is a very good and perfect joint, and was fully described in our account of the Sanitary Exhibition at Leicester last year.* Another joint to be mentioned as worth examination is one shown by Messrs R. W. Hale & Co., of London. It consists in making the pipes with interchangeable ends, one end having the upper part and the other end the lower part of the socket removed. An annular space is left for the cement, and projecting lugs,—projecting almost so much as to seem insecure,—on the pipes are secured together by lock-pins. Another form of this joint is shown as applied to gas, water, and steam pipes, where it will undoubtedly be found of service. Messrs. Bailey & Co., of Fulham, exhibit Woodman's patent screw plugs for drain-pipes, which are made both in stoneware and in cast-iron, with wrought-iron ring. They will be found useful in many situations.

In Section 10 of Class II. the Wortley Fire-Clay Company exhibit Simpson's patent street gully, the special advantages of which are that with the use of a common brick it can be trapped or untrapped at will, and that it presents no obstacles internally to a most perfect and thorough cleansing. Mr. D. T. Bostel, of Brighton, exhibits his registered intercepting trap and manhole. Messrs. Bailey & Co., of Fulham, have some good exhibits in this section, including Belham's trap for disconnecting pits, Mr. Rogers Field's channel curves for disconnecting pits, and Bailey's "Desideratum" gully traps. Messrs. Burn & Baillie, of Edinburgh and London, are exhibitors in this section. Messrs. W. Phillips & Son, of Baker-street, London, show the "Cerus" patent traps, gullies, and syphons, which are all well worth attention by visitors to the Exhibition. The "Scrabamus" gullies and syphons, which have removable dips, are also well worth notice. Messrs. Thomas Wragg & Sons, of Swadlow, Burton-on-Trent, exhibit Gordon's patent disconnecting syphon for house drainage,—the invention of the present Borough Engineer of Leicester. It is admirably contrived and adapted to its purpose, and has been largely used, we believe, in Leicester and the neighbourhood. In Section 11 (Dry Closets) there are shown Morrell's ash-sifting closets and Moule's earth-closets, and Nicholl's patent antiseptic dry-closets and commodes, in which soot is used as the deodorant. By very simple improvements lately introduced, this closet can be adopted wherever "the pail system" is in use, and the soot is kept entirely away from all possibility of contact with clothing,—a defect from which the first form of this closet was not free. This closet seems likely to come into extended use. The exhibitors also apply their antiseptic system to dust-bins, house and hospital pails, &c. In Section 13 (Miscellaneous Goods) Messrs. Geo. Potter & Son, of Hampstead, exhibit samples of their patent "siphosels" pipe-fastening for rain-water down-pipes, &c. This invention, which was described and illustrated in our columns not long ago (see p. 182, ante), permits of the ready removal of a split or worn-out length of pipe without knocking the wall about, and combines other advantages, to which we have already referred. Mr. D. T. Bostel shows his excellent safety ferrule for connecting any kind of bib, ball, or stop cock to service-pipes. It is a very simple and useful invention, and enables a plumber to repair a leaky tap in any part of the house without turning off the water from the whole house. The "Cerus" and the "Brontes" patent air-tight manhole covers are exhibited by Messrs. W. Phillips & Son, of London. The "Cerus" cover consists of a double door, closed down upon double-filled grooves by a rising lever attached to each angle, which closes the under door down to an airtight condition. The "Brontes" cover is constructed in such a manner as to permit the door, when opened, to be easily unhooked and taken right off the frame. It embodies many other improvements, and is a capital cover, and well worth attention by those who have not seen it. Messrs. Joseph Cliff & Sons, of Wortley, near Leeds, exhibit an excellent variety of good sanitary ware, but we may direct special attention to the "Winner" intercepting trap and channel bends for inspection and disconnecting chambers. These bends have been specially designed and constructed of such a section as to obviate a defect which has been experienced in most bends hitherto in use for this purpose. The outer side of the bend is made higher than the inner side, and

curved over, so that, in fact, the section of the bend describes three-fourths of a circle. By this means, the sewage, as it rises in passing round the bend, is prevented from flowing over, and its flow in the direction of the out-go much facilitated. The use of these channels will be a distinct gain in the direction of efficiency.

Class III. "Heating, Lighting, and Ventilation," contains some exhibits worth special mention. Section 1 (heating apparatus) includes gas-stoves and winter-fires, by H. & C. Davis & Co., of London; Wright & Co., of Birmingham; and Charles Wilson & Sons, of Leeds. The *Æolus* Water Spray General Ventilating Company, London, show a large ventilating gas-stove to be used in connexion with their well-known appliances. For cheerfulness and efficiency in halls and other situations, nothing can be better than Doulton's portable radiating tile-stoves, or their glazed ware fireplaces and mantelpieces. Section 2 includes cooking apparatus, mainly for use with gas, the chief exhibitors in this department being Messrs. Davis and the other two firms named with them a few lines back. Section 4 is devoted to lighting, including electric lighting. In this section, the *Æolus* Water Spray Company exhibit a system of domestic electric lighting by primary batteries; and the Woodhouse & Rawson Electric Supply Company, of Queen Victoria-street (who are the contractors for the lighting of the Exhibition, which is very efficiently done), have a display of electrical apparatus and appliances of all kinds connected with electric lighting. Section 6 is appropriated to ventilators. Messrs. Bailey & Co., of Fulham, exhibit Wery's atmospheric cowl, which was illustrated and fully described in our last volume, on p. 637. The *Æolus* Water Spray Ventilating Company have, as usual, a good display of their specialities. Messrs. C. Kite & Co., of London, exhibit their patent ventilators, including a new under-roof ventilator, which is so arranged as not to project beyond the roof. The inlet-ventilators and chimney-breast exhaust ventilators have been referred to by us on many previous occasions. Messrs. R. W. Hale & Co., of London, are also exhibitors of ventilators which are equally well known; but they also show in model a new system of exhaust ventilation for rooms, for carrying off human exhalations and the products of gas combustion. It is a "trunk" system, all the branch-pipes from the several rooms going into one upcast shaft, which is, however, increased in diameter as it ascends, and shields or baffle-plates are provided at the points where branch-pipes effect junctions with the main trunk, with a view to the prevention of back-draughts, or the discharge of the air of one room into another apartment. We believe that this system of exhaustion of the foul air of apartments has been reserved for trial and experiment by the judges. We must make special mention of the "Diaphragm" patent ventilator, which is the invention of a well-known architect, Mr. John Honeyman, of Glasgow. This ventilator was designed by Mr. Honeyman, he tells us, to effect the ventilation of churches and other buildings without risk of down-draught, and without disfiguring the building by any erection upon the roof. He claims for it that it answers this purpose admirably, and that it is equally well adapted for use in all ordinary circumstances for the ventilation of buildings of every kind, besides being applicable in positions where no other exhaust ventilator could be used. It is certainly simple in construction, compact, unobtrusive, cheap, and durable. It is claimed to be proof against the admission of either rain, snow, or air, and allows a very large area for egress of air compared with the size of the apparatus. It may be made of any required size; but as a rule need not be large, as two or more may, it is claimed, be used in the same apartment without any chance of one of them acting as an inlet. The air trunk is formed with a sill sloping outwards and covered with lead or zinc, so that rain blown into the opening runs readily out again. In the accompanying diagrams, Fig. 2 shows the form of ventilator best adapted for an open timber roof, fig. 3 the form suitable for coiled apartments. The principle of action is the same in both. Air pressing in by the air trunk A, shuts the valves B on the windward side of the diaphragm C, and passing through the orifice D, with accelerated speed, creates an outward

* See p. 475, ante.

* See *Builder*, vol. xlix., p. 417 (Sept. 26, 1886).

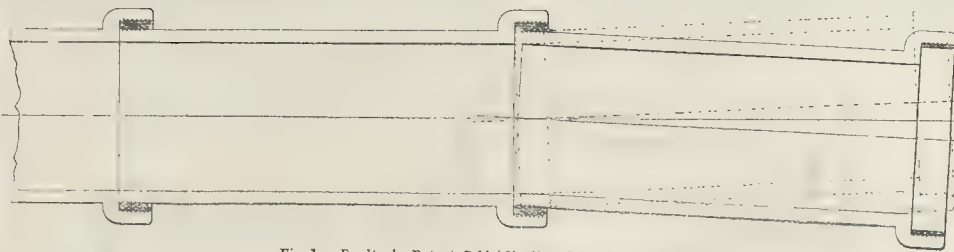


Fig. 1.—Doulton's Patent Self-Adjusting Joint for Drain-Pipes.

current in the air trunk E, which draws the air out of the apartment to be ventilated through the valves F, on the lee side of the diaphragm. Fig. 4 shows the mode of applying the ventilator both where there is and where there is not another apartment above the one to be ventilated. It is claimed that when there is no wind, the valves on both sides of the diaphragm open freely for the exit of heated air. The inventor asserts that when there is wind a strong upward current is induced; when there is no wind,—and it is

unsightly affair. The main point of excellence which Mr. Honeyman claims for this ventilator is, therefore, that it has facility for giving a large amount of ventilation without

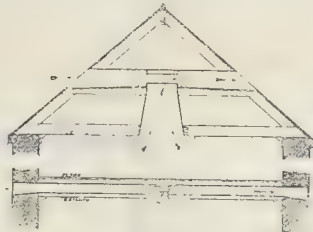


Fig. 4.

disfiguring a building, and at a small cost. As mentioned in the list last week, this ventilator is one of those exhibits which have been selected by the judges for trial and experiment.

Class IV. is devoted to "Personal Hygiene: Foods and Disinfectants." It includes sections for clothing, bedding and furniture, sick-room appliances, domestic appliances, school furniture and fittings, domestic filters, soaps and other detergents, antiseptics, disinfectants, and disinfecting apparatus. Fishburn's patent tubular refrigerator, shown by Messrs. King & Co., Limited, of Hull, embodies an improvement of great value in refrigerators for storing food. The ice is placed in tubes quite distinct from the contents of the refrigerator, and thus the temperature is kept low, while the sloppy condition of the floor which results when the ice is introduced bodily into the refrigerator is entirely obviated. Architects who have the planning of hotels, restaurants, mansions, and public institutions will do well to make a note of the merits of this new cold safe or larder. The North of England School Furnishing Company, of Darlington, show some very good school desks and seats, specially devised and constructed to meet the anatomical necessities of healthy posture in work or study. Mr. Washington Lyon, of Old Kent-road, London, exhibits a model of his admirable patent steam disinfecter for the disinfection of wearing apparel, bedding, furniture, &c. A disinfecting apparatus of another kind is shown by Mr. Germain. This is a small portable apparatus intended for use in sick chambers and households, with a view to the prevention of the spread of contagion. It is also available for use for fumigation and inhalation, and has been favourably spoken of by Dr. Septimus Gibbon, the Medical Officer of Health for the Holborn District Board of Works.

Class V. is appropriated to miscellaneous exhibits, none of which call for special remark. The Exhibition will remain open until and including the 16th of October.

University College Lectures.—Professor Roger Smith is about to recommence his course of lectures on the History of Architecture, Construction, and Modern Practice at University College, London, and will give the usual free, public introductory lecture on Thursday evening, 7th October, at 7-30 o'clock, at the College, his subject being "Learning to Design Buildings."

Colonial and Indian Exhibition.—It has been decided that this Exhibition shall close on the evening of Wednesday, November 10th.

FIRE-ENGINES AT THE COLONIAL EXHIBITION.

The opportunity was taken by Messrs. Shand & Mason, on Wednesday, to make a trial display of two of the fire-engines which they have supplied to the Indian and Colonial Exhibition towards the protection of the valuable goods which are stored therein. The trials began at nine o'clock, so that their realisation might be effected before the entry of visitors at ten. They were conducted under the personal superintendence of Mr. Mason, and, notwithstanding the early hour, there were a number of persons present interested in the matter, and many Colonists, amongst whom were Sir Saul Samuel, of New South Wales; Sir G. H. Chambers, of Barbadoes; Col. Ross, of Canada; Lieut.-Col. Palmer; Mr. Scott, of South Australia; Mr. Thomson, of Western Australia; Mr. Davidson, of Ceylon; and Mr. Fishbourne, of Hong Kong.

The first engine tried was one of the improved Fire Brigade engines, of the type used by the London Fire Brigade, and of which five have been recently added to their plant. It has been made for the Fire Insurance Brigade of Melbourne, and is the third supplied to that body within the past two years. Steam was raised to 100 lb. pressure in ten minutes from lighting of fires, and a strong jet was then commenced to be thrown, which reached to double the height of the Albert Statue at the Fountains Pond, whence the engine drew its water supply. Two jets were then substituted for the one jet, and subsequently four jets were also thrown with efficacy, the engine working to about 28-h.p. with 110 lb. of steam.

The second engine tried was three times as powerful as the first above noticed, and worked with remarkable power and force. It was one of the patent "Equilibrium" type, many of which have been supplied to the manufacturing towns of the North of England and Scotland. Steam was even more rapidly got up in this case, 100 lb. pressure being reached in less than six minutes from the lighting of the fire. The jet was very fine, having a delivery of 900 gallons per minute from a $1\frac{1}{2}$ in. nozzle and rising to an elevation of probably 200 ft. Four $1\frac{1}{2}$ in. jets were afterwards substituted and were worked with admirable effect. Long known as the Shand & Mason engines have been to the world, they are at this date more efficient than ever, the long experience in actual working having been constantly taken note of to effect those minor improvements which so vastly contribute to the perfection of the whole and to the prevention of accidents and breakdowns during the rough and energetic work to which these machines in the ordinary nature of their duties are so frequently and so severely put.

OBITUARY.

Mr. Thomas Webster, R.A., died on the 23rd ult., at his residence, Cranbrook, Kent, in his eighty-seventh year. Mr. Webster, whose contributions to the annual exhibitions of the Academy ranged over half a century, was born in Pimlico on the 20th of March, 1800. His father, who was a member of the Household of George III., intended him in the first instance for the musical profession, and the boy was educated in St. George's Chapel with a view to his becoming a chorister. But young Webster soon displayed a preference for painting over music, and in 1820 entered the Royal Academy as a student. In 1823 he exhibited a portrait group, and in 1825 obtained the first medal in the school of painting. From this time for many

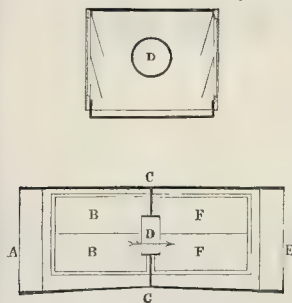


Fig. 2.—The Diaphragm Ventilator.

generally then that most outlet is wanted,—the heated air escapes freely from both sides of the ventilator. Thus a "diaphragm" ventilator, with only a 12-in. opening on each side of the roof, gives a free area for outlet of 288 superficial inches, fully equal to a tube 19 in. in diameter, which would require a very large turret. By making the openings in the walls of a building, instead of the roof, the apparatus will, it is claimed, work equally well; and in this way, by placing it between joists (as shown

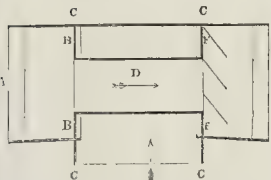
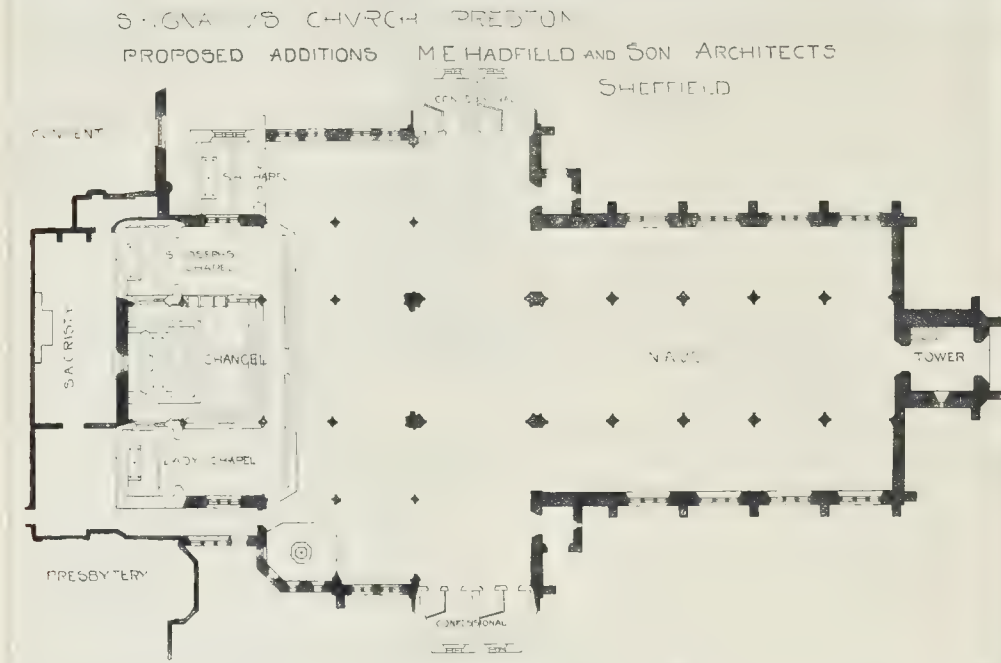


Fig. 3.

in one of the sections, fig. 4) it may be used for the ventilation of stables or other apartments having floors over them. Mr. Honeyman has submitted to us a photograph of the new Eastern School at Gourrock, which is ventilated by four of these diaphragm ventilators without the least projection above the roof. These four ventilators, we are informed, provide 6 in. of clear area of egress per child. As Mr. Honeyman says, a turret or cowl ventilator giving as much as this for a large number of children would be an enormous and



years Mr. Webster's paintings were annually to be seen on the walls of the Academy and other exhibitions. Mr. Webster resigned his membership of the Academy in 1876, when he was placed in the list of Honorary Retired Academicians.—*Times*.

Mr. James Kennedy, M.I.M.E. The *Times* records the death of Mr. James Kennedy, the eminent mechanical engineer, who rendered important services in connexion with the construction of high-pressure locomotive engines, marine engines, and iron shipbuilding. He was born near Edinburgh on the 13th of January, 1797, and was apprenticed at the age of fourteen to a wheelwright near Dalkeith. Some years later he entered the service of Mr. John Stephenson, at Monkland Steel Works, to make and erect water-wheels and pumping-engines, designing his own patterns. Subsequently he engaged in the construction of direct-acting engines for steam vessels, one of which was placed on a steamer of the St. George's Packet Company, Liverpool, to which port he travelled to superintend its erection. While at Liverpool he was introduced to George Stephenson, who afterwards employed him to manage his works at Newcastle-on-Tyne. In this position he prepared plans for the first three locomotives which opened the Stockton and Darlington Railway in 1825. In 1846 Mr. Kennedy was elected President of the Institution of Mechanical Engineers. He died at his residence in Cressington Park, near Liverpool.

Illustrations.

FAÇADE OF THE DUOMO, FLORENCE.

WE give this week a view of Santa Maria del Fiore with its western façade complete, according to the design of its late architect, Signor de Fabris, except that (as before noted in our columns), de Fabris was always in favour of a more Gothic form of termination to the skyline of the façade, with shrines and pinnacles at the angles and at the bases of the gable. As we have before said, the lower portion of the Duomo is distinctly Gothic, and so is the lower portion of De Fabris's façade; but it may be questioned whether, when viewed as a whole in combination with the dome, the horizontal cornice is not most in harmony with the total effect, especially as the campanile has never had its spire, and probably never will have it now, as people have got used to regard it as being finished as it is. If they read

Browning's poem, "Old Pictures in Florence," they will find their mistake expressed in a style sufficiently picturesque and vivid to awaken an enthusiasm for crowning the edifice. In that case, however, it would be possible to assimilate the façade to the completed campanile by adding spirelets to the former. At present, façade and campanile harmonise fairly well.

The front is not, we understand, to be formally "inaugurated" just yet, for reasons other than architectural.

ST. IGNATIUS' (R.C.) CHURCH, PRESTON.

We illustrate this week the interior of St. Ignatius (R.C.) Church, Preston, to which Messrs. M. E. Hadfield & Son have designed extensive additions for the Rev. V. J. Bond, S.J., and which are now on the point of completion. The drawing from which our illustration is taken was hung in the recent Royal Academy Exhibition. The improvements, as shown by the plans, consist of three new side chapels with altars and reredoses, chancel reredos, new altars, of Hopton Wood stone, with marble capping and encaustic tile pavements, and new confessionals in the transepts.

The nave of the church was designed by the late Ignatius Scoles, the architect of the College Chapel at Stonyhurst, in 1836, and extensive additions to the chancel were made in 1858 by the late Joseph Hansom. The new work is being executed in the beautiful West Derby red sandstone, with Bath stone for the plain wall surfaces, and filling in of groined ceilings to chapels, the upper portion of the new chancel reredos being in Beer stone. Mr. T. J. Sculphor, of Sheffield, is executing the carving with the exception of the upper part of the chancel reredos, which is the work of Mr. Wall, of Cheltenham, and Mr. George Webster, clerk of the works, has carried out the masonry. The encaustic tile pavements are from the manufactory of Messrs. Carter, Johnson, & Co., of Worcester, the whole being executed from the drawings and frequent supervision of the architect, Mr. Hadfield, of Sheffield.

PARISH CHURCH, ROSSETT, DENBIGHSHIRE.

This new church, about to be erected, is to take the place of a building of no architectural interest erected at the beginning of the present century. It will be built of Runcorn stone, faced internally with the material of the present structure, which is a local grey stone, and will

have slated roofs, the roof timbers and internal fittings being of pitch-pine. The plan is arranged to accommodate in nave and aisles 497 worshippers. The central tower, which is the dominant feature in the exterior view, gives interest also to the interior of the chancel.

Messrs. Douglas & Fordham, of Chester, are the architects, and Messrs. Davies Bros., of Wrexham, the contractors for the works.

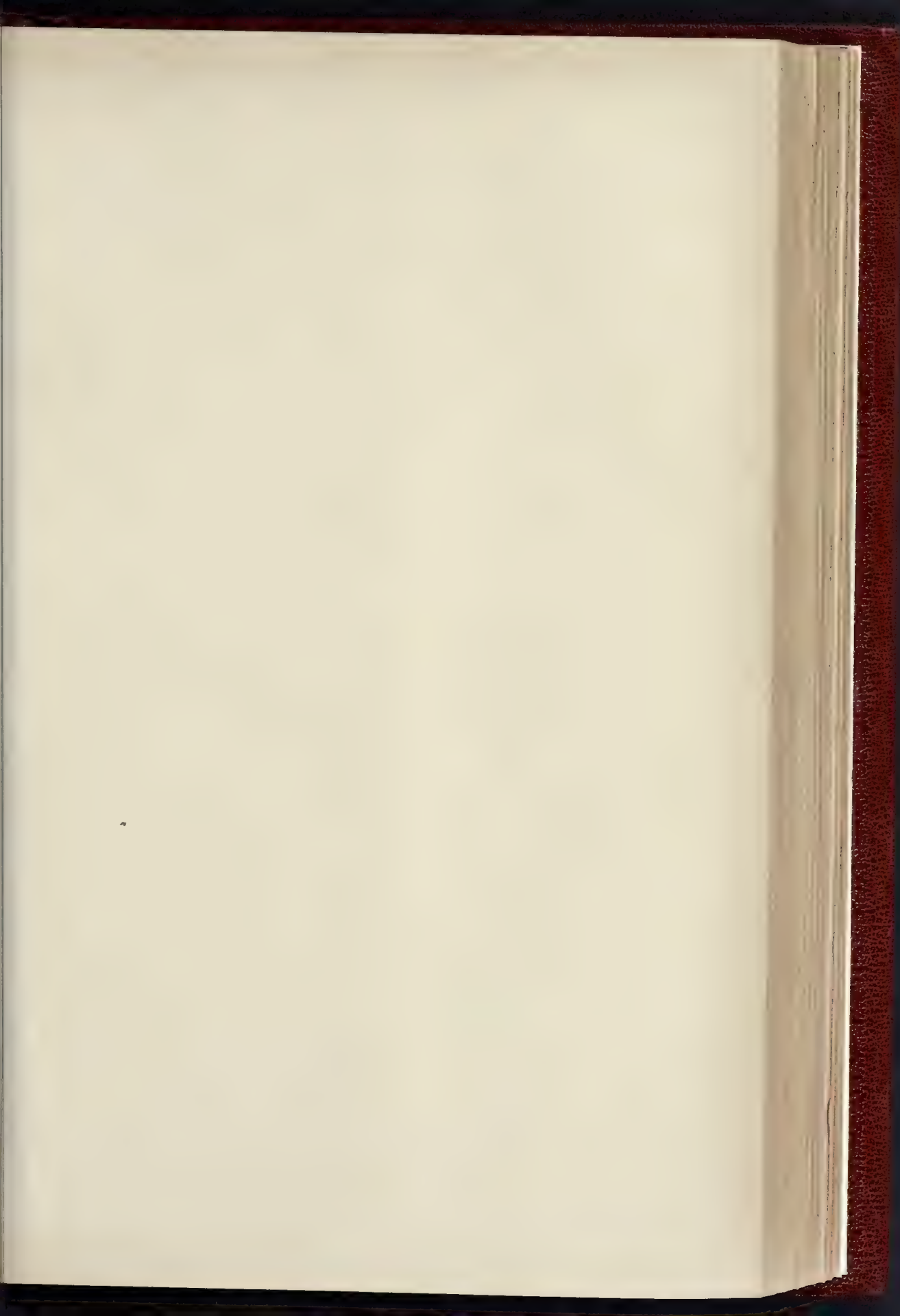
PEW, CHELVEY CHURCH, SOMERSETSHIRE.

CHELVEY Church is still unrestored. The pew here shown is situated at the west end of the south aisle, stretching across its entire width. There is much pewing of the same date in the church, and on the front of one facing the chancel, a shield bearing "1631 W.C." The font cover is of the same period. There are some earlier seats, probably as old as the fourteenth century, very plain and rude in execution, and resembling those in the church at Clapton-in-Gordano. The altar-table has carving similar to that on the "Tynte pew." In the south aisle are three canopied tombs, and the remains of a reredos, with its flanking niches. There is some stained glass, and the hour-glass stand still remains attached to the pulpit.

ST. JAMES'S CHURCH, AUDLEM, CHESHIRE.

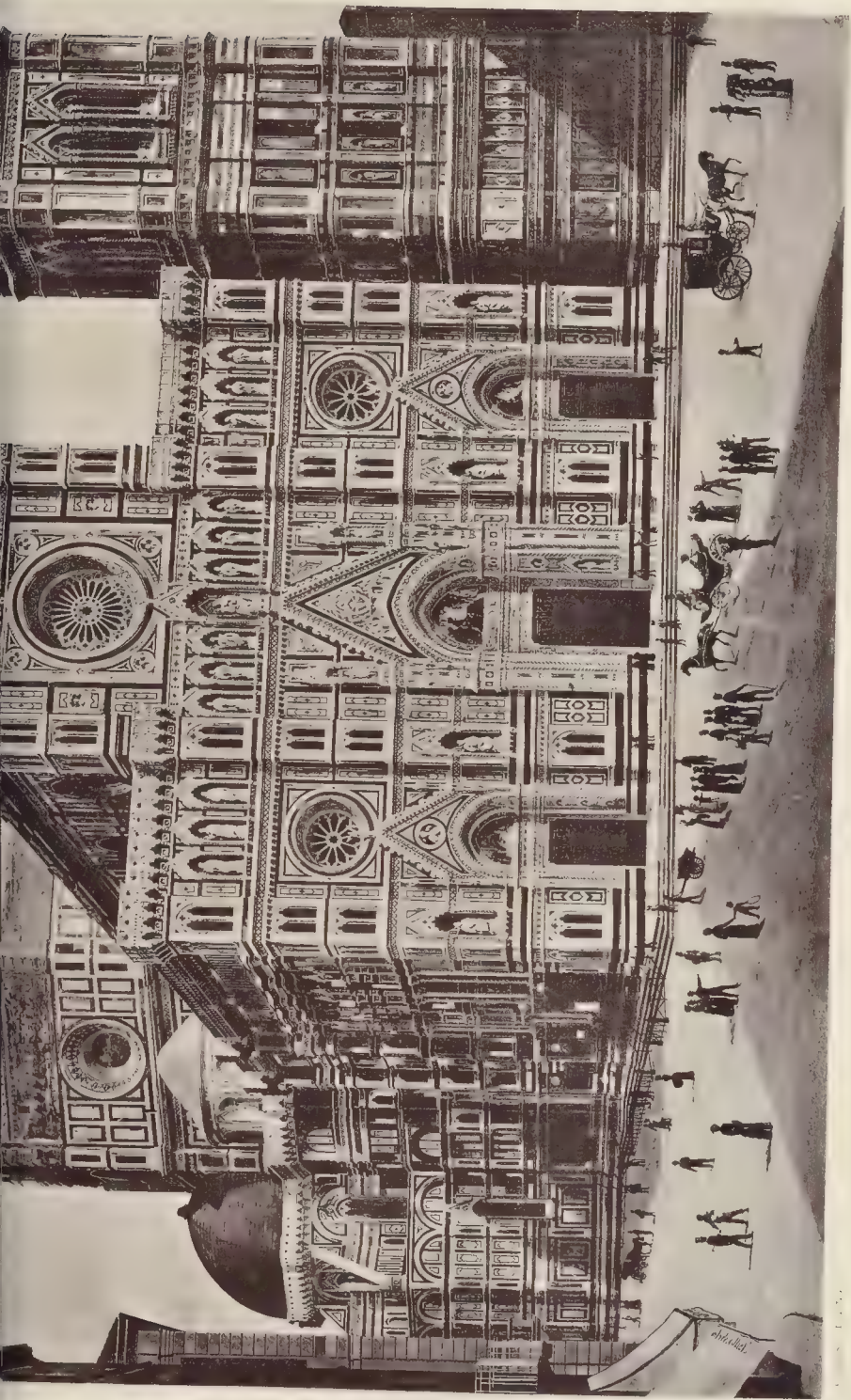
RECENTLY this church has been repaired and redeemed from a state of all-pervading whitewash, high close pews of various forms, shapes, and sizes, and galleries which blocked the floor and rendered the west end of the church like unto two low lofts. From the old pewing all the new seats have been made. The chancel roof is new, and of oak covered with lead; the screens are new, and in design follow the character of the old woodwork. As little as possible was done to the fabric, but the various changes which have taken place in the building through the Early English, Decorated, and Perpendicular periods are now distinctly visible, and form an interesting series of developments. The cost of the whole of the works amounted to about 2,300*l*.

Farnborough.—The chancel of the parish church of Farnborough, Hants, has recently been entirely rebuilt from the designs and under the superintendence of Mr. A. R. Barker, architect and Diocesan Surveyor, Buckingham-street, Strand, the contractor being Mr. Smith, of Farnborough.



"THE BUILDER," OCTOBER 2, 1886.

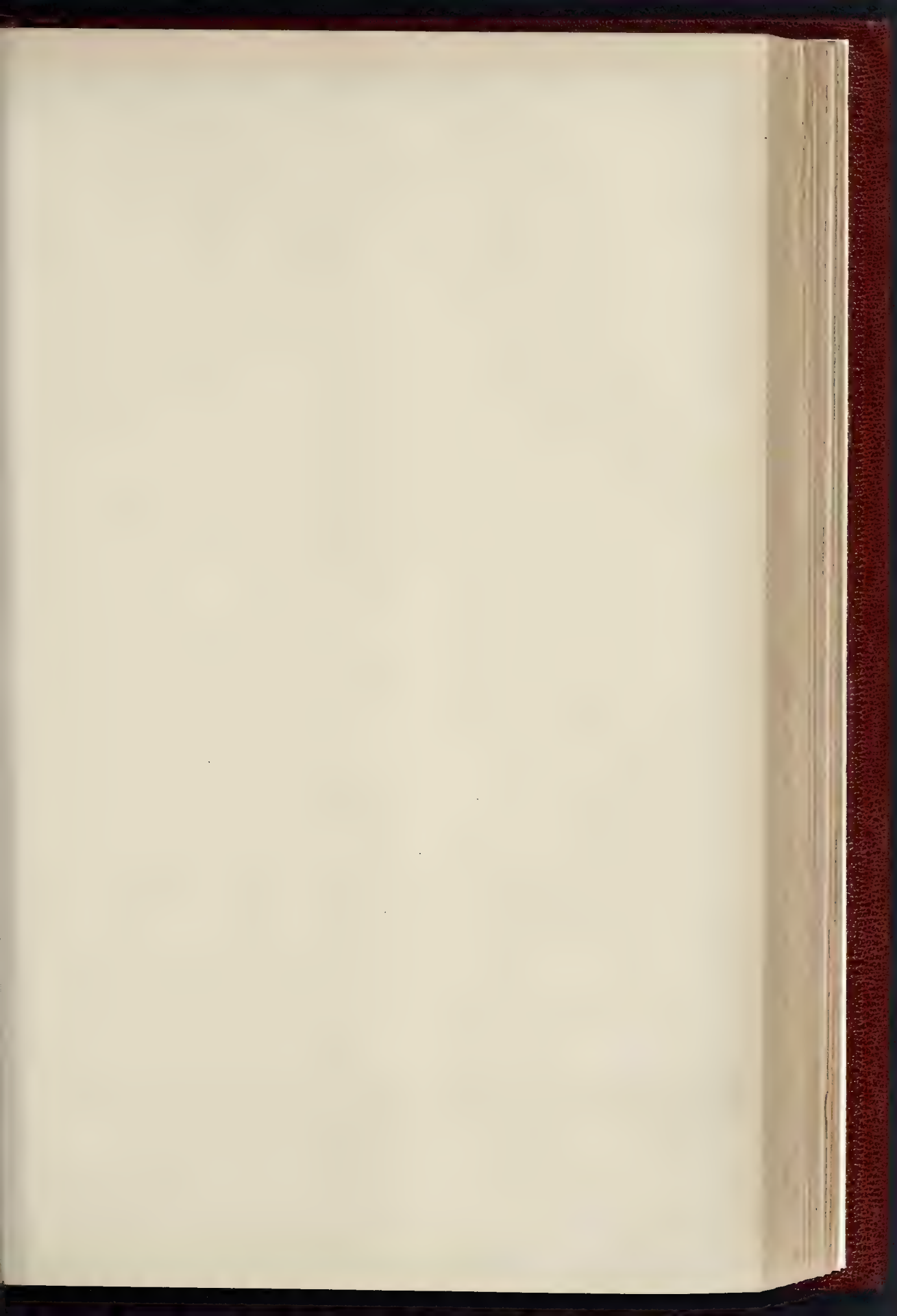


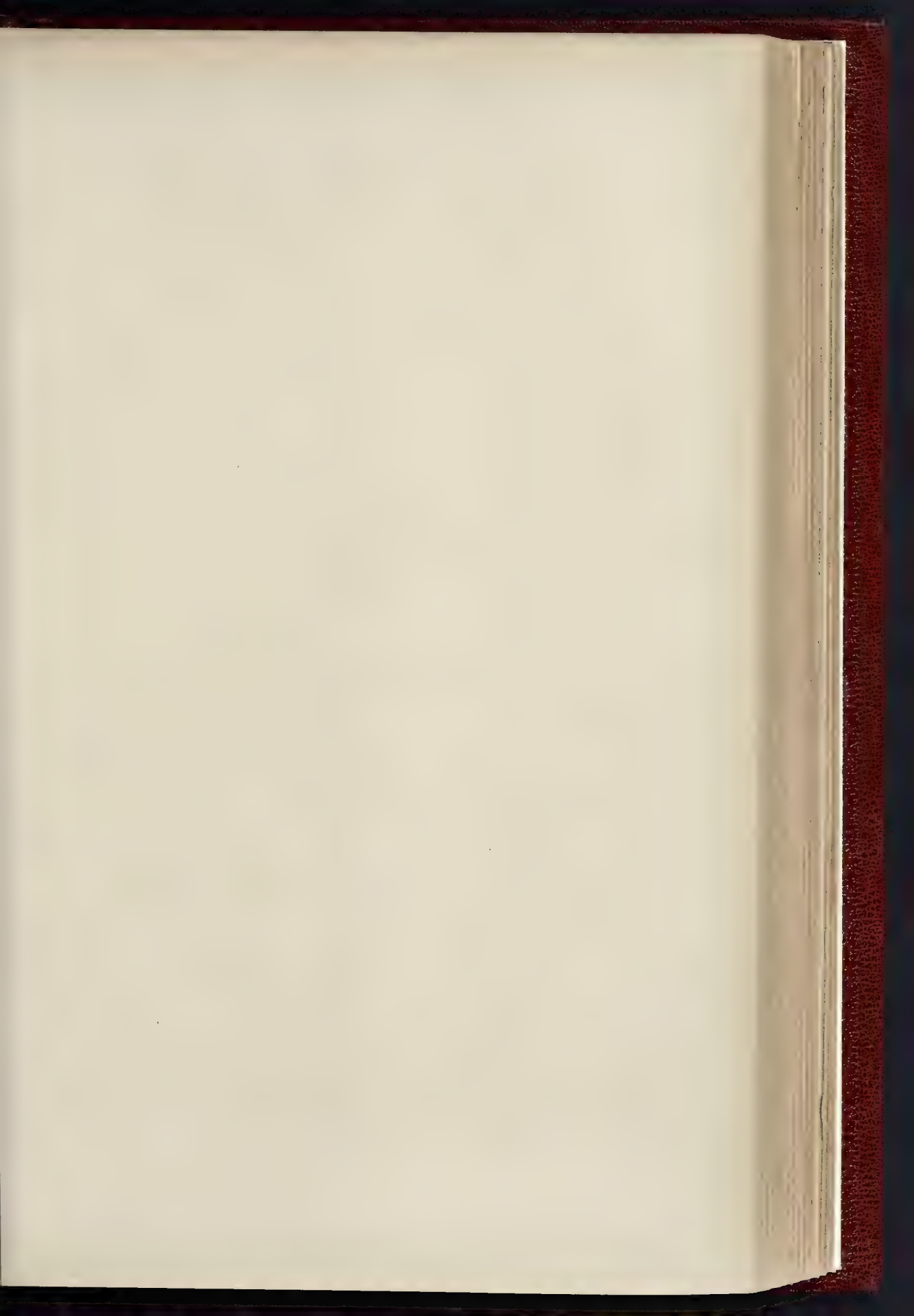


"PROFESSOR" HILL & COMPANY, 9 MONKWELL ST. LONDON, E. C.

SANTA MARIA DEL FIORE, FLORENCE; SHEWING THE NEW FAÇADE AS COMPLETED.

THE LATE PROFESSOR DE FABRIS; ARCHITECT.







PARISH CHURCH, ROSSETT, DENBIGH



PHOTO. BRATLEY & CO. 24 MARTIN LANE, LONDON E.C.

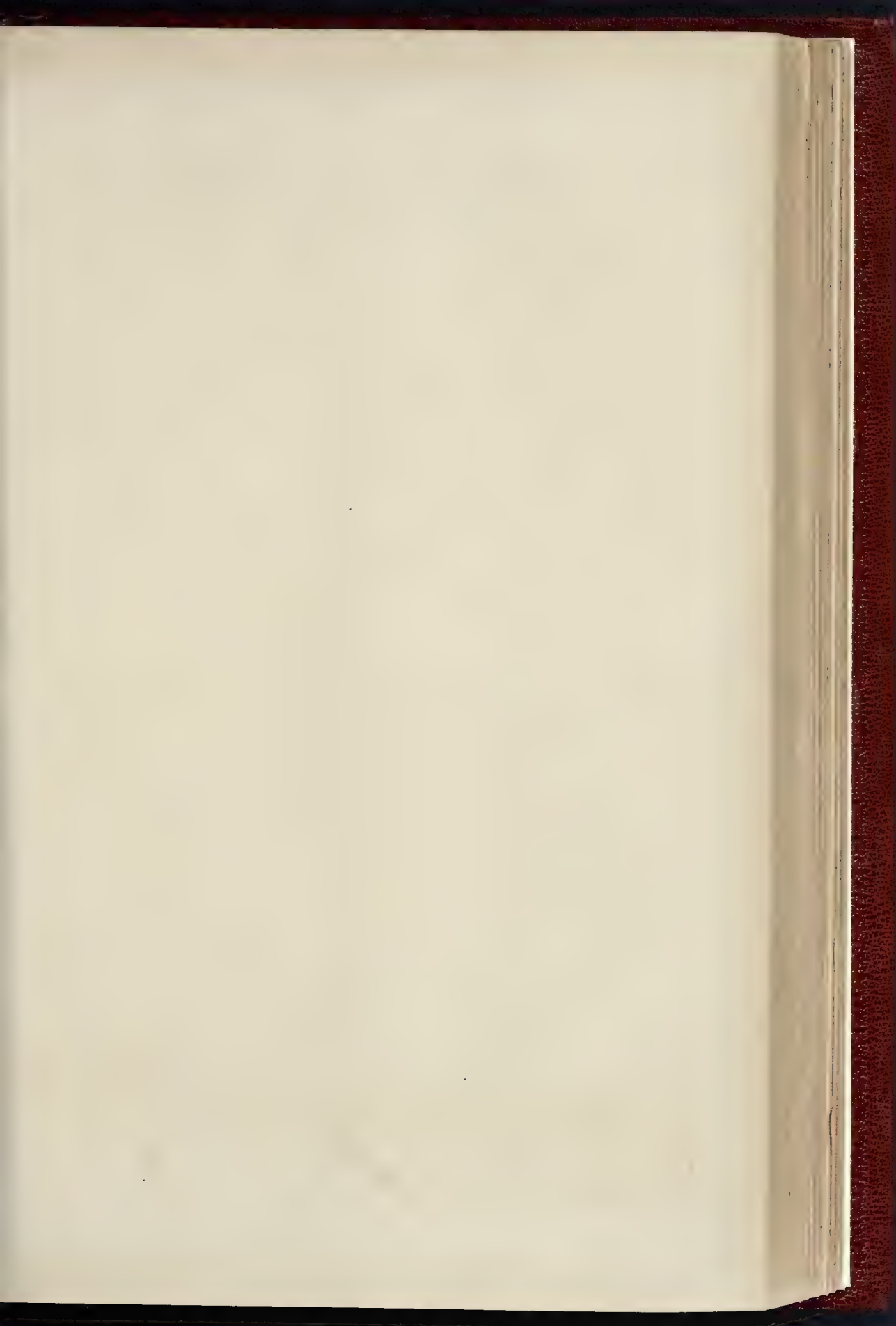
ESSRS. DOUGLAS & FORDHAM, ARCHITECTS.



TRAIL & CO. LITH.

W. Green St. London W.C.

INTERIOR OF AUDLEM CHURCH, CHESHIRE, AS RESTORED.—MESSRS. LYNAM & RICKMAN, ARCHITECTS.





ADDITIONS AND ALTERATIONS TO ST. IGNATIUS C



NOTES OF THE SANITARY CONGRESS
AT YORK.

We last week recorded the opening, at York, of the ninth Autumnal Congress of the Sanitary Institute of Great Britain, with its adjunct the Sanitary Exhibition. We then gave a considerable portion of the inaugural address of the President of the Congress, Sir T. Spencer Wells, as well as portions of the addresses delivered by Professor De Chaumont and Mr. Baldwin Latham as Presidents of the Sections devoted to "Sanitary Science and Preventive Medicine" and "Engineering and Architecture" respectively.* We this week proceed to give some extracts from other addresses and papers read or delivered at or in connexion with the Congress, and in another column we complete our notes of the Sanitary Exhibition.†

Chemistry, Meteorology, and Geology.

The third Section of the Congress was devoted to these subjects, and was presided over by Mr. William Whitaker, B.A., F.G.S., who, in the course of his opening address, delivered on Friday, the 24th ult., said,—It has been my duty at times to work with medical officers, and this duty has been a pleasure also; for it is pleasant to find one's own particular science of use beyond one's own immediate sphere of action. One of these occasions may fairly be alluded to here, as an example of the bearing of geology on large problems relating to questions of health; in this case to the distribution of certain diseases in certain districts. I refer to the inquiry made by my old friend and fellow-student in geology, Dr. G. Buchanan, now the Chief Medical Officer of the Local Government Board, on the Distribution of Phtisis as affected by Dampness of Soil. Having had to report on the effects of sanitary work in certain large towns, Dr. Buchanan unexpectedly found that where, from improved drainage, a decrease of subsoil water had taken place, there the consumption death-rate had also decreased, the most marked example being Salisbury, where the decrease was to nearly a half. This result led Dr. Buchanan to think that, as artificial drainage caused so great an improvement, it might be found that in districts where, from natural causes, the subsoil was least saturated with water, the death-rate from consumption might be less than in districts where greater saturation occurred. The further inquiry that was made for the purpose of settling this important question of course involved the examination, in some detail, of the surface-geology of the district selected as being the one in which alone (at that time) we had the materials for such a work. This district included the whole of the counties of Kent and Surrey (leaving out London), with the east part of Sussex, and the inquiry resulted generally in the conclusion that wetness of soil and prevalence of consumption go together. Two of the chief problems in matters sanitary are to get good water and to get rid of bad water. Indeed, one may say that when these problems have been solved in any town, at least two-thirds of the work of sanitation have been done. Our aerial friends may perhaps object to this, and may say that I should be contented with a half, air being of equal importance with water; but I hold that the objection would be itself aerial, and, for this reason, that the questions of good and of bad air together; you cannot get good air without getting rid of bad air, though it is possible, of course, to replace bad air by other equally bad, even by worse. With water, however, the case is quite different; a town may have one of the best of water-supplies, but its bad water,—its sewage,—may be got rid of in the right way; and, on the other hand, another town may have the most complete arrangements for properly getting rid of its sewage, or for almost doing without that article, but may have a very bad water-supply. Again, sewerage and sewerage must be questions of more or less public kind, in large places; but air cannot be publicly dealt with to any extent, except as part of sewerage arrangements, the ventilation of houses not being yet within the ken of corporate bodies. With

regard to water, it is not only important that populous places should, in the first instance, get a good supply; but also that it should be kept good; or, in other words, that sources of pollution should be religiously kept away, a process that entails a careful watch on the doings not only of one's own corporations, companies, &c., but on those of one's neighbours besides.

The Economy of Cremation.

This was the subject of a paper by Mr. W. Eassie, C.E., in the Sanitary Science Section. After having briefly described the process and its sanitary advantages, Mr. Eassie said,—Statistics are sometimes very misleading, but those referring to burial may be taken as reliable, because they are mostly due to the labours of Mr. Edwin Chadwick, C.B., our veteran sanitarian, and vice-president of this Sanitary Institute; and I may have occasion to apply some of his figures during the reading of this paper. First of all, as to the question of land. Taking the population of England and Wales at twenty-seven millions, the number of now existing cemeteries for this population is about 11,400 for England, or at the rate of forty-five for every 100,000 persons, and about 960 for Wales, or seventy-one for every 100,000 persons. It is now usual to allow a quarter of an acre to each 1,000 head of population where the soil is favourable, but this figure must be much enlarged where much embellishment of the ground is desired. I need not go into the statistics published in 1843, when it was discovered that the graveyards in London were sometimes forced to accommodate 1,200 bodies, and sometimes as many as 2,300, per acre; but I may state that at present London has twenty-two cemeteries, with an aggregate of 2,210 acres. Supposing the annual mortality of London to be 5,200, a provision for decennially renewed interments would require at least 500 acres, and Whitechapel alone, for every 20,000 inhabitants, would require over 7 acres of cemetery accommodation. London will therefore appear to be at present well provided with cemeteries, if these are taken to be accessible to the population of each district. But the contrary is the case, and hence additional cemeteries are in process of projection for various districts where the existing ones are held as being too remote. London must be taken as an exception when speaking of the necessity for extra cemetery space, because its population is dense, and intramural interments are now forbidden. In the country the death-rate is different, and assuming the deaths for every 35,000 in the metropolis to be 1,200 yearly, the deaths in a rural place like Hereford might be counted at about half of this figure. Thus, if Whitechapel would require over 7.4 acres of burial accommodation for every 20,000 inhabitants, Hereford would require 4.3 acres for the same number of persons. We may safely assume that in a few years' time the ground appropriated to the dead for the metropolis alone will reach 3,000 acres. The metropolis has at present one acre of burial-ground for every 1,700 inhabitants, which is in excess of the quarter acre for every 1,000 inhabitants recommended by the authorities. This recommendation, however, is sometimes doubled by various cemetery authorities in order to provide for the planting of suitable shrubs and the laying-out of ample roads. At the rate of one acre for every 4,000 inhabitants, 6,750 acres would be required to accommodate the 27 millions of residents in England and Wales; and the more our cemeteries are extended for embellishment the more these figures would be enhanced. The whole of this land is alienated for ever, looking at it from an agricultural or mining point of view, and will go on increasing yearly. Our burial laws specify that each adult shall be entitled to four superficial yards of earth, and, accordingly, after allowing for the predominant death-rate among children, this figure gives an average of 27 superficial feet. Taking the recommended depth of each grave to be 10 ft., this would show that 10 cubic yards of earth space are in process of allotment for each person. The average cost per acre for the land purchased for cemeteries was reported to the House of Commons in 1851 as being 123l. per acre. This would be a fairly-computed cost per acre outside the metropolis, but the cost of land around London would be in excess of this. Taking, however, this low estimate, the cost of the cemeteries connected with the metropolis

would be nearly 272,000l. Were cremation practised by 50 per cent. of the population of the metropolis, a piece of ground not larger than Woking Cemetery, or about 500 acres, would be sufficient ground to allot for their wants, and at the same average rate of purchase, this ground could have been bought freehold for 62,000l., which would have been a saving of 75,000l., and 605 acres would have been spared from pollution. To the calculation of 500 acres as being sufficient for the wants of the metropolis and suburbs, if half of the population of say five millions practised cremation, it will be seen that an acre has been reserved for every 5,000 persons; and considering that an urn would not require more accommodation than 1 cubic foot, it is easy to perceive that one-fourth of these 500 acres would be sufficient upon which to erect crematory temples and columbaria resembling those at Milan and Gosh, leaving 375 acres for roads and gardens. This space of 500 acres would serve to accommodate the wants of a population of 24 millions for more than 1,000 years, even after according permanent space for each urn. As for the cost of the erection of the chapels, crematories, and columbaria, this would be more than met by the cessation of the expense for buildings and maintenance now spent upon the 605 acres of ground which would be saved to the metropolis. As it would be with London, so would it be throughout the country in a proper ratio, were only a moiety of the people to practise the reformed rite. The expenses attending the total number of funerals in England and Wales in 1884 were given by statistical returns as amounting to 4,871,000l., and it was reported that half of this could be saved if national cemeteries were provided by the Government; but the saving would be much greater (Mr. Eassie went on to show) if cremation were adopted as the mode of disposing of the dead.

"Beauty and Health versus Horror and Decay in our Cemeteries" was the title of a paper by Mr. W. Robinson, F.L.S., on another phase of this subject. We give a few extracts:—Urn burial could be carried out in churches and city graveyards to any extent. For various reasons, many persons would prefer burial in churches or near them, but, as is well known, the evils of the present system of burial became so horrible and so evidently dangerous, in the case of city churchyards, that burial in cities was forbidden by law, and not too soon. But the evils from which we were then saved are again appearing in populous suburban districts, and soon the numerous family tombs and graves in our extensive suburban cemeteries must fall into disuse. Establish urn burial, and people who have family tombs in neglected city churchyards would take a renewed interest in them,—an interest that might save them from desecration. Our churches and even our cities would be more interesting, for there is a certain fitness in men resting in death near the scene of their life and labours. The ashes of those who had deserved well of their country might be brought home from any distant place, where they had perished, and receive a place of honour in our national churches and buildings. Vaults, passages, niches, and walls in churches would form suitable places for urns and their inscriptions. Given a space equal to one of our largest London cemeteries, or one of those in America, several hundred acres in extent, we may begin our outline of what the cemetery of the future may easily be made. Permanent and inviolable it must be, and it must have space to spare for those open green lawns, without which no good natural effect is possible in such place. It is to be a national garden in its best sense, safe from violation as the *via sacra*, and having the charms of fresh air, trees, grass, and flowers. There is not, and there never can be, any satisfactory way of disposing of the dead which does not do, promptly and unoffensively what is now done in the slowest and most odious manner. Until some better system is devised, cremation is the only method which will rapidly dissolve the body into its harmless elements by a process which cannot offend the living, and which will render the remains of the dead innocuous. This system is also that which gives us the amplest opportunity for making cemeteries a blessing instead of a danger to its neighbourhood; by its means we may have memorials preserved from decay, ground from sacrilege, soil and water from impurity, art not unworthy of its aim, church burial for all who

See *Builder*, pp. 447, 468, 467, ante.
Ibid., p. 365, ante. See also p. 430 of the present
 ber.
 For full details, see Tenth Report of the Medical
 Officer of the Privy Council, pp. 57-110 (1885); for a
 further account, from a geological point of view, see
Medical Magazine, vol. vi., pp. 493-505.

desire it, space for gardens and groves in our cemeteries, the mindfulness and care of each successive generation, deliverance from the undertaker and his "effects," many precious open spaces in cities free from dread or danger, age-enduring cemeteries in which efforts towards "perpetuating" the memory of the dead need not be so delusory as they now are; quiet places where the ashes of the dead should never be dishonoured but might find unpolluted rest.

Conference of Medical Officers of Health.

One of the features of the Congress was a Conference of Medical Officers of Health, which was presided over by Professor de Chaumont. Of some of the papers discussed at this Conference we now proceed to make mention.

Mr. R. Bruce Low, M.D. Edin., Medical Officer of Health for the Helmsley Rural District, read an able paper on "The Tenure of Office and Appointment of Medical Officers of Health." Speaking on behalf of his brethren, he said:—The sanitary service has received as yet very little encouragement from the State. We do not at present ask for honours or rewards, although some of our brethren have well deserved them. We ask that an unjust and unwise system should be altered so that the work of the health officer may be carried on in peace. We ask that in all future schemes of local government the appointment of medical officer of health may be taken from the local control of petty agitators who do not recognise the utility or importance of sanitary measures. We ask to have the election of this office freed from the influence of all party prejudice. We ask that all sanitary authorities be kept up to a certain definite standard of efficiency, and that the present system be abolished, where one district is well looked after and the next one to it neglected, to the serious danger and detriment of its neighbours. For, after all, the sanitary condition of each district does not alone concern itself or the locality in which it stands, but it may be a source of danger to the nation by acting as a focus of infection to foster and disseminate disease to the rest of the country. It is evident, then, that it is of national importance that every district should be well cared for and kept up to a given standard of healthiness. To attain this it appears that there must be an inspection, by representatives of the central authority, of the work done, and part of the grants given in aid of local expenditure might be made conditional on a satisfactory report being given. To do this would necessitate an increase in the number of the medical inspectors of the Local Government Board. This increase in the staff would create expense, and much opposition would doubtless be excited. But if the Government of the country could only become impressed with the fact that this money was needed for a national defence against disease and premature death, the necessary vote would be obtained. There appears to be very little difficulty in getting money for expeditions to the Nile or to the North Pole; why, then, should the nation grumble at a vote which would confer upon it such enormous advantages? The present undermanned and overworked staff of Government medical inspectors could be doubled without entirely overtaking the work. The extra expense would be returned to the nation in the increased efficiency of the sanitary work throughout the land. The wage-earning classes would obtain a larger fund of health and strength, which is their wealth and capital. The rate-paying classes would have less to pay for paupers and police. Efficiency and economy would go hand in hand.

Dr. Scanton, Medical Officer of Health for Chelsea, read a paper on "The Notification of Infectious Diseases." The conclusions he arrived at were that there is ample proof of the benefits derived from notification where there is a good sanitary service, but that without a good sanitary service the full advantages are not to be obtained; that the difficulties associated with notification are considerable, but that experience has shown that they are not insuperable.

Mr. John F. Sykes, Medical Officer of Health for St. Pancras, read a paper on "Organisation and Administration for the Control of Infectious Diseases." The major infectious diseases, which constitute six of the nine principal zymotic diseases, urgently demand, he said, measures for their control, and are those with which we are more immediately concerned.

There is no doubt that small-pox hospitals are a source of danger to the inmates of surrounding dwellings, without entering into the question whether the infection is transmitted aërially from the hospital itself, or diffused by the transport, or whether it is spread by convalescents, the staff, or persons supplying the hospital. Hence, small-pox hospitals should be removed from dwellings and not be too easily accessible. If forming part of a complete fever hospital, the small-pox building should be removed a convenient distance from the rest, and access restricted within narrow limits and rigidly supervised. The infection of scarlet fever, although not so far-reaching as that of small-pox, is, nevertheless, easily spread, and this disease would be more advantageously treated in a building separated somewhat from the general fever building, or in a separate wing. Under the head of general fevers would come typhoid, typhus, and suspicious continued fever. It is obviously desirable that diphtheria should also come under this category, and relapsing fever, which is now of rare occurrence, may be classed with typhus. These might, with advantage, be treated in a single building, possibly in separate wards. This outline can be enlarged upon to any extent, but I confine myself to a minimum, for the sake of lucidity and brevity. The complete institution would be constituted somewhat in this manner, and may be called a sanatorium, or by some other soothing name, to allay the fears and prejudices of the public:—

Sanatorium.

Hospital Buildings.	I. Small-pox building.
	II. Fever building.
	1. Scarlet fever wing.
	2. General fever wing.
Administrative Buildings.	Typhoid fever.
	Typhus fever.
	Continued fever.
	Diphtheria, &c.
Isolation of the whole hospital or sanatorium must have regard to two points: firstly, that it should be removed from dwellings, but not so far as to render transport unnecessarily long; secondly, that it should be out of the track of ordinary traffic,—in fact, difficult of access to the public, and yet easily communicated with from the central office.	III. Residential building: Staff, &c.
	IV. Service building: Disinfecting chamber for hospitals, &c.
	Ambulance, &c.

Isolation of the whole hospital or sanatorium must have regard to two points: firstly, that it should be removed from dwellings, but not so far as to render transport unnecessarily long; secondly, that it should be out of the track of ordinary traffic,—in fact, difficult of access to the public, and yet easily communicated with from the central office.

Mr. Francis Vacher, F.R.C.S., also read a paper on "Hospitals for Infectious Cases," specially discussing the question whether such hospitals should be free, or whether a charge should be made for the maintenance of the patients. He briefly recapitulated the existing powers of local authorities in regard to the provision of infectious hospital accommodation, and showed what difficulties, and even scandals, had arisen through the unfortunate 132nd clause of the Public Health Act (1875), which, he said, seemed specially designed to embroil those who had to give effect to it. Rather, he said, than that these scandals should continue, let the simple rule be adopted of having all public hospitals for infectious diseases free, as surgical and general hospitals usually are. It is doubtless for the advantage of the patient to be comfortably lodged and nursed and treated in hospital, but it is primarily in the interest of the community that the infectious patient is removed to hospital. It would be really profitable to any local community to pay an infectious patient 1*l.* a week to permit himself to be isolated in hospital; and yet, when he is willing to go to hospital, and his family are willing to let him go, all sorts of obstacles are placed in his way; and the local authority, in the spirit of a petty tradesman, worries him to pay for his bottle of physic, his bread and milk, and his beef tea.

Milk and Disease.

Among other papers read in the Section devoted to Sanitary Science and Preventive Medicine was one on "Milk and Disease," by Dr. Louis Parkes, who showed the great need that exists for increased and scrupulous attention to all that concerns our milk supply. The moral of the paper, as a whole, seems to be that milk, no matter how devoid of suspicion it may be, should always be boiled before being consumed.

Defective Eyesight.

Mr. John Oakley, M.R.C.S., read a paper on "The Prevalence of Defective Eyesight," which contained a passage or two worth remembering by architects who are called upon to plan schools. Children who are defective in vision should, he said, have special attention given to the postures in which they work. The desks should be so constructed that the child can sit with shoulders square, the work exactly in front, and the eyes at least 12 in. or 14 in. away. The light should be good, and, if possible, proceed from the left side.

The Administrators of the Public Health Act.

Mr. T. Harnett Harrison read a paper entitled "An Account of an Investigation into the Classes who administer the Public Health Act." The author explained that he had addressed a circular to the Medical Officers of Health of 800 of the Urban Sanitary Authorities of England and Wales, asking for information as to the profession or occupation of each member of their several sanitary authorities. Of these 800 circulars, only 202 were returned with the information asked for. The 202 sanitary authorities of which returns were made are composed of 2,796 members, and these 2,796 members are readily divisible into twenty-two classes, of which only nine classes numbered more than fifty persons:—

Shopkeepers	862	Clergy	23
Manufacturers	490	Schoolmasters	20
Gentlemen	327	Artisans	17
Merchants	211	Literary	8
Farmers	218	Insurance Agents	7
Builders	212	Army	5
Lawyers	104	Artists	4
Doctors	59	Contractors	4
Estate Agents	59	Registrars	2
Auctioneers	41	Undertakers	4
Engineers	33		
Architects	32	Total	2,796

Proceeding to consider the attitude of some of these classes with reference to sanitary progress, Mr. Harrison referred firstly to builders. He said that the nature and effect of the action of builders upon boards of health is pretty well understood, and is almost universally objected to by sanitarians, on the ground that their building operations cannot be controlled by the sanitary officers, since the sanitary officers in this case have to control the sanitary (or unsanitary) authority, the servant to control their masters, and this position of things of course applies to all other cases where members of such boards oppose sanitary work. The builder members of sanitary boards generally get elected in order that they may build cheaply and in defiance of the law. The result is that the public health is often sacrificed in order that a paltry sum of money may be retained in the pockets of the men appointed to promote public health. A body of men who are elected by their fellow men to save life turn round and kill their electors for a small fee. And one is inclined to say it serves the electors right, since the public are entirely responsible for the presence of builders on Boards of Health and for the kind of dwellings they erect. It cannot be said of the speculative builder that he is an instance of the survival of the fittest; he, however, seems to be a product of natural selection, since he has been developed to his present state of imperfection by surroundings which he has accepted as being of material advantage to himself. People are never tired of abusing the speculative builder who has erected their defective dwellings, but the public have really themselves created him, and then proceed to elect him as the guardian of their health. When people are willing to give a fair rent, purchase-money, or mortgage money for a well-designed, well-built, and sanitary house, of a size in proportion to the price, the speculative builder, as we now know him, will die out, and a better stamp of man will take his place. What people now want in a house is display, not a convenient or healthy home. . . . Manufacturers are very strongly represented upon sanitary boards: they number 489 out of the 2,796 members, or 17½ per cent. As a class they may, it is thought, be fairly ranked with those whose interests directly clash with sanitary work. Among their numbers are chemical manufacturers, tanners, bone-boilers, fellmongers, glue-makers, manure-makers, fat-refiners, brick-makers, dye-makers, candle-makers, soap-boilers, gas-makers, and others too numerous to mention, the nature of whose operations are such as to pollute our water, and load the air of our populous places with noxious

gases and smoke. The constant litigation brought about by the doings of these men, and the special provisions in the health Acts made by Parliament to regulate and control their works, is pretty good evidence that they are not a class calculated to make good administrators of the health Acts; while, on the contrary, they are eminently fitted to make formidable enemies to sanitary reform. They are a very powerful class, in that they are wealthy; they pay the working population of towns their wages and command votes. They can arrange that the medical officer of health shall or shall not act as doctor to their workmen. Are they not at the same time among the worst and most numerous offenders against the health Acts? But we find that next to the shopkeepers, who have every reason to work with them, they are the most numerous of all the classes serving upon sanitary boards. They are also of all classes the largest property owners, 16 per cent. of them appearing under that head, and their property largely consists of cottages inhabited by their own workmen. Is it not natural that this class, considering the great stake generally involved, should use their power for the purposes of self-defence? If the builder's interests are sufficient to make him so potent an enemy of sanitary work, what is likely to be the effect of the enormous interests of the manufacturers upon such work? Lawyers, of whom there are 104, or 34 per cent., serving upon these boards, as men of education and administrative ability, are no doubt often useful members, but as representatives of trustees, mortgagees, and executors, they are largely interested in saving expenditure upon house property, and it is to be feared they are doubtful sanitarians. Speaking of a lawyer, a medical officer of health says:—"He takes a very sensible view of things unless the interests of clients interfere." Another says a lawyer dominates a committee, and throws obstacles in the way of sanitation if expense is likely to be incurred. Estate agents are represented to the number of fifty-six, or nearly 2 per cent. They must be placed on the side of the goats; while auctioneers, who appear to the extent of forty-two, or about 13 per cent., must be regarded as questionable sheep. There are only thirty-three engineers, or 14 per cent.; these one Board has seven out of nine members, and the remark of the medical officer is, "This Board is one of the best in England." The clergy number twenty-three, or 8 per cent.; it is difficult to say why there are not more of them, their presence in such a position could but be good, for, as men of culture, and as visitors of the sick and poor, they can well understand the necessity for sanitary work. There are thirty-two, or 14 per cent., architects, and the experience of some of them is that plans can be passed by members of this profession when serving upon such Boards that are rejected when presented by outsiders. There are twenty schoolmasters, five members under the head of Army, five literary, three contractors, and two registrars of births and deaths. As a rule, the professions or classes least likely to produce objectionable members of Boards of Health are much the most sparsely represented. The conclusion drawn by the author from the partial statistics he had been able to collect is that 954 per cent. of the number of persons serving upon Local Boards of Health, taken from members of classes, and considering their interests and fitness, either presented a negative attitude or active opposition to the administration of the Public Health Acts.

Sanitary Associations.

The Rev. J. M. Lambert, M.A., Vicar of Newland, Hull, and Hon. Sec. of the Hull Sanitary Association, read an admirable paper on "Sanitary Associations: their Mission and Methods of Action." The concluding paragraph of the paper was as follows:—"It is the glory of the present day to-day that it places in the hands of the means, not of doing only isolated acts of good, but of acting directly on the sources of good and evil. The hydra-headed enemy, disease, can be attacked while in the germ. If there be no lack of men and women who will forth to relieve suffering and give comfort in distress, will there be a lack of those who will stand in the narrow pass where the invading pest can be withstood and turned back ere it reads its vast destroying forces over the land? rely not. Such a work is in the highest sense Christian. Over multitudes of the poor, wealthy surroundings hang like fate. To know their danger is for them to know also that

it cannot be escaped from. It is for others to dispel the dark cloud that shadows their weary lives, and to let in the gleam of the sunshine of health into every English home."

River Pollution.

In the Section devoted to Engineering and Architecture, a paper by Professor Henry Robinson, M.Inst. C.E., on "River Pollution" was read for him, in his unavoidable absence, by Mr. E. C. Robins. Professor Robinson, in the course of his paper, said,—There is no longer any excuse for discharging sewage in an unpurified state, as the conditions which have to be observed in the purification of sewage matter are now well known, and are capable of being easily complied with. The field of conflict which a sanitary authority has now to enter upon in carrying out a scheme of sewage disposal has been so much narrowed by the experience of recent years that no difficulty has to be encountered which should deter an authority from taking steps to cease to offend in this respect. My experience leads me to think that in sewerage large districts it is often undesirable to concentrate the sewage at one point. Very costly works can in many cases be avoided by sub-dividing an extensive area into a few groups for sewerage purposes, according to the physical conditions which exist. . . . The removal of the solid matter from manufacturing refuse before discharging it into rivers can be effected by mechanical means in a vast number of cases where no attempt is now made to do so. The enforcement of such remedial measures need not interfere unfairly with trading interests if the standard of purity which is required is not unreasonable, and is not arbitrarily fixed without regard to the circumstances both of the river to be protected and of the trader to be dealt with. I assert with confidence that there is no justification whatever for continuing the employment of our rivers as carriers of the fluid refuse of the community. London, Glasgow, and many other large towns may be cited as abusing their rivers, and are not (as they should be) taking the lead in promptly discontinuing this pollution.

Municipal Government in Relation to the Public Health.

This was the subject of a very interesting and able paper by Mr. Alderman J. S. Rowntree, of York, who, after giving an account of the sanitary history of York, showed what advances have been made in the sanitary condition of that city, and of Glasgow and Birmingham as additional instances, through the energetic and public spirited action of the respective municipalities. He continued:—"If the connexion between a healthy population and good municipal government were yet more generally recognised, a more widely diffused and a more intelligent interest would be taken in the selection of councillors than is now the case. This would show itself both in the choice of candidates, and in inducing fit men to be willing to take the appointment. In some localities municipal office is honoured, and is an object of ambition to able and educated men. In other places it is too much the fashion in the educated circles to reckon the office of councillor or alderman as *infra dignitate*. When a corporation has been elected, how may it best serve the sanitary interests of its constituents? You may assume that all its members would rather see their locality healthy than unhealthy. It is also safe to assume that there will be a considerable number who have but little knowledge how this is to be brought about. The main work of a corporation is done by its standing committees. You want, then, a public spirit amongst its members, and a sense of responsibility to the population they represent, which shall secure upon the health committees the presence of those members who have special acquaintance with the subject. Then, beyond this, I should attach extreme importance to the selection of your permanent officials. Unless a corporation is well sustained by its officials, its work will fail. Why? Because a corporation and its committees are always changing, but its officials are permanent. You may have the most intelligent committees. They may arrive at the wisest conclusions. These may be recorded on their minutes. The committee breaks up and disperses. When it meets in a fortnight's time it may be to find that its dictatorial have not been carried out at all,—or carried out too late,—or

in an imperfect manner. This is what constantly takes place when the administration of a public body is in the hands of inefficient officers. Then how shall you secure good officials? (1) By paying adequate salaries. (2) By the maintenance of a public spirit in the appointing body, which will demand efficiency as the supreme qualification for appointment. . . . The difference of a few pence in the rates of a locality makes but little difference to the majority of the population, in comparison to the cost of disease. The abolition of a 6d. rate would be a great event in municipal finance. It would save the majority of ratepayers 6d. to 1s. a month. But an outbreak of preventable disease would cost the poorest many times the amount of such a rate, irrespective of the sorrow and suffering that follow in its train. Yet all public expenditure, even in the interests of health, should be thrifty and economical. Lavish expenditure may go hand in hand with inefficient administration. And it should never be overlooked that a population is always liable to forget what it is receiving from its sanitary guardians, whilst the cost of their services it never forgets. The averted fever, the escape from small-pox, are not thought of: the rate-collector always asserts his presence. If his visits become too frequent and too onerous, they are liable to provoke a reaction against measures urgently required for the public weal. I have spoken hitherto chiefly of municipal administration in relation to health. There is outside this the wider question of general municipal policy. Should a municipality limit the sphere of its activity within the narrowest limits prescribed by the general law of the country, or should it take a wider and more comprehensive view of its responsibilities? Experience indicates, I think, rather decisively that the latter is the wiser policy. If the work of a corporation is small, it excites but little public interest. It is liable to fall into the hands of an inferior class of men. On the other hand, where the work is important and interesting, it attracts to it able men."

The Sanitation of Dwellings.

Mr. J. Vickers Edwards, M.Inst. C.E., read a paper entitled "The Sanitation of our Dwellings." In the course of his paper Mr. Edwards strongly urged that sanitary officers should be qualified men, holding diplomas or certificates of competency. As an example of this, "take," he said, "our large watering-places,—Scarborough, Blackpool, Eastbourne, Brighton, &c.,—where the major part of the population at certain periods of the year is ever changing. Many of the lodging houses have obtained certificates of a clean bill of health as to the sanitary requirements of their houses. Well, at Scarborough and other places I know from experience you will find nine-tenths of the houses fitted up with old abominable pan closets, insufficiently flushed, and with soil pipes inside the buildings; a few may be ventilated, but the major part are not, and when the soil pipe is ventilated, what does it consist of? A 2-in. rain water pipe carried from the trap up to above the roof, with open joints, and crowned at the outlet with some wonderful head gear in the shape of a ventilating cowl,—all this work doing more harm than good. And yet these houses are all certified, and the British public think they are quite safe. So much for the value of these certificates." In the course of further observations Mr. Edwards said that "our leading architects" do not pay sufficient attention to "the scientific knowledge of drainage and sanitary plumbing."

The Artistic Side of Sanitary Science.

This was the subject of an able "Address to the Working-classes," delivered by Mr. E. C. Robins, F.S.A., at a public meeting held on Saturday evening last in connexion with the Congress. Two other addresses were delivered on the same occasion, one by Dr. Poore and the other by Mr. James Mansergh. To these we may return. It is one of the commendable features of these annual congresses of the Sanitary Institute that attempts are made in this way to popularise a knowledge of sanitary laws and conditions. Mr. Robins, in the course of his address, said,—I can imagine some of you to say, What in the world can sanitary science have to do with artistic matters? Well, that is the question to which my remarks will be a reply, and I trust my answer will be sufficiently clear to commend itself to your judgment and

to enlist your sympathy. Primarily, the non-adaptability of means to ends is not only unscientific, but it is eminently inartistic; nothing is beautiful that is not in harmony with its uses, or that is opposed to the first principles of natural science. Everything has an element of artistic completeness, which more or less answers the purposes for which it was designed. The fitness of things is in itself artistic; indeed, it is the only true foundation upon which to build up the accessories in form and colour which constitute the decorative aspect of those things of beauty which are "a joy for ever." There is a moral quality in all good and true work, a reasonableness in all honest labour, which, fully appreciated, brings its own reward. Perfectly to do anything is eminently artistic. It satisfies the moral and scientific aspirations of the individual, and edifies others, and it is specially necessary to be done in hygienic operations. The use of good materials and workmanship is therefore a fundamental characteristic of artistic sanitation. The artistic workman takes pride in his work, and does not do it only because he is to be paid for it; he has a taste for good materials, a love of good workmanship. Having shown in detail how an artistic workman should and would proceed in the arrangement and construction of any dwelling which he might be able to build for himself or over which he might have control, Mr. Robins dealt with the subject of personal sanitation, cleanliness of the person and attire, and of the house. Finally, he summed up the whole subject in the following words:—It is as inartistic as it is dishonest, insatiable, and false economy, to execute any works with bad materials and workmanship, but especially that of dwelling-houses. It is as inartistic as it is insatiable to be dirty in our persons or in our dwellings. It is as inartistic as it is insatiable to be deformed in our figures, or surrounded by habitations doing violence to every law of geometrical precision and taste in outline and detail. It is inartistic to be colourless in mind and body, or to be the centre of colourless rooms of furniture. It is inartistic and insatiable to poison one's skin with cosmetics, or to cover one's walls with arsenical papers and poisonous pigments for painted and coloured decoration. It is inartistic to dress chiefly for effect and not for useful life, or to clothe one's house with woollens and draperies and dust accumulators and other absorbents, to the prejudice of the purity of the atmosphere in which we live and breathe the largest portion of our lives. It is as inhospitable as it is inartistic and insatiable to invite one's friends to dine or to dance in a fetid atmosphere, where no change of air is possible without draught; or to let your friends sleep in ill-ventilated chambers, and perhaps unconsciously, but really (as did the Prince of Wales, at Scarborough) to inhale sewer gases arising from leaky joints of unventilated pipes laid in connexion with public sewers. I say it is as inhospitable as it is inartistic, and most culpably insatiable, to give your friends drinking-water drawn from filthy cisterns over which miasma has floated and been absorbed, through the medium of standing wastes in direct untrapped connexion with the sewer. All these things, and hundreds more, are preventable causes of disease, and yet are commonly done and suffered by peer and peasant alike, through inattention to, or ignorance of, the simplest applications of sanitary science to the every-day wants of life, or the absence of any attempt to realise the necessity for its introduction. For the sake, then, of "sweetness and light," of "beauty and truth," of health and usefulness and consequent happiness, remember the Artistic Side of Sanitary Science.

Among other papers read during the Congress were the following:—"On the Ventilation of Factories and Workshops," by Mr. William Tattersall. "On American Sanitation," by Mr. John B. Gass (Godwin Bursar, R.I.B.A.). "On Open Spaces and Physical Education," by Lord Brabazon. "On Medical Climatology," by Mr. Charles Roberts, F.R.C.S. "On the Filtration of Water for Town Supply," by Mr. Percy F. Frankland. "On the Sanitary Condition of the Country, with Special Reference to Water Channels," by Mr. Robert T. Cooper, M.A., M.D. "On the Collection and Storage of Rain and Drinking Water," by Surgeon-Major R. Pringle, M.D. Besides these, Captain Douglas Galton delivered the "Lecture to the Congress" on the evening of the 23rd ult. The subject of Dr. Poore's address to the working classes on

Saturday evening was, "The Story of Bremon-tier and the Reclamation of the Sand-Wastes of Gascony." The subject of Mr. Mansergh's address on the same occasion was "The Supply of Water to Towns." To some of these papers and lectures, and to points of exception taken to the views enunciated in some of the papers from which we have already quoted, we will briefly return next week, when we shall conclude our notes of the Congress, which has been a very successful one.

It has been decided to hold next year's Congress at Bolton.

SOME SANITARY EXHIBITS AT THE EDINBURGH EXHIBITION.

AMONG exhibits of this class, those of Messrs. J. & M. Craig, of Kilmaronock, may be mentioned as being possessed of special merit. Amongst them Buchan's (Edinburgh) closets, "Climax" and "Eclipse," are a novelty, and combine the advantages of many former closets. The novelty consists in the way the trap is formed at the bottom of the basin, ending in a chamber directly over the shutting-valve, and having the mouth of the overflow in the bottom of the trap, and rising in a pipe outside the basin. The advantages claimed are that it is impossible for sewer gas to pass through these closets even when opened, a considerable quantity of water being held in the basin and chamber over the valve, which, when opened, falls in full volume into the soil, pressing all gas before it, and creating such a suction as to cause the contents to be instantly drawn out, while at the same time the trap is never unsealed. These closets are, it is stated, highly esteemed by all sanitary engineers who have examined them. This firm have received awards at the Health Exhibition of 1884, and from the Sanitary Institute, &c., for other exhibits, amongst which we note their enamelled sinks, which, it is stated, can only be manufactured in Scotland, the tenacity of the clay permitting pieces without endangering the strength of the basin. The enamelled bricks formed of this clay are remarkably hard and true in form, as are also Buchan's improved drain-pipes and traps.

The horizontal wash-hand basin of Mr. William Miller, St. Vincent-street, Glasgow, has the peculiarity of dispensing entirely with stop-cocks for the admission or letting off hot or cold water, or for letting off waste water. All these operations are performed by turning the basin round horizontally to a point marked on the margin of the cabinet. The basin is so constructed that it can be easily lifted from its seat, as the valves close at once on its being raised, thus insuring easy access to its working parts, should they require to be overhauled.

A specimen is exhibited of the Pennycook patent glazing system. By this system the glass is held in position or "glazed" by the simple folding down of narrow flanges of sheet lead, which are rolled in with the zinc or other metal of the sash bars. Amongst other advantages claimed for this system are the entire absence of risk or breakage from vibration, and that no painting is required nor the employment of skilled labour for repairs, &c.

Messrs. William Frew & Sons, of Perth, exhibit in Stand No. 134 plumber's work of very superior quality. The original Perth Bramah water-closet has long been recognised as one of the best in use. Messrs. Frew state that some of the water-closets of this description manufactured by them have been used for upwards of twenty years without requiring to be repaired.

The acme of simplicity seems to be obtained in the British Sanitary Company's improved self-acting earth-closet. If people would only take the trouble to keep a store of dry earth, and empty the receptacle when full, no more efficient closet could be desired. It is, of course, specially adapted for situations where water-carriage by gravitation is not obtainable.

The Patent Combination Filter of Mr. Stewart Robertson, of Dundee, is effective in its operation. It consists of an outer and an inner case, the latter of which is divided into two chambers separated by a thin web of the finest kiln-burned fire-clay. In the upper chamber is a preparation of oxide of iron, and in the lower a layer of purified carbon, through which the water passes. The combination of these two materials is recognised as the most powerful agent in removing chemical and organic impurities from water.

NEW RESERVOIR AT KIDDERMINSTER.

THE new high-level reservoir, which has been constructed at Kidderminster with the object of improving the water supply of that borough, was opened on the 27th ult., when the ceremony of turning the water into mains was performed by Councillor Potter, the chairman of the Drainage and Waterworks Committee. It was on the 27th September, 1884, just two years ago, that the preliminary report was dated which Mr. E. Pritchard, C.E., of Westminster and Birmingham, and Mr. A. Comber, Borough Engineer, drew up for the Council, recommending, among other sanitary improvements in the borough, the construction of a reservoir on the plan now carried out. The works of water supply and sewerage then reported upon were called for in consequence of the lamentable outbreak of typhoid in the town. The preliminary report which Mr. Pritchard and Mr. Comber presented to the Council was followed up by a more detailed and exhaustive report at a later date, in which they pointed out that many defects existed in both water and sewerage, although the existing works had been only constructed comparatively a few years, at an outlay of some 126,000*l.* In the report referred to, the construction of a high-level reservoir was strongly recommended. The following are some particulars respecting the reservoir, which was designed by the engineer, Mr. E. Pritchard, and has been constructed under his superintendence. The site of the reservoir is a portion of the high land known as Sutton Farms, on the Bewdley-road, and it is some 1,100 yards distant from the waterworks pumping station on the Stourport-road. This land is the highest available site near Kidderminster, and will permit of 43 ft. greater head of water than could have been obtained from the existing open reservoir near the pumping-station. The new reservoir is a covered one, and is constructed of masonry, brickwork in cement and concrete, and is partly in excavation and partly in embankment. Special care has been taken by puddling all portions of the work below the top water-level, as the ground upon which it has been constructed contains a porous subsoil. The interior of the reservoir has the following dimensions (being square on the plan):—145 ft. long, 145 ft. wide, with an available height for water of 14 ft. 7 in. This capacity, after making deductions for pillars and buttresses, will provide a storage of 1,550,000 gallons. The roof of the reservoir is constructed of a rolled iron girder floor and with cement concrete arches, upon which is placed some 2 ft. of earth, the whole being supported by seventy-two cast-iron pillars. There are several inspection and air shafts. The present engines and pumps at the Stourport-road station will supply the water to the reservoir, the water being obtained from a bore-hole in the Bunter beds of the new red sandstone. Considerable difficulties were experienced in the construction of the works during the last severe winter, and the works were much delayed thereby. They have been carried out by the contractor, Mr. George Lay of Kidderminster. The total cost of the reservoir, including the purchase of land, is stated approximately at 6,800*l.* Mr. Peirce and Mr. Tarbet were the resident engineers. The total outlay which the Local Government Board sanctioned for improvements in the water supply and sewerage of Kidderminster was about 25,000*l.*, and in round figures two-thirds of this sum have been expended up to the present time.

EPISCOPAL HERALDRY.

SIR,—In reply to a request of a correspondent [p. 469, ante], for the arms of modern Sees in "Episcopal Heraldry," I beg to give the following from an illuminated plate lately issued at Liverpool. Argent, an eagle displayed sable, numbered or, and holding in its dexter claw a book of the last. A chief per pale azure and gules, the dexter charged with an open book or, inscribed "Thy word is truth"; on the sinister, a lymphad argent.

Manchester.—Or, on a pale engrailed gules, three mitres of the field on a canton gules, three bendlets enhanced argent.

Turo.—Argent, a saltire gules charged with key and sword or, within a bordure sable bezanty.

Newcastle.—Azure, thereon a pastoral staff and coronet or, within a bordure sable charged with billets argent.

Ripon.—Argent, a saltire gules charged with two

keys or, the wards in chief, on a chief of the second an Agnus Dei proper.

I give this blazonry with all reserve. You will notice that the arms for Newcastle are totally different from those described by your correspondent, and perhaps my authority may be in fault.

The canton in the See of Manchester shield I believe represents the arms of the city, and which were formerly borne by the Greslet or Greiley family, its feudal barons in Norman days.

J. B.

HOUSE-OWNERS AND CARE-TAKERS.

SIR,—Allow me to inform property-buyers that many excellent residences, suited to families of good position and those with middle-class incomes, would soon be taken and occupied, to the benefit of the neighbourhood and tradespeople, were the owners, by themselves or personal friends, daily to look after and inspect them. Many well-planned commodious dwellings, by neglect, look almost haunted. Were an attendant sent daily (not to sleep on the premises, which would not be the case), up, air, and show them, such would not be the case. But when the bill says "key at agents,"—probably some distance away,—or care-takers purposely do not hear street-door bells or knockers, house-seekers depart. Poor people used to rent two small rooms at 5s. weekly, enjoying for themselves, children, and acquaintances, a mansion for nothing, often keep rooms, staircases, passages, paths, and water-closets filthy, windows dirty, gardens weedy, and house close-shut, to make it damp, smelly, &c., in order not to leave. Poor humanity naturally loves to enjoy detached and semi-detached villas, with their rail, flower, and kitchen gardens, worth 25s. to 22s. weekly,—it costs users *nil*,—and feel little sympathy for the unhearted landlords, who pay heavy ground-rents, and have heavy outlays for repairs, decorations, and wilful dilapidations.

A VICTIM.

** We may add that it is very questionable policy, for other reasons, to allow a family of people probably not clean habits to occupy a good house the interim of letting it.

THE ROMAN BATHS OF BATH.

SIR,—Having seen, in your paper of the 25th pt. [p. 469], a letter from a Mr. Richard Mann on its subject, allow me to make a few remarks thereon.

You do not publish a drawing of the plan he got you, but I conclude it is a duplicate of one which he has lately exhibited here. For your information I may assure you that the plans in the plan figured D, E, and F, including the bath of which he writes, are entirely covered by existing buildings, the removal of which has never been contemplated.

The hypothesis of which he writes I saw exposed view, and the whole of it (with the exception of a small fragment in the north-west corner) was completely crushed in by later buildings.

There was nothing left standing save here and there a tile pillar, all of which are being preserved. The fragment above alluded to will remain intact, and every stone and brick that was found *in situ* remains, and will remain, undisturbed.

Those who are on the spot are not likely to be deceived by Mr. Mann's statements, but it is not surprising that the public at a distance should be misled by what he must know to be inaccuracies, to use a very mild expression.

BATHONIENSIS.

The Tyne Cement Trade.—It is well known that though the production of cement on the Tyne is on a scale of magnitude, yet the conditions in regard to the raw materials which make it more costly here than in some localities naturally favoured. For there have been experiments in progress of different firms, and of late two large firms have been carrying out experiments with the intention of using some of the residual products from the blast furnace in the manufacture of Portland cement. These experiments have resulted in the production of a better quality than that made by the ordinary process. Nothing has been attempted in the way of making a "slag-cement," the attempt is to utilise the residues from blast furnaces in making Portland cement of even a higher quality. Although the question of cost is not so much a point at issue, yet it may be said that the utilisation of these processes would give an advantage to the district, and probably enable it to extend the production of cement, because a part of the materials would be found in this district in unlimited quantities, and they would be subjected in some small degree for material brought at considerable cost from a distance.—*Castle Chronicle.*

CHURCH-BUILDING NEWS.

Droitwich.—A special meeting of the Droitwich Town Council was held recently, to consider the condition of St. Andrew's Church. The Borough Surveyor (Mr. Headen) said the corner of the church had sunk 5½ in. The High-street had sunk 3 ft. in the last six years, and this had, of course, affected the church. The tower was in a dangerous state. The Town Clerk read the reports of builders who had inspected the church. Mr. Collins, of Tewkesbury, wrote saying that the arches ought to be propped at once. Mr. John Smith reported that the tower was in an immediately dangerous state, and that money would be thrown away in restoring it. Mr. Beanlands said he was present when Mr. Cotton examined the church, and that gentleman did not think there was the slightest fear of the tower giving way; on the contrary, he thought the church might be made as secure as ever. Mr. Wouldridge expressed the opinion that it would be useless to spend money to keep up the church. The ground on which the church stood was continually shifting, and the church would have to be continually patched up at considerable expense. The Mayor said what they had to do was to petition the Chancellor of the Diocese to grant a faculty to the rector, churchwardens, and parishioners to enable them to do what was necessary. Alderman Holyoake proposed that the surveyor be instructed to place timber supports under the faulty arches of the tower, on the understanding that the expenses be borne by the rates. Mr. Greaves seconded the motion, which was then passed by the parishioners of St. Andrew's, assembled as a vestry. The Mayor having left, Alderman Holyoake took the chair, and a similar resolution proposed by Mr. Greaves, and seconded by Mr. Wouldridge, was then submitted to the Town Council. Mr. Bourne proposed, and Mr. Harris seconded, as an amendment, that no work should be done to the church which would cause expense to the rates. The amendment was carried by five votes to three. Alderman Holyoake then proposed, and Mr. Onion seconded, a resolution affirming that the church was in a dangerous condition, and that the Council should take proper steps to make it safe. This resolution was carried.

Eastrop.—The foundation stone of the new Church of St. Mary, Eastrop, near Basingstoke, has been laid. The cost of rebuilding will be about £500. The new church will be of Gothic design, slightly wider and considerably longer than the old building, of which the chancel alone was left standing, the old material, chiefly flint, being used in the foundations, and the exterior walls built of Bargate stone with Bath stone quoins. The inside of the building is of white brick with red brick lines as a relief. The architects are Messrs. Raynbird & Sons, and Mr. Thumbwood is the builder.

Monyash (Derbyshire).—The Derbyshire Advertiser states that a scheme has just received the sanction of the patron and the rural dean for the carrying out of considerable improvements and enlargements of the parish church of Monyash, which is situated in the archdeaconry of Bakewell. The church is one of the oldest in the county, and dates back as far as the thirteenth century. For some time it has exhibited signs of decay, the tower especially being in a very dilapidated state. A committee have had the matter in hand, and it has been decided to rebuild the tower, chancel, and vestry, besides effecting other much-needed improvements. The Duke of Devonshire has promised 200l. The whole of the improvements are estimated to cost upwards of 3,000l.

Rulton.—The re-opening of Rulton Church, Norfolk, took place on the 23rd ult. after restoration of the nave, roof, and tower. New choir-stalls, carved in oak, have been placed in the chancel, and a new lych-gate has been fixed at the entrance to the church-yard. The work has been entrusted to Messrs. Riches, of Cromer, and the carving to Mr. Chapman, of Hanworth, under the superintendence of Mr. E. Preston Willis, architect, and Diocesan Surveyor, Norwich.

Sandhurst.—Some elaborate decorative works have just been completed in the chancel of the Church of St. Michael and All Angels, Sandhurst, by Messrs. Heaton, Butler, & Bayne, ecclesiastical decorators. The general design is Old English. The subjects depicted include the "Adoration of the Lamb," which occupies the space over the chancel arch. On a gold

ground, with stars, are six angels on the south side and six angels on the north side, with golden vials in their hands, offering praise with the words "Worthy is the Lamb that was slain." The lamb occupies the central space, and the central space on the east side of the arch is filled by a pelican feeding her young. At the east end of the chancel are four archangels, St. Michael and St. Gabriel being on the north side of the Communion Table, and St. Uriel and St. Raphael on the south side. Beneath the two former are the two evangelists St. Matthew and St. Mark, painted on oak panels, and beneath the two latter are St. Luke and St. John. The work has been carried out under the direction of Mr. Barron, who has had charge of it on behalf of Messrs. Heaton, Butler, & Bayne.

Seamer (near Scarborough).—According to the *York Herald*, the ancient Church of St. Martin, Seamer, near Scarborough, is about to undergo what is described as "a much-needed restoration." It is proposed in the present restoration that the chief attention shall be given to the roofs, which have become dilapidated through age, and to the interior of the church. The old high pews will be removed and new open stalls substituted, whilst a modern pulpit and reading-desk will take the place of the characterless erections which now serve that purpose. The name of the architect (if any) who has been consulted in the matter is not given.

Sheffield.—Ranmoor Church, Sheffield, which has been closed for some weeks for sundry alterations and for interior decoration, has been re-opened. The chancel walls and roof have been decorated with diapers, borders, &c., with the exception of spaces at the sides of the six eastern windows, which have been reserved for figures of the Apostles and other Saints, which are done in bold outline, slightly hatched up in the shadows. Each figure is surmounted by canopy work, also in outline, upon gold grounds. The colour in the roof is chiefly upon the rafters and principals, which are picked out in colour; vermillion, gold, and black predominating. The whole of the work, with the exception of the plain painting, has been done by Messrs. Powell Brothers, of Leeds.

SCHOOL-BUILDING NEWS.

Halifax.—The new Board school in Akroyd-place,—the largest yet built in the borough of Halifax,—has been opened. It is to replace the Victoria-street, Cross-hills, and Albion-street schools,—which were all rented by the Board,—as well as to give additional accommodation in a thickly-populated district near the centre of the town. The school has been built from the designs of Messrs. Horsfall & Williams, of Halifax, at a cost of about 16,000l., and will accommodate 1,500 children.

Maybury (near Woking).—The new buildings erected by the School Board for the purpose of an infants' school have been completed, and are now in use. Situated at the back of the old schools, they afford accommodation for 255 children. The building is of red brick, and has been carried out by Mr. J. Peters, contractor, of Horsham, from the designs of Messrs. Wolman & Street, the Board's architects, at a cost of 1,407l., exclusive of an enlargement of the master's house, which cost 150l.

Widnesbury.—The memorial stones of the new wing of the Wesleyan schools at Spring Head have been laid. The extension will take the form of six new class-rooms, teacher's-room, and an extension of the upper schoolroom, and the entire cost, exclusive of furniture, is estimated at 1,319l., of which nearly 700l. remains as a debt. The work has been entrusted to Mr. A. Lynex, of Walsall, under the direction of Mr. C. H. Newman, architect, of Widnesbury.

STAINED GLASS.

Birch (near Manchester).—The Church of St. Agnes, Birch, has just received the addition of five painted windows, each with a pair of lights, placed in the chancel apse. They are presented to the church by Mr. Charles S. Keeling, of Burnage House, Levenshulme. The subjects are taken from among the chief events in the life of Our Lord, viz., His Birth, Christ with the Doctors in the Temple, the Baptism, the First Miracle, the Agony, Bearing the Cross, the Three Marias at the Tomb, Emmaus, the Incredulity of St. Thomas, and

the Charge to St. Peter. The work has been executed by Messrs. Heaton, Butler, & Bayne, of London, under the direction of Mr. Medland Taylor, the architect of the church.

Windsor.—Two stained glass windows by Messrs. C. Bussell, Gibbs, & Co., of London, designed by Mr. W. R. Brown, have been completed for the Windsor Town Hall. The windows are square-headed and divided into three panels, the centre ones containing medallion portraits of the late Duke of Albany and of Princess Beatrice respectively, while in the upper panels are their respective arms, with their supporters, &c., and in the lower ones the arms of the town.

The Student's Column.

STONE QUARRIES.—XIV.

ABERDEENSHIRE GRANITES (*continued*).

TIRLINGHILL QUARRIES.—These quarries are on the Boddam estate, about four miles south of Peterhead, and close to the sea. They have been extensively worked for a long period, and produce stone very much like that described as being worked on the Longhaven estate; so much so that what has been said of the one will equally apply to the other.

When large slabs and columns of it are examined, spots and dark patches are rarely found, and the tint is tolerably uniform. This cannot be said of many granites, hornblende or otherwise. It retains its polish for a long time. We saw a monument, erected in Aberdeen twenty years ago, and made of Peterhead granite. The weather had attacked the hornblende, and caused those parts of the stone containing a considerable proportion of that mineral to look rather dull, but, speaking of the monument generally, the polish is still quite fresh.

Cairngall Quarries.—The granite quarries of Cairngall are situated about five miles due west from Peterhead, in a rising piece of ground. They have been opened for a great number of years. The principal quarry was not worked systematically until 1808, in which year the foundations of the Bell Rock Lighthouse were laid, this stone being selected by Mr. Stevenson for use in that construction.

Although so near Peterhead, the colour of the stone is not red, but a bluish grey, and in this respect it resembles the granites near Aberdeen. It is readily distinguished from them by reason of the white felspar, many of which are 7 mm. across, being distributed conspicuously in the exceedingly fine-grained ground mass. This gives the stone a somewhat porphyritic appearance, which would be much better defined if the crystals alluded to had clearer outlines. As it is, they occur as white spots, the edges of which merge almost imperceptibly into the more minute felspars, forming, with the clear transparent quartz, the greater part of the base of the rock. The mica is black, and in very small flakes.

The joints in the quarries are, as a rule, perpendicular, and vary in thickness from 6 in. to 8 ft. These joints run from east to west, and are crossed by several slides from south to north at an angle of 45°. Blocks have been obtained above 20 ft. square and 8 ft. thick, an example being the sarcophagus in which the late Prince Consort is entombed, which is more than 80 tons in weight.

Other examples of the Cairngall granite may be seen at St. George's Hall, Liverpool, where eight pillars are erected, the shafts being 18 ft. in height, and each made of one polished block; the lintel over the door of the Duke of York's Monument; round the fountains at Charing Cross; and the pedestal of the Duke of Wellington's statue at the Royal Exchange, Glasgow.

Other quarries in Aberdeenshire are found at Alford, the largest one being known as the

Sylvestrie Quarry.—The stone obtained here is a very dark grey, much deeper than the average Aberdeen granite tint. It is composed of irregular crystals of white felspar, from an almost microscopic size to 12 or 14 mm. across. The quartz is very minute; the large quantity of mica present being black. A considerable amount of schorl may also be detected, though, as far as we can see, it does not occur in large crystals.

It is no doubt a pretty polishing stone, and is worked into various monumental and orna-

mental purposes by the quarriers, who bring it up the Alford Branch of the Great North of Scotland Railway to Aberdeen.

Tillyfourie Quarries.—These quarries are about five miles south-east of Alford, and quite close to the railway station. The old workings near the line are now nearly abandoned, the greatest energy at the present time being exhibited in those up the side of the hill, where they are partially hidden by the forest which surrounds them. These new workings were only opened about a year ago, but have been quarried to such a great extent that they have already assumed gigantic proportions, three large steam cranes being constantly at work. A fence has been erected, showing the intended size of the excavations, which, if carried out, will make this one of the largest quarries in Aberdeenshire. A fact worth mentioning is the manner in which the surface of the ground has been searched in attempting to fathom the existence of dykes or veins,—important items in opening up new ground. These are known locally as "barrs." As usual, a considerable amount of decomposed granite, an earthy substance, has been removed, and the blocks, *in situ*, which resisted that action, have been carefully examined and turned over. The examination has apparently been satisfactory, and there are good indications that the stone will run in large blocks. There can be no doubt that, with plenty of capital, this is a good method of arriving at the value of the quarry. Steam rock-drills are not used. Steam is conveyed to the cranes in pipes, from boilers at a distance. Two lines of rails go down the precipitous sides of the hill from the quarry to the railway, steel ropes moving over rollers, letting down trucks filled with the granite, and at the same time pulling up empty ones; precisely the same method as adopted at the Corrennie quarries.

The stone is of a bluish grey colour, and the grain is strongly marked; that is to say, the minerals have a rough tendency to lie in lines. The felspar, like that in other granites in the vicinity, is variable in size and very irregularly crystallised. In addition to the white felspar, a pink variety occurs, as elongated crystals, up to an inch in length, and with their major axes lying in approximately parallel planes. This pinkish felspar is the chief characteristic of the stone. The quartz is white, and clear, whilst the considerable proportion of mica present is quite black.

The rock is principally used for kerb and paving-sets, the greater part of which is sent to London.

Kintore Quarries.—These are situated close to the village of the same name, and produce a bluish-grey stone, not unlike the granite nearer Aberdeen. When the stone is cut at right angles to the foliation, roughly exhibited, the minute black specks of mica cause it to look strong in the grain. The felspar is white and some parts of the rock, when polished, present an appearance very much like that obtained from Cairngall. The quartz is small and granular, and appears rather snaky.

Birsmore Quarries.—The stone found at these quarries, which are close to Aboyne, is a very peculiar one, and the only granite we can compare with it, as far as appearance is concerned, is that from Shap in Westmoreland, for which, indeed, it is often mistaken. The principal difference between them is that the large porphyritic crystals of orthoclase felspar are not so well defined as in the latter stone. In other words, the large salmon-coloured spars are much more ragged in outline. These crystals occur up to an inch or more in length. There is a considerable proportion of the milky-white felspar in the base of the rock, which, when predominating more than usual, causes polished slabs to look rather cold. A similar appearance is presented by some of the light kinds of Peterhead rock. The quartz is in rather large pieces, transparent, but of a dark hue. Biotite mica is fairly abundant, hornblende being so rarely found that it ranks only as an accessory mineral.

This rock will no doubt become better known in the market. The darker kinds, when polished, are very handsome.

Persley Quarries.—These are close to the railway station at Buxburn, across the river. The general tint of the stone is a light grey. It differs from that of other quarries in the vicinity in containing white as well as black mica. The quartz is very minute, looking like transparent beads. White felspar forms a

large part of the rock, which imparts to it a light tint.

The stone is quarried principally for dressed blocks, but we have also seen polished examples, which look well.

Cairnery Quarry is also extensively worked by steam machinery. The stone is of a dark grey tint, and similar to other rocks of that nature, already described.

Other quarries are found near Ellon, where the stone is exceedingly dark, and, in fact, the small workings opened are far too numerous to mention. We have confined our observations on Aberdeenshire granites to the quarries where steam machinery is used, or in which the rock presents features of general interest.

The student who visits the yards of the Aberdeen polished granite merchants will find in some of them stones of quite different characters from those we have described. That city is the principal emporium of the polished granites, and it is not surprising that we find there stone from certain parts of Argyleshire and other parts of Scotland which have been sent to be polished. Again, a rich green rock from Warberg, in Sweden, and a light grey, fine-grained granite from near Breslau, in Silesia, may be found in some of the yards. The stone from the latter place is worked exclusively by manual labour, sent to and shipped at Sletting, and then carried to Aberdeen. After being made into monuments, &c., a great part of it is exported to America.

Many of the large firms in that city, however, polish Scotch granite exclusively, and will not permit foreign stone to enter their premises.

In concluding the observations on Aberdeenshire granites, we may draw attention to the fact that all granites, more or less, vary in tint even on the same stones. The granites under consideration fall under this law, and we find that polished slabs and monuments of the ordinary grey and blue stones are not always uniform in colour and texture; the darker stones being frequently covered here and there with lighter streaks, and the lighter ones with dark spots. Of course, great care is taken to avoid these as much as possible, and we could point to stones where the tint is quite uniform, but these may generally be regarded, as of exceptional quality. As far as durability is concerned, these local differences in composition are not detrimental in most cases, to their preservation, and unless such spots or veins contain more perishable minerals, than does the normal rock, they do not detract from their value in this respect.

There are exceedingly few granites used in the polishing trade, which permanently retain their tints. A granite column, or slab, always looks better when it is just finished, and immediately turned out of the polisher's yard, than when it has been made a year or two. This means that the quarry water, or moisture introduced during manipulation, has dried out; and in some cases, that the stone has commenced to decay. If it has been caused by the former action, it is astonishing to find that after its original tint has been toned down its colour will often remain permanent for many years, unless time discovers that magnetic iron, or some other discolouration mineral is present, when unsightly brown marks are caused,—two well-known to the architect to need much description. The best method for detecting these minerals is by the aid of the microscope in the manner previously described. They are rarely seen on a fresh surface of stone, by the naked eye.

If the student elects to examine the stone from the examples seen in buildings that have been erected for a few years, we must caution him to be very careful in identifying each of the stones. Even the experienced eye cannot always be sure of the name of the quarry from which certain stones have been obtained, as many of the grey and blue granites are almost exactly alike in appearance, though the differences existing, as far as quality is concerned, are often very considerable. The rocks are no sooner investigated closely, from a scientific point of view, than these diversities become at once apparent.

Durham.—The new Congregational church designed and superintended by Mr. H. T. Graddon, architect, of Durham, has been opened for public worship. It has been erected at a cost of about 3,500l., and has accommodation for upwards of 500 people. Messrs. George Graddon & Son were the contractors.

Books.

The Construction of Silos. By THOMAS POTTER. London: B. T. Batsford. 1886.

ALTHOUGH Mr. Potter's little book is necessarily of the technical order, it is sufficiently interesting both in matter and manner to warrant a perusal on the part of the general reader, whose first impression must be one of astonishment to find that any agricultural subject could have risen within such a very short space of time, as to require not only a special handbook but also a special nomenclature. Some three years ago, ensilage, ensile, or silo were unknown quantities in the English language, whereas now they are household words, and what is more, words implying a vast revolution in agricultural affairs. So rapidly has the application of "silage," or the preparation and preservation of green crops for cattle food, increased, that the subject is becoming of very considerable interest to the builder, as well as the farmer; for although a silo may mean simply a hole in the ground, water-tight, and with sides that will not tumble in, it has come to mean also buildings of various degrees of size and complicated arrangements, the object of the process being to place the green crops in the receptacle so as to exclude the atmosphere, and under considerable pressure, so as to produce fermentation. The fermentation goes through the stages of lactic, alcoholic, and acetic acid, by which time, or perhaps a little before, the silage becomes "sweet," or in its best condition for cattle food. The chief requisites, therefore, are air and water tightness, with varying amounts of pressure, which should be uniform and continuous, although opinions differ very much whether it should be heavy or light. The consensus of opinion leans to the former, although some agriculturists go so far as to declare that none at all is desirable. Generally speaking, the amount of compression necessary for sweet or sour silage is taken at the medium of from 100 to 125 pounds. The considerations that influence the erection of a silo are manifold, depending upon the landlord's view, in which case it would be permanent, or the tenant's, who would naturally make it portable, while some advocate silage stacks in all respects like haystacks, but with the addition of pressure or weights. There is no doubt that in hill farms and straggling districts there is considerable advantage in these latter. Some, too, build silos below ground, others above ground; but in this latter case care must be taken not to fix them too near wells, unless they are made completely water-tight. Although some landowners favour very large silos, such as that of the Vicomte de Chazelles, which is 16 ft. long, 20 ft. broad, and 13 ft. 6 in. in depth, it is considered wiser to have two or three silos of medium size; more especially, after the cutting of the silage has commenced, the face of the cut material is apt to get mouldy, and its value as a feeding stuff impaired. Silos above ground may be of any shape, the point to be considered being how to obtain a minimum amount of wall material for a maximum amount of cubic space, and, or is, perhaps, a cylindrical silo would answer best, of 12 ft. in diameter, with walls 12 in. thick. In underground silo is best to be made circular, inasmuch as it is the strongest form to resist external lateral pressure. In constructing a circular, square, and rectangular silo, of equal depth, the latter being about a third longer in the ends, the result would be a capacity of 2½ cubic feet for every foot in depth of the circular, 100 ft. for the square, and 88 ft. for the oblong, a difference that points to a preference for the circular first, and then for the square; but if a group of silos were wanted, 10 ft. square it would be best to build a group of four, as there would be a great saving of material, a group of three rectangular silos requiring 108 ft. of lineal walling, while three separate ones would require 126 ft. A group of four square silos would want only 84 ft. of walling, while four separate ones would want 168 ft., a saving of 23 per cent. in group of four. As to the cost of walling of silos, it is almost impossible to give any accurate estimate, for this will depend upon site, material, and many other things, though it may be stated that a 50-ton silo (the silage weighing 12 lb. per cubic foot), measuring 14 ft. square and 12 ft. 6 in. in depth, would require 82 superficial yards of brick walling, one brick thick, or

84 superficial yards, of one brick and a half thick, at the cost of 221. 11s. or 341. 13s. respectively. The three classes of walling from which a choice can be made are, (1) stone, either rubble or squared; (2) brick; (3) concrete, the latter possessing all the elements of homogeneity, durability, and economy, though requiring some special knowledge in its application. It is true that silos may be also made of wood, as is mostly the case in America, where timber is plentiful, but it scarcely answers the purpose in this country, elm or beech being apt to warp, ash being too valuable, while oak would convey an unpleasant taste to the silage, from its contact with the acid arising from fermentation. If, however, timber is used, say the best red deal or battens, the walls would cost about 5s. 6d. per superficial yard, or 201. 10s. for a 50-ton silo; but a wood silo has so many disadvantages, and its life is so short,—about five years on the average,—that this material cannot be recommended as a rule. The roofing is an important point, and when durability is not the question (from the tenant's view), weather-boarding, roofing felt, or Willemsen paper will answer the purpose; but when the silo is permanent, the ordinary description of roof-covering is required, the best being corrugated galvanised iron, the price of which, though fluctuating with the cost of iron, zinc, and spelter, will range from 14l. to 17l. per ton. *Appropos* of this fact, Mr. Potter properly calls attention to the frequently faulty statements of builders' price-books. The flooring of the silos should be of concrete, though differing from the concrete of the walls by containing a larger portion of cement, say, one part to four of the coarser material, while less water should be employed in the mixing. The author gives some excellent illustrations of some of the most typical silos in this country, such as Lord Ashburton's at Alresford, which holds ninety-six tons, and cost 113l., and Messrs. Bantall's, of Maldon, which is of considerable height, and has a crab and a swinging crane to raise the green crop. Lord Londesborough's two silos near Lyndhurst cost 220l., while Lord Toller's, in Cheshire, has set an example of economy by converting existing buildings into silos, such as old barns or open sheds, at an approximate cost of 52l. We have not space to go into the many minute details as to silo construction with which Mr. Potter's excellent manual abounds. To the intending possessor of a silo it is simply indispensable, while those who are not on agricultural concerns bent will obtain much pleasant and valuable information.

Retrospections, Social and Archaeological. Vol. II. By C. ROACH SMITH, F.S.A. London: Geo. Bell & Sons. 1886.

THE personal reminiscences of any man who has spent a long and active life in the pursuit of a special science, can scarcely fail to possess more or less interest for the reader; and in this respect the second volume of Mr. Roach Smith's retrospections does not fall short of the standard. There is not an archaeologist in this country or throughout the Continent to whom the name of Roach Smith has not for many years been a household word, and particularly in that branch that deals with Roman remains; and his "*Collectanea Antiqua*" and the collection illustrating Roman England now in the British Museum will remain a permanent and enduring monument to his wonderful energy and perseverance. The present volume, which appears three years after the first, a break in the continuity that is much to be regretted, is mainly an account of his personal acquaintance with contemporary archaeologists, somewhat loosely strung together, in which antiquarianism and anecdotal matter follow each other in rather incongruous juxtaposition. Even under this form the information that we get of the lives and writings of such men as John Britton, John Gough Nichols, Rev. Charles Welbeloved, J. G. Waller, Prof. Henslow, Dr. Bruce, Llewellynn Jewitt, M. Worsæ (of Denmark), M. Boucher de Perthes (of prehistoric flints renown), Matthew Bloxam, and others, can never be uninteresting, if only as showing how laboriously and bit by bit the records of past nations have been unearthed. Indeed, the book may well be described as the identification of the workers with the science of archaeology, though, interspersed here and there, we find valuable notices of the places as well as of the people, the most important of these being the Roman remains of Colchester, London,

York, Aldborough, and Chesterford. Mr. Smith tells us of the battle that raged, as to whether Colchester was *Camalodunum* or *Colonia*, whereas these were one and the same place, the former being the great British oppidum, the latter the name given by the Romans to the colonia or town which they built about a mile from the oppidum. Here was the chief cemetery of Roman Colchester, though it is curious that all the military inscriptions are those of veteran retired legionaries from other parts of Britain, *Colonia* never having had a garrison permanently quartered in it. The tiles, which form such a very peculiar feature in the old church and other buildings of Colchester, have misled many as to their date; and even in the Castle, they have been so abundantly used after the Roman style, as to give a notion of much earlier antiquity than belongs to it. Mr. Smith points out, however, that these tiles are not Roman, being much less firm and compact, and of a darker and duller red. The fact was, that they were manufactured at Colchester for several centuries after the departure of the Romans; and this is shown also by a careful observation of the mortar, which more or less always adheres to true Roman tiles. It was composed largely of lime with pounded tiles, sand, and gravel, while Saxon and Norman mortar is very inferior, the sand being in excess and without the pounded tile.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,934, Cement. R. Stone.

The chief improvement embraced by this invention consists in mechanical means adapted for the crushing the raw materials instead of pulverising them. Rolls and harrows with many teeth (placed on both sides of the harrows) are used for the purpose.

11,225, Gate Latches. E. Jones.

The latch is formed with a club bolt worked by a spiral spring, and the action is made by pulling an inner bow or handle towards the outer bow or handle, so that the motion requisite to open the gates also unfastens them.

13,329, Ships' and other Water-closets. J. Beresford and W. Restall.

The improvements made by this invention are principally applicable to such water-closets as are stationed below the water-line of a ship, or to water-closets placed in basements or at a level below that of the drain-off or sewer into which the excrementitious matters are to be passed. A water-supply pump and a force-pump for withdrawing the soil are placed near each other, the piston-rods of the two pumps being connected to a horizontal lever worked by hand, this hand-lever being jointed to a rocking arm of the closet. Suitable valves are worked by this arrangement, so that the double operation is performed by a single action of the lever.

13,346, Door Locks. C. A. Andersson, Stockholm.

This invention relates to a lock which can be oiled or lubricated without the necessity of removing it from the door or otherwise disconnecting it. A hole is bored in the portion of the bolt projecting from the lock and parallel with the edge plate. Into this hole is introduced a spiral spring with a small valve at its upper end. When the valve is pressed down into the hole oil can be poured into the interior parts of the lock.

13,514, Boardings for Surfaces to be Plastered. Heinrichs and Wildhagen.

The boards are provided with notches or grooves which form a pointed angle to the level of the surface to be plastered. No hair or laths are required.

13,638, Window and Door Fastener. T. Newey.

The fastener is locked by the simple action of moving the bolt across the sashes as now performed with ordinary window-fasteners. The falling of the catch engages two levers, a fastening and a locking lever.

13,687, Apparatus for Drawing in Perspective. A. Brix, Frankfurt.

This invention aims at effecting a direct preparation of perspectives without construction from the outline, and given heights, with a single determination of height. Slanting and curved lines can be projected with a considerable saving of time and labour. A pantographic arrangement is adjusted by means of a vertical scale, and the point of view being determined, the drawing may be traced in perspective from a flat outline.

13,699, Cement or Mortar. W. Keller.

Metallic fibres or wires are mixed with the cement for the purpose of imparting a fibrous nature to the material, and making it bind much firmer.

Birmingham Architectural Association.
On Saturday afternoon last the members of this Association paid a visit to the new Institute Buildings and "The Oak" half-timbered house at West Bromwich. On arriving at West Bromwich the party were met by Messrs. Wood & Kendrick, architects of the Institute, who conducted them over the new buildings, which were much admired both for their general design and convenience of plan. Mr. Macaulay, Secretary of the Institute, had kindly granted permission for the visit, and gave much useful information as to the classes and lectures held during the session. The party then proceeded to the old half-timbered house called "The Oak," where, by the favour of its present owner, inspection was made both internally and externally of the rare woodwork and carving. This old mansion, though much out of repair, still remains a fine example of sixteenth-century work. The plan consists of porch, hall, three sitting-rooms, kitchen, &c., and bedrooms over. The old staircase and quaintly-carved chimney-pieces are in a good state of preservation. The house originally belonged to the Turlton family of Alrewas, near Lichfield, and is now in the possession of Mr. T. Hamblett, of West Bromwich. A visit was made to the Town-hall and adjacent buildings, and the members returned to Birmingham about five p.m.

The "Prince of Wales's" Theatre.—Mr. Edgar Bruce has just obtained special permission from H.R.H. the Prince of Wales, through the Lord Chamberlain, to rename his house in Coventry-street, Piccadilly, the Prince of Wales's Theatre. This was the title originally intended to be used; but the licensing authorities held that it was but fair to the landlords of the famous old building in Tottenham-street (which was condemned by the Board of Works in 1882 as unsafe), that a certain time should be allowed them to rebuild before their title could be transferred elsewhere. This difficulty being now removed, the Prince's Theatre will, on and after next licensing day (September 30th), be known as "The Prince of Wales's Theatre."

Building Land at Barking.—The first portion of the Kennedy Estate at Barking, covering an area of about thirty acres, was offered for sale on Monday evening by Messrs. Baker & Sons at the Bull Hotel. The estate, which is intersected by the London, Tilbury, and Southend Railway, and on the main road to Rainham, has been laid out for the erection of about 450 houses and shops, ten new roads, each 40 ft. in width, having been formed on the estate. The number of sites submitted on Monday was ninety-one, nearly the whole of them having frontages of 18 ft., and a depth of about 100 ft. There was a very numerous attendance at the sale. Mr. Baker pointed out the eligibility and value of the property as situated so near London, and in immediate proximity to several extensive manufactories. Referring to the rapid expansion of Barking, he stated that an estate closely adjoining, on the west side, had all been sold, and was now covered with houses. On the sale commencing there was a very active competition for the several lots, the first twenty-six lots having frontages to Kennedy-road realising from 10l. 13l. each, several succeeding shop plots bringing another road being sold for 16l. and 17l. 10s. Other shop plots facing the Barking and Rainham main road, and having frontages of 18 ft. and a depth of 100 ft., were sold at 20l. 12l. each, and a corner hotel plot having frontage of 40 ft. to the Barking and Rainham rd., with a return frontage of 150 ft., realised 17l. The whole of the lots were sold, and the auctioneer announced that there would be a further sale of another portion of the estate in not more than three weeks.

Swedish Timber for the City of Paris.—It may seem strange that, considering the enormous import of Swedish timber annually to France, the City of Paris should have to go to the wood markets of Sweden in order to obtain its supply of wood for paving streets. It is, however, the case, this city having lately invited tenders in Sweden for the supply of 70,000 metres run of Swedish pine planks, 3 by 9, 3 by 8, and 3 by 7, from 2 to 20 metres in length, assortments so-called French de (English fourths). A Government engineer has been sent over to examine the wood before acceptance. It is believed that the price will be far less than if purchased in France, agents being dispensed with, but the price expected is not known.

Architectural Association.—By a communication from the hon. secretary of the Association we learn that it is intended that the Architectural Association's practical class of masonry, under the direction of Mr. Lawrence Harvey, should be carried on "on the same lines as the classes of masonry in the old guilds of stonemasons. The students will be made to construct models of various structures at the scale of about one-eighth real size, and will execute for that purpose the working drawings as well as cut out each stone. The instruction will be mutual as is still usual in the remaining guilds of stonemasons abroad. Every student will be expected to give as well as to receive instruction, so that the lessons delivered to a few by the director of the class may be transmitted to all those who wish to study masonry. By this means two advantages are secured; firstly, a much closer supervision can be given to each student than when the teacher has to deal with large numbers of pupils; secondly, each student has an opportunity of testing his own knowledge when he endeavours to teach others. The selection of the ten members of the first class will be made on the principle of their seniority in architectural practice, as being the most likely to profit by the instruction given and to be able to teach in their turn. The others will join the subsidiary classes, which will be formed as soon as possible under the direction of the members of the first class."

PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	.....ton	6	10	0	7	0	0
Teak, E.I.	.....load	9	0	0	14	0	0
Sequoia, U.S.	.....foot cube	0	2	4	0	2	7
Ash, Canada	.....load	3	0	0	4	10	0
Birch	.....	2	10	0	4	0	0
Elm	.....	3	10	0	4	10	0
Fir, Dantzig, &c.	.....	1	10	0	4	0	0
Oak	.....	2	10	0	4	10	0
Canada	.....	3	0	0	6	0	0
Pine, Canada red	.....	2	0	0	3	10	0
Lath, Dantzig	.....fathom	3	0	0	5	0	0
St. Petersburg	.....	4	0	0	5	10	0
Wainscot, Riga	.....log	2	15	0	4	0	0
Odessa, crown	.....	3	5	0	3	7	6
Deals, Finland, 2nd and 1st	.....std. 100	7	0	0	8	0	0
4th and 3rd	.....	6	0	0	7	0	0
Riga	.....	8	10	0	7	0	0
St. Petersburg, 1st yellow	.....	8	0	0	14	0	0
2nd	.....	7	0	0	8	0	0
Swedish white	.....	7	0	0	10	0	0
White Sea	.....	7	0	0	15	0	0
Canada Pine, 1st	.....	17	0	0	30	0	0
2nd	.....	12	0	0	17	0	0
3rd, &c.	.....	6	0	0	10	0	0
Spruce 1st	.....	8	0	0	11	0	0
3rd and 2nd	.....	5	0	0	7	10	0
New Brunswick, &c.	.....	5	0	0	7	0	0

TIMBER (continued).		£.	s.	d.	£.	s.	d.
Battens, all kinds	.....	4	0	0	12	0	0
Flooring Boards, sq. 1 in. prepared, first	.....	0	9	0	0	13	0
Second	.....	0	7	0	0	8	6
Other qualities	.....	0	5	0	0	7	0
Cedar, Cuba, .....	.....	0	0	0	0	0	33
Honduras, &c.	.....	0	0	22	0	0	32
Australian	.....	0	0	2	0	0	3
Mahogany, Cuba	.....	0	0	4	0	0	7
St. Domingo, cargo average	.....	0	0	4	0	0	7
Mexican	.....	0	0	32	0	0	42
Tobacco	.....	0	0	4	0	0	62
Honduras	.....	0	0	42	0	0	62
Maple, Bird's-eye	.....	0	0	8	0	0	8
Rose, Rio	.....	7	0	0	10	0	0
Bahia	.....	9	0	0	10	0	0
Box, Turkey	.....	5	0	0	17	0	0
Satin, St. Domingo	.....	0	0	7	0	0	11
Porto Rico	.....	0	0	8	0	0	1
Walnut, Italian	.....	0	0	4	0	0	5

METALS.

Iron—Fig. in Scotland	.....ton	0	0	0	0	0	0
Bar, Welsh, in London	.....	4	2	6	4	15	0
" " in Wales	.....	4	2	6	4	7	6
Staffordshire, London	.....	5	10	0	6	0	0
Sheets, single, in London	.....	6	15	0	8	10	0
Hoops	.....	6	0	0	7	0	0
Nail-roads	.....	5	10	0	6	10	0

COPPER.		£.	s.	d.	£.	s.	d.
British, cake and ingot	.....ton	43	0	0	43	10	0
Best selected	.....	44	0	0	44	10	0
Sheets, strong	.....	50	0	0	50	0	0
" India	.....	0	0	0	0	0	0
Australian	.....	0	0	0	0	0	0
Chili, bars	.....	40	12	6	41	0	0
YELLOW METAL	.....lb.	0	0	0	0	0	0

LEAD.		£.	s.	d.	£.	s.	d.
Fig. Spanish	.....	13	18	9	0	0	0
English, common brands	.....	13	2	6	0	0	0
Sheet, English	.....	14	0	0	14	2	6
SWEETENED.		£.	s.	d.	£.	s.	d.
Silesian, special	.....ton	13	12	6	13	15	0
Ordinary brands	.....	13	10	0	13	12	6

TRY.		£.	s.	d.	£.	s.	d.
Banca	.....ton	0	0	0	0	0	0
Billiton	.....	0	0	0	0	0	0
Straits	.....	102	15	0	0	0	0
Australian	.....	103	10	0	0	0	0
English ingots	.....	105	0	0	0	0	0

ZINC.		£.	s.	d.	£.	s.	d.
English sheet	.....ton	18	0	0	18	5	0

OILS.

Linseed	.....ton	21	0	0	21	5	0
Cocanut, Cochin	.....	33	5	0	0	0	0
Ceylon	.....	25	10	0	25	15	0
Copra	.....	0	0	0	0	0	0
Palm, Lagos	.....	33	0	0	0	0	0
Palm-put Kernel	.....	0	0	0	0	0	0
Rapeseed, English pale	.....	22	0	0	0	0	0
" brown	.....	20	10	0	0	0	0
Cottonseed, refined	.....	18	0	0	18	0	0
Tallow and Oleine	.....	25	0	0	45	0	0
Lubricating, U.S.	.....	8	0	0	10	0	0
" Refined	.....	8	0	0	13	0	0

TURPENTINE.		£.	s.	d.	£.	s.	d.
American, in casks	.....cwt.	1	6	6	1	6	6
Tar—Stockholm	.....barrel	0	15	0	0	15	6
Archangel	.....	0	10	6	0	11	0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Market Buildings	Carlisle Corporation	100l. and 50l.	Nov. 20th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Broken Granite	Aldershot Local Board	W. L. Coulson	October 4th	xviii.
Making-up Road	Lewisham Bd. of Wks.	Official	October 5th	ii.
Making-up Roads, &c.	Essex Local Board	De Page	do.	ii.
Alterations, W.C. District Post-Office	Com. of H.M. Works	Official	October 11th	ii.
River Wall, Dumb Dock, &c.	Wandsworth Bd. of Wks.	do.	October 12th	ii.
Dames Ballast and Sand	Admiralty	do.	do.	ii.
General Repairs, Oldbury County Court	Com. of H.M. Works	do.	October 13th	ii.
Broken Blue Guernsey Granite	Twickenham Local Bd.	do.	October 14th	xviii.
New Boiler and Repairs to Hot-Water System	Kensington Guardians	H. H. Bridgman	do.	xviii.
Erection of House, Worthing	Admiralty	Official	October 15th	ii.
Reservoir, and other Works	Liverpool Corporation	G. F. Deacon	October 18th	ii.
Sewage Works Extension	Tottenham Local Board	De Page	October 18th	ii.
Water Works, &c., Burnham	Maldon U. R. S. A.	Alan Stewart	October 25th	ii.

TENDERS.

BATH.—For the erection of farm buildings, Sutton Montis, Bath. Mr. George B. Jewell, architect.		£.	s.	d.
Yeoil	.....	1,900	0	0
Pittard	.....	2,654	10	0
Poole	.....	1,850	0	0
Andrews, Sherborne (accepted)	.....	1,570	0	0
BAYSWATER.—For building hall at the side of the Swan public-house, Bayswater-road. Mr. F. Dovey, architect.		£.	s.	d.
Stevens & Hayworth	.....	2596	0	0
Grant	.....	475	0	0
Saunders	.....	455	0	0
G. Bowles	.....	415	0	0
White (accepted)	.....	380	0	0

BRADING (I.W.).—For infant schoolroom, &c., the
Mall, Brading, Isle of Wight, for the Brading School
Board. Mr. Jas. Newman, architect:—

F. Edmett.....	£293 18 0
E. M. Dailsh.....	803 7 0
R. Griffin.....	822 17 3
Geo. Hayles.....	793 10 0
Jas. Ball.....	757 0 0
Alex. Newham.....	770 0 0
Isaac Barton.....	764 0 0
Jas. Hayden.....	740 0 0
John Meader (accepted).....	676 0 0

CAMBRIDGE.—For additional cattle-pens, flooring,
and fencing at the Cattle Market, for the Cambridge
Corporation. Mr. Frank Waters, F.S.I., architect,
Sidney-street, Cambridge. Quantities by the architect:—

G. E. Mills.....	£1,047 0 0
M. Yarrow.....	984 0 0
Wm. Saint.....	958 0 0
Royal Bros. (accepted).....	945 3 0

[All of Cambridge.]

CHELSEA.—For mansions, Pont-street, Cadogan-
square. Mr. Edwin T. Hall, architect, Moorgate-street.
Quantities by Messrs. Evans & Deacon, Adelaide-street:—

Longmire & Burge.....	£13,440 0 0
T. Boyce.....	13,154 0 0
J. & J. Greenwood.....	13,132 0 0
Perry & Co.....	12,837 0 0
E. Toms.....	12,738 0 0
W. Oldrey.....	12,377 0 0
Foster & Dicksee (accepted).....	12,324 0 0

CHANNING (Middlesex).—For a villa residence at
Crown, near Hounslow, for Mr. John Croxson Messrs.
Brown & Marsland, architects:—

Daniels.....	£2850 0 0
Haynes.....	2921 0 0
Jamieson.....	2988 0 0
Kearley.....	2776 0 0
Gibson.....	2774 0 0
A. B. Hanson.....	2767 0 0

CROYDON.—For first portion of new shop and pre-
mises, Walsley-road, for Messrs. Lovibond, brewers, &c.,
Mr. Robert Ridge, architect, Katharine-street, Croydon:—

Bryan.....	£2389 0 0
Smith & Sons.....	230 0 0
Pearce.....	214 0 0
Wyatt.....	206 0 0
Smith & Bullied.....	199 0 0
Pearson.....	195 10 0
Gould & Glasscock.....	185 0 0
Paps.....	183 0 0
Tite.....	180 0 0

HIGHBURY.—For the construction of new roads and
sewers on the Highbury-place Estate, for the Executors of
the late Mr. Edwin Robinson. Mr. C. J. Bentley,
surveyor:—

J. Mowlem & Co., Westminster.....	£1,413 0 0
Carter, Akerley.....	1,364 19 7
G. Neal, Wandsworth.....	1,323 0 0
C. Taylor, Holloway.....	1,326 0 0
W. Harris, Camberwell.....	1,315 0 0
J. Hare, Clapham.....	949 0 0

LONDON.—For the erection of warehouses and offices
on a site adjoining Clifford's Inn, Fetter-lane, for Messrs.
Sampson Low, Marston, Searle, Rivington, & Marston.
W. H. Seckham Witherington, F.R.I.B.A., architect,
Mark-lane:—

Stanley Bird.....	£10,027 0 0
C. F. Kearley.....	9,970 0 0
Grover & Sons.....	9,723 0 0
W. Shepherd.....	9,364 0 0
Brass & Sons.....	9,763 0 0
Kirk & Randall.....	9,740 0 0
Colls & Sons.....	9,700 0 0
Friesley.....	9,670 0 0
Patman & Fotheringham.....	9,463 0 0

[Architect's estimate, 9,467.]

LONDON.—For painting and repairs at No. 144,
Harley-street. Mr. H. H. Collins, architect, Old Broad-
street:—

Shoolbred & Co.....	£569 0 0
Vernal & Griffiths.....	617 0 0
Geo. Foxley, King-street.....	495 0 0

LONDON.—For new bar fittings and sundry alterations
at the Wheatstee, Goldhawk-road, Shepherd's Bush, for
Mr. Lavers:—

Schlatter.....	£133 0 0
Pectester's Work.....	58 8 0

[No competition.]

PLUMSTEAD.—For the erection of nine small houses.
Mr. H. Whitman Rising, architect:—

Drake & Co. (concrete builders).....	£3,700 0 0
Longman Brothers, Plumstead.....	3,498 0 0
J. T. Chappell.....	3,483 0 0
Robt. Rayner.....	3,173 0 0
Harris & Wardrop.....	3,120 0 0
O. Craske.....	3,083 0 0
B. E. Nightingale.....	3,029 0 0
J. Holloway.....	292 0 0

SANDOWN (I.W.).—For St. John's parish room,
Sandown, Isle of Wight. Mr. Jas. Newman, architect:—

Alfred Young.....	£285 0 0
Wm. Jolliffe.....	283 0 0
Fred. Edmelf.....	289 0 0
Jas. Hayden (accepted).....	245 0 0

SPECIAL NOTICE.—Lists of Tenders frequently
reach us too late for insertion. They should be delivered
at our office, 46, Catherine-street, W.C., not later than
Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

E. G. D.—P. T. W. G. (drawings received).—V. S.—J. C. R.—
J. H. E.—"Brighton." (We do not publish tenders without amount).
—O. & R.—J. B. (MS. received).—M. & T.—J. W. Handworth (It is
not the asking what would be the cost of a plan, but what it
is all depends on what sort of building you want. You might spend
anything from £100 to £5,000 on it).

All statements of fact, tenders, &c., must be accompanied
by the name and address of the sender, not necessary for publica-
tion.

We are compelled to decline printing out books and giving
addresses.

NOTE.—The responsibility of signed articles and papers read at
public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications beyond newsworthy items have
been objected for their length, are NOT DESIRED.

All communications on technical and artistic matters should be
addressed to THE EDITOR, all communications relating to
advertisements and other business matters should be
addressed to THE PUBLISHER, and not to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS,
TRADE, AND GENERAL ADVERTISEMENTS.

Advertisements on front page, 50 words or under..... 4s. 6d.

Each additional line (about ten words)..... 6d.

Terms for Series of Trade Advertisements, also for special adver-
tisements on front page, 50 words or under..... 9s. 6d.

Each additional line (about ten words)..... 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

FOUR Lines (about THIRTY words or under)..... 2s. 6d.

Each additional line (about ten words)..... 6d.

Stamp must not be sent, but all small sums should be
remitted by Cash in Registered Letter or by Money Order, payable
to the Post-office, Covent garden, W.C. to

DOUGLAS FOUNDRY, Publisher.

Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week's issue must reach the Office
before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTI-
MONIALS, &c. left at the Office in reply to advertisements, and
strongly recommends that of the latter COPIES ONLY should be
sent.

**SPECIAL—ALTERATIONS IN STANDING ADVERTISE-
MENTS OR ORDERS TO DISCONTINUE same,**
must reach the Office before FIVE o'clock on WEDNES-
DAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed
to the Office, 46, Catherine-street, Covent garden, W.C.
free of charge. Letters will be forwarded, if addressed
envelopes are sent, together with sufficient stamps to
cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied gratis from the Office to residents
in any part of the United Kingdom at the rate of 12s. per annum
Prepaid To all parts of Europe, America, Australia, and New
Zealand, 25s. per annum. To India, China, Ceylon, &c. 30s. per
annum. Remittances payable to DOUGLAS FOUNDRY, the
Publisher, No. 46, Catherine-street, W.C.

AN EDITION Printed on THIN PAPER, for FOREIGN CIR-
CULATION, is issued every week.

Colonial and Foreign Postage.

AN EDITION of "THE BUILDER" printed on
thin paper, for foreign circulation, is issued
every week.

Best Bath Stone.

WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down,
And Farleigh Down,
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [Adv.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [Adv.]

Doubling Freestone and Ham Hill Stone

of best quality, in blocks, or prepared ready for
fixing. An inspection of the Doubling Quarries
is respectfully solicited; and Architects and
others are CAUTIONED against inferior stone.
Prices, delivered to any part of the United
Kingdom, given on application to CHARLES
TRASK & SONS, Norton-sub-Hamdon, Ilminster,
Somerset.—Agent, Mr. E. WILLIAMS,
No. 16, Craven-street, Strand, W.C. [Adv.]

Doubling Free Stone

For prices, &c., ad-
dress S. & J. STAPLE,
HAM HILL STONE, Quarry Owners, Stone
and Lime Merchants,
BLUE LIAS LIME, Stoke - under - Ham,
(Ground or Lump), Ilminster. [Adv.]

Asphalte.—The Seyssel and Metallic Lava

Asphalte Company (Mr. H. Glenn), Office, 88,
Poultry, E.C.—The best and cheapest materials
for damp courses, railway arches, warehouse
floors, flat roofs, stables, cow-sheds, and milk-
rooms, granaries, tun-rooms, and terraces. [Adv.]

Asphalte.

Seyssel, Patent Metallic Lava, and
White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [Adv.]

Labour and Time Saved!

New SAW. PATENTED 1885.

Saves its cost every year. Great economiser of strength.
Circular, two stamps. May be seen at Britannia Company's
London Showroom, 99, FENCHURCH-STREET. All
correspondence to Britannia Works, COLCHESTER.
Every woodworker should see this. [Adv.]

MICHELMORE & REAP,

Manufacturers of

CHARLES COLLINGS' PATENT.

COLLINGS' PATENT HINGES,

LEVER, SCREW, & BARREL BOLTS,

Self-Acting "FALL DOWN" GATE STOPS,

and IMPROVED GATE FITTINGS of every Description.

36A, BOROUGH ROAD,

LONDON, S.E.

DISCOUNT TO BUILDERS.

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.

IRON CISTERNS.

F. BRABY & CO.

LONDON, LIVERPOOL, GLASGOW.

VERY PROMPT SUPPLY.

LARGE STOCK READY.

CYLINDERS FOR HOT-WATER CIRCULATION.

Particulars on application.

Chief Office: 360, EUSTON ROAD, LONDON.

ILLUSTRATIONS.

Suggested Design for Liverpool Cathedral.—By Mr. James M. Hay, Architect	520-521
The Manchester Jubilee Exhibition Building (with Plan).—Messrs. Maxwell & Tuke, Architects.....	524-525
Warehouses, St. Paul's Churchyard.—Mr. Fredk. Henning, Architect	528-529
New Studios, South Kensington.—Mr. Wm. Flockhart, Architect	532
New Building for the University, Oxford.—Mr. T. G. Jackson, M.A., Architect	533

CONTENTS.

The Government and the Thames.....	530	New Studios, Gloucester Terrace, for Messrs. Elliott & Fry	518	The Diminishing Remnants of Roman Bath.....	540
The Imperial Colonial Institute.....	510	New Buildings for the University of Oxford	535	Episcopal Heraldry	540
The Roman Remains at Bath	510	The Constitutional Club, Northumberland Avenue	535	Stained Glass at Windsor	540
Notes	511	Further Notes of the Sanitary Congress at York.....	535	The Student's Column: Stone Quarries.—K.V.	540
A Proposal for a New Thames Bridge (Illustrated).....	511	The Architectural Association	536	Recent Patents	541
The Ecclesiastical Art Exhibition, Wakefield	513	The Association of Public Sanitary Inspectors	538	Recent Sales of Property	541
Professor Roger Smith on Learning to Design Buildings.....	514	Architectural Association Saturday Visits.....	539	Meetings	542
Suggested Design for Liverpool Cathedral	518	Competitions	539	Building Land at Lowestoft.....	542
Manchester Exhibition Building	518	Stanley's Patent Secret Balance Chandeliers	539	Miscellaneous	543
New Warehouses, St. Paul's Churchyard	518	Obituary	539	Prices Current of Building Materials	543

The Government and the Thames.

THE interference of the Home Secretary in defence of the river Thames, referred to in a "Note" in the *Builder* for September 25 (p. 441), if it be anything more than a *brutum fulmen*, must initiate a new phase in sanitary procedure. We can see no reason to doubt that a Secretary of State new to his department, and worthily desirous to signalise his tenure of office by valuable administrative reforms, has carefully weighed his own power, before proceeding to give a hint which would be ridiculous if it did not convey a covert menace to such a body as the Metropolitan Board of Works. It has been considered to be a principle of English law that there is no wrong without a remedy. But in the case of such a wrong as may be committed by a bungled Act of Parliament the remedy is somewhat hard to find. It is generally held to consist in the enactment of an amended measure. And this involves cost, anxiety, and responsibility which few persons are willing to encounter. But it is, or at all events it used to be, true that there are certain occasions on which the Secretary of State, if he cannot overrule an ill-drawn Act of Parliament, has such means at his command as will come, if judiciously and firmly used, to pretty much the same thing. That this is the case with reference to the pollution of the Thames there are many persons who have long been of opinion. And if the Home Secretary takes this view, and has the courage of his opinions, we may be within a measurable distance of the remedy for one of the most dangerous sanitary scandals of the day.

If we clear the ground, it will become apparent to what small proportion doubt on the subject will be reduced. It is well known that the Metropolitan Board of Works now pour daily into the Thames the raw sewage of some four millions of human beings. It is well known that, by the general consent of medical men, great danger is thus incurred; as the sewage due to each unit of a population, if undefeated, is enough to poison the water supply required for fifty individuals. It is known that Parliament has decided that direct pollution of our rivers shall be prohibited under severe penalties, and that it is only due to a misunderstanding at the time when their powers were granted that the Metropolitan Board of Works have contracted themselves, or, so to speak, legislated themselves, out of

the wholesome control of the provisions of the Rivers Pollution Act.

The Home Office acknowledges that, at all events, to a certain extent, it is responsible for the enforcement of the law. Nor can any case be imagined in which it is more desirable that the powers of the Department should be exercised to their uttermost legal limit than one in which the whole principle of modern legislation is set at defiance by a body so considerable as to be able to act as if it were above the law, or as if it relied on one or two legal phrases to enable it to despise the object and spirit of duties imposed for a definite and well-understood object.

The great powers conferred in the Metropolitan Management Act of 1855 (see section 135) were so granted in order "to prevent the sewage of the metropolis from passing into the Thames in or near the metropolis." The same condition is re-stated in the Amendment Act of 1858. The word "near" is not defined as to its meaning. It cannot be rationally denied that its interpretation must be affected by numeric data. A discharge from a small sewer may, without danger, be allowed at a much shorter measured distance from a spot which has to be kept pure than one from a much larger sewer. In the case of the concentration of the sewage of a vast province, therefore, the minimum distance called "near" must be such as to carry out the object of the Act of Parliament, and to prevent the foul matter from coming up with the tide into the limits of the inhabited banks of the river. It is important to look at the real force of the words employed; and that for this reason. The action of the Metropolitan Board of Works is utterly indefensible in principle; for, if otherwise, all our sanitary legislation for the last eighteen years has been so much idle and costly worry. If defensible at all, it is so on what a plain man who is no lawyer can only term a legal quibble. The fact is undeniable that the Thames through London is heavily laden with London sewage. No impartial witness questions that. But the Board are bound "to prevent the sewage of the metropolis passing into the Thames within the metropolis." This, as matter of fact, they palpably fail to do. But try to bring the matter home, and they reply, "Oh! no; we pass it into the Thames below the metropolis, and our Act of Parliament says nothing about the effect of the flow of the tide." Quibble it is, no doubt, but it may perhaps give trouble. Then comes the reply, "There is no doubt of what the Legislature intended, viz., that the Thames should be kept pure through London. There is no doubt that this is not effected. The discharge is so 'near' to the metropolis as to poison the metropolitan water. The Board

has not, therefore, discharged the function for which it was created." And it is, we humbly venture to think, within the powers of the Home Secretary to put a stop to an abuse of powers so manifestly in contradiction at once to the expressed mind of Parliament, and to the definite language of the Metropolitan Management Act.

When to these broad, plain, common-sense considerations is added a little information as to what the Board are actually doing in the way of diminishing the gigantic nuisance they cause, the case is only so much the stronger. In the year 1855 they spent the sum of 48,400*l.* in "sewage experiments and deodorising at outfalls." Out of a daily flow of 160 million gallons they are partially treating 9 million gallons. This small portion they treat, their report informs us, with 3·7 grains of lime and 1 grain of copperas, per gallon. But when, in 1884, Messrs. Mansergh and Melliss proposed to treat the sewage of the lower Thames valley at Mortlake with $4\frac{1}{2}$ grains of lime, 1 of copperas, and 5 of alum, the chemist consulted by the Board stated that the effluent would be substantially unaltered by the process; and that on the river at the point of discharge a very serious nuisance would arise. And this provision was justified by the fact that the sewage of Hertford, which in the year 1867 was treated with 3·5 grains of lime and 0·25 grains of chloride of lime per gallon, gave so bad a result that Captain Flower reported in 1876:—"The effluent, though clear, was not pure, and the adjoining town of Ware, lower down the stream, was constantly complaining of the nuisance caused by secondary decomposition which is invariably set up by the lime effluent."

Is it possible to state a case more imperatively demanding the interference of the administration? For the danger and injury inflicted on the Thames we need only recall the testimony of Lord Bramwell, that "it was in such a state as to be a disgrace and a scandal to the metropolis and to civilisation." "The Thames," reported Mr. J. T. Harrison, an inspector of the Local Government Board, "in its present condition can now only be compared to a huge sewage-tank, which for now many months has not been cleaned out."

It may, of course, be the case that Mr. Secretary Matthews may content himself with making the same inefficient representations, with the same absolutely null result, as were made by his predecessor in 1884. (See Parliamentary Return, No. 323, 1884.) But we hope better things. We hesitate to believe that one of the first acts of a new Secretary of State, who has already distinguished himself in Parliament, should be to attract attention to the absolute inefficiency of the office over

which he presides. If, under the conditions referred to above, the Home Secretary has the power to protect the public health, we will not allow ourselves to doubt that he will do so. If he has not, it is of little use to waste paper and ink in a correspondence to be treated with the same contempt by those to whom it was addressed as on the former occasion. If Government has the power to prevent the Thames from being made the channel of corruption and the source of pestilence, the country will expect it to use it. If it has not, it will be expected to come to Parliament to make up the deficiency.

THE IMPERIAL COLONIAL INSTITUTE.

THE proposal of the Prince of Wales to institute an Imperial Colonial Institute, in commemoration of next year's jubilee, is one which will require much anxious thought and deliberation, if it is to become the imperial success that we have a right to expect in such an undertaking. The intention is unmistakably good; no time could possibly be more propitious, nor could any project be launched on a more favourable tide and with a greater consensus of public opinion. Nevertheless, there are some formidable difficulties in the way, the two principal being the form that the proposed Institute is to assume, and its organisation and management; and on both points its progress will be keenly watched by a critical public, which is at length awaking to the fact that we can no longer afford to trifle with matters of international importance. There are sure to be many parties to the discussion, varying in their ideas according to the motives, tastes, and knowledge of those who join in it; though most persons will agree that the new Institute should not be on the lines of, or in any way associated with, South Kensington, which has enough, and more than enough upon its hands already. Exhibitions and bazaars are all very well in moderation and in their proper place, but it is not upon such examples that a truly Imperial establishment should be framed.

Our idea is, that it should be a representative house in this country, dedicated entirely to colonists and colonial interests,—a place where intercolonial questions should be periodically ventilated and discussed, and especially those which arise between the mother country and her children over the seas,—a place where the most comprehensive library that it is possible to obtain should be open to all those desirous of gaining colonial information,—a place where the national products and the industrial resources of every British colony should be thoroughly and completely illustrated. Many minor adjuncts can be suggested in detail, such as lecture-rooms, emigration offices, &c., but the objects above suggested should be the foundation upon which the whole should rest. As to situation, nothing could be better than one on the Embankment, accessible alike to the City, Westminster, and the West End. A continual drawback to the utility of South Kensington is its out-of-the-way locality, and this mistake must not be perpetuated. The organisation and management are somewhat delicate questions, in view of the fact that so many different colonies have to be represented, and, consequently, so many susceptibilities to be attended to; but these could best be arranged by the appointment of a Grand Council, and a much smaller working committee. The former should consist, on the colonial side, of one representative from each colony, or, perhaps, in the case of very small ones, of one representing a group; and, on this side, an equal number of prominent men in this country, though among them may be included colonists who have returned to reside in England. From this body it would not be a matter of difficulty to select the working committee by ballot, although it would probably be at this stage that susceptibilities would come into play, and great discretion would have to be exercised to prevent any appearance of the smaller colonies being over-ridden by the larger ones. The appointment of a director

or manager of the Institute would be a matter of the greatest importance, for although the working committee would naturally be paramount in general matters, a large field of action would be in the power of the director, and much of the future utility and popularity would lie in his hands. It need scarcely be said, that an exhibition manager, however successful in his department, would not be the proper man here, for it is no disparagement to the members of that profession to say that the mere artistic displaying of wares, and the catering for the public amusement, are scarcely the qualifications that would be required for an institution that may be said to be of national dignity. Moreover, the commercial and personal influences to which exhibitions are constantly liable, as witness the recent complaint of the Australian wine-growers against the tactics pursued at the "Colinderies," would at once be the signal for universal uproar, and effectively check all possibility of future growth. Far greater interests than trade and barter should constitute the *raison d'être* of the Imperial Institute, and in proportion to the grandeur of the opportunity that we now have of permanently cementing the union of our colonies with us and with each other, should be the care and anxiety that no backstairs influence should be allowed to mar the prospect.

THE ROMAN REMAINS AT BATH.

AS our readers may already have gathered from remarks and correspondence in our columns, there is an antiquarian skirmish going on just now in Bath in regard to the alleged obscuration of the remains of the Roman bath there by the buildings which are in progress for the extension of the modern baths. As noted in our columns two or three weeks since, the City Architect and the party who are on his side in the Corporation (a majority of the Town Council, as we gather) called in Mr. Penrose as a professional referee, and he, regarding the matter with reference to the requirements of the modern baths as detailed to him, gave it as his opinion that all due regard was being paid to the preservation of the Roman remains, and to leaving them visible for inspection, as far as was reasonably consistent with the requirements of the new building, and the needs of the present day. We expressed at the time full confidence in the judgment of Mr. Penrose, as one who was at once a learned archaeologist and a practical architect, and who might be trusted to see and consider both sides of the question.

The conservative or antiquarian party in the town, however (some of whom, as we have already remarked, seem a good deal at sea about Mr. Penrose's qualifications), are not satisfied, and urge that Mr. Penrose had only a one-sided statement of the case laid before him,—a conclusion which is not improbably true to some extent. The "conservatives" invite our support to their views, and though we decline altogether to play the rôle of advocate for one or the other side, we have been at some trouble to ascertain, from a personal inspection of the new work, and of the state of the remains over which it is being built, and from comparing the statements of some of those interested on either side of the question, how far the contentions of the opponents of the present operations are right and reasonable.

There is obviously some amount of personal feeling mixed up in the matter, which must, of course, be discounted. One of the most active partisans on the antiquarian side was some time ago, as noted in our columns, working as contractor on the site under the City Architect, and has ceased to do so now, for reasons we did not inquire into. On the other hand, the letter of our correspondent "Bathoniensis" last week, attacking our former correspondent as "a Mr. Mann," and imputing want of veracity to him, is obviously (even after we had benevolently deleted from his letter a phrase which might have been regarded as "actionable") inspired by pretty strong animus of some kind. Our own opinion is that Mr. Mann has somewhat

exaggerated both the amount of detailed interest in the portion of the remains alluded to, and the extent of indifference to them which is to be imputed to the Town Council and their architect; but we have seen ample evidence, from Mr. Mann's notes and sketches, that he has taken a great deal of intelligent interest in the remains, and made very good use of his opportunities, when working on the site, to study and become acquainted with what was there.

The case in dispute is briefly this: the large swimming bath, the architectural remains of which are of great interest and in good preservation so far as they go, is not to be touched; on the contrary, it is hoped that the house at present standing over and obscuring part of it will shortly be removed.

Extending from this, however, are the portions more recently discovered; the smaller circular bath nearly always found in the Roman system of baths, and beyond this the *calidarium*, with some remains of the hypocaust, and further on an apsidal recess, at present shut in by walls, which, if it exists as shown on Mr. Mann's plan, was obviously the *laconicum*. Mr. Mann tells us he has measured this at the time he was working on the site, and his statement is more or less confirmed by memoranda and drawings by Mr. Irvine, the present clerk of works at Peterborough Cathedral, a most accurate and trustworthy observer. Over these portions of the remains the new buildings are being extended, and this is obviously the most convenient direction for their extension in connexion with the existing portions. The new building is to be vaulted over the circular bath, leaving the latter untouched; but the walls of the new work have been carried right through the other portions, which are to be utilised for some additional baths in the basement, with a staircase to give access to them, only building the new work so as to leave it possible for explorers to get round and in and out of it and study what remains still exist of the *calidarium* and its accessories.

Encumbered as the site is at present with building debris, it is difficult to judge exactly how much detail there is left of the hypocaust, but Mr. Irvine's evidence, in which we have great confidence, goes to show that at the time this portion was uncovered there was, at any rate, enough left to show the construction of the floor very completely. Undoubtedly the remains at this part, however, are in a much rougher and more dilapidated state than those of the large bath, and we can understand that it may appear to many that the interests of archaeology have been sufficiently consulted by constructing the new work so as to permit of access to the old. This appears to have been Mr. Penrose's view. But it appears to us that he and those concerned in carrying out the new building have not sufficiently considered the great interest there would be in keeping the plan at least, if it be little more, of the Roman bath system unencumbered by new building, so that its general disposition could be seen and understood by ordinary visitors. Few people can understand and take in such a plan when they have to piece it together from bits seen here and there in the middle of modern work. If the Corporation or the Baths Committee, or whoever is responsible for the new building, would consent to forego the two or three baths to be gained in the basement, to remove the walls which have been partially built, and to arch over the rest of the old remains, so as to leave them unencumbered and easy of inspection as a whole, they will not lose much practical advantage, and they will certainly make their remarkable antiquarian possession of far more interest to visitors, and of far greater value to the town, besides leaving much better chances for future further exploration, than by obscuring it all in a labyrinth of modern walls.

New Mission Hall, Alnwick.—This new Mission-hall and Institute was opened on Tuesday in this week, the Bishop of Newcastle and a large number of clergy officiating in the morning, and Lord Percy presiding at a meeting in the evening.

NOTES.

NOW that the Richmond Vestry has obtained official sanction to the purchase of the Buccleuch estate as a pleasure-ground for the people, the next important question to be considered in connexion with the transaction is apparently whether a slice is to be taken from the estate at the river frontage for the purpose of continuing the towing path unbroken from London to Staines. Pedestrians on this path are at present blocked by the admittedly beautiful lawn which slopes down to the river edge, and a *détour* has to be made round by the Lower Road in order to regain the path. Although the Local Government Board in its sanction ventured to express its opinion that the continuation of the path by the river side at this point would be a "desirable improvement," there appears to be a strong feeling in the vestry, and in the town itself, that the material depreciation of part of the estate to be sold, and the great expense of maintaining this portion of the path, which would fall on the shoulders of the ratepayers, would not be compensated for by any public advantage attending the construction of the path. An offer of 6,000*l.* has been made for the mansion alone, on condition that the lawn remains intact. It is further argued that as horse-power in the working of barges on the river Thames has given place to steam-tugs, the path is not required as a towing-path, and that the deviation which the pedestrian requires to make in consequence of the above-mentioned interruption involves an increased walk of only a hundred yards or so. A witness at the recent inquiry asserted that this portion of the path had been "filched from the people." But this does not seem to be the fact. The Corporation of London, when it was empowered by Act of Parliament to construct the towing-path from London to Staines, endeavoured, it appears, to purchase this piece of river-frontage from the predecessors of the Duke of Buccleuch, but unsuccessfully, very high offers for it being refused. We should imagine that "the greatest happiness of the greatest number" would be much better promoted by the sight of the green lawn than by the use of part of it as a path, to the detriment of the scene.

THE Chancellor of the Exchequer, in his speech at Dartford on Saturday last, confirmed the statement that the Government have in hand a Bill relating to railway rates. His Lordship expressed his belief that if the railway companies are approached fairly they will assist and co-operate in making the existing regulations more equitable and satisfactory; and remarked upon the policy of "agreeing with thine adversary quickly while in the way with him." It is sincerely to be hoped that the proposed measure will not arouse such an amount of opposition among the directors and shareholders as was excited by Mr. Mundella's Bill. It is quite possible, however, that, although not a party question, the fact of the Bill referred to being brought forward by a Government of advanced Liberal views partly accounted for the animosity of certain of those who declaimed so loudly against it. It now remains to be seen how a Conservative measure will be received. It will hardly be charged against the present Government that they advocate "confiscation," but Lord Randolph Churchill showed himself alive to the fact that if the grievances which exist are suffered to continue, and to develop still further, the property of the railway companies may be placed in serious peril. This is being increasingly recognised by the railway companies themselves, and concessions are being made in individual cases, but in not a few of these the necessity has been forced upon the companies by the withdrawal and diversion of the traffic. If, in place of the present (chaotic state of affairs, a definite principle of charging can be agreed upon, the benefit will be incalculable. In any case, the grievance of unfair advantages being given to the foreign importer over the home producer, will (if the lengthy programme of the Government be carried out) be removed.

THERE appears to be no doubt that cremation is making steady progress in this country, as regards public opinion, and in some Continental States in actual progress, especially Germany and Italy. The congress of cremationists, which has just been held at Gotha, was attended not only by members of the general association but by the local societies of Berlin, Dresden, Frankfort, Leipsic, Hamburg, Vienna, and other towns; and the operations of the Gotha Crematorium (the chief locality in Germany) were pronounced on all sides to be cleanly, decorous, and entirely devoid of anything that might shock the feelings or the sentiments. Those persons who have paid no attention to the subject would do well to read Mr. Eassie's figures, contained in his paper read before the Sanitary Institute at York (reported in our last number), in which he states that, if cremation were practised by only half the population of London, 500 acres would be sufficient for all burial purposes, while at the present time the requisite ground is nearly 3,000 acres; and that this 500 could accommodate two and a half million persons for 1,000 years, allowing permanent room to each urn. Closely allied to the actual question of cremation is that of funeral reform, and the abolition, to a great extent, of the undertaker and his bill; no small matter, when it is considered that the annual total of funeral expenses in England and Wales is estimated at about five millions. But cremation itself goes far deeper than the question of expense, for it is the only solution of a daily occurring danger to the public health, to which not a single valid objection, apart from prejudice and a conservative sentimentality, has yet been raised.

WHATEVER fine stroke of policy may possibly have dictated the publication, just at this juncture, of the announcement of the Duc d'Anmale's bequest of Chantilly to the Institute of France, there is no doubt of the value of such a splendid gift,—a gift for which not only France, but the whole civilised world may well be grateful. The architectural history of Chantilly was the subject of a long and interesting communication in our columns two or three years ago, from one of the most eminent French art-critics of the day,* and some illustrations of the building will be found accompanying it. The château, with its collection of antiquities and works of art, forms a kind of epitomised monument of French architecture and art in the days of the *ancien régime*.

THE ancient fortifications of Bassano, to which we have frequently referred, were commenced to be dismantled on the 20th of September, the anniversary of the recognition of Rome as the capital of Italy, amid the almost frantic applause of the citizens. The Mayor, in the course of the ceremony which preceded the work of demolition, referred to what he considered to be the propriety of selecting the date of the 20th of September for the inauguration of the work, and suggested that the new boulevard which will be formed upon the site of the ancient walls should be named after the 20th of September (*la viale venti Settembre*). This name, he continued, would recall the aspirations of many centuries, the sighs of many philosophers, the sacrifices of many martyrs, and the deeds of those illustrious pioneers who laboured with heart and hand to accomplish the unity of Italy. The citizens of Bassano are, perhaps, the best judges of what alterations are requisite for the good of their native town, but the artist and the archaeologist may, perhaps, be pardoned if they express a regret that the people of Bassano did not experience some compunction at the destruction (even if such destruction were necessary) of an ancient and interesting landmark in the history of their venerable town.

THE Hammersmith Vestry, like the Richmond Authority, are in the middle of negotiations for the purchase of picturesque sylvan estates for the recreation of the people.

*See the *Builder*, vol. xlvii., pp. 119, 136-139, 166, 161-167.

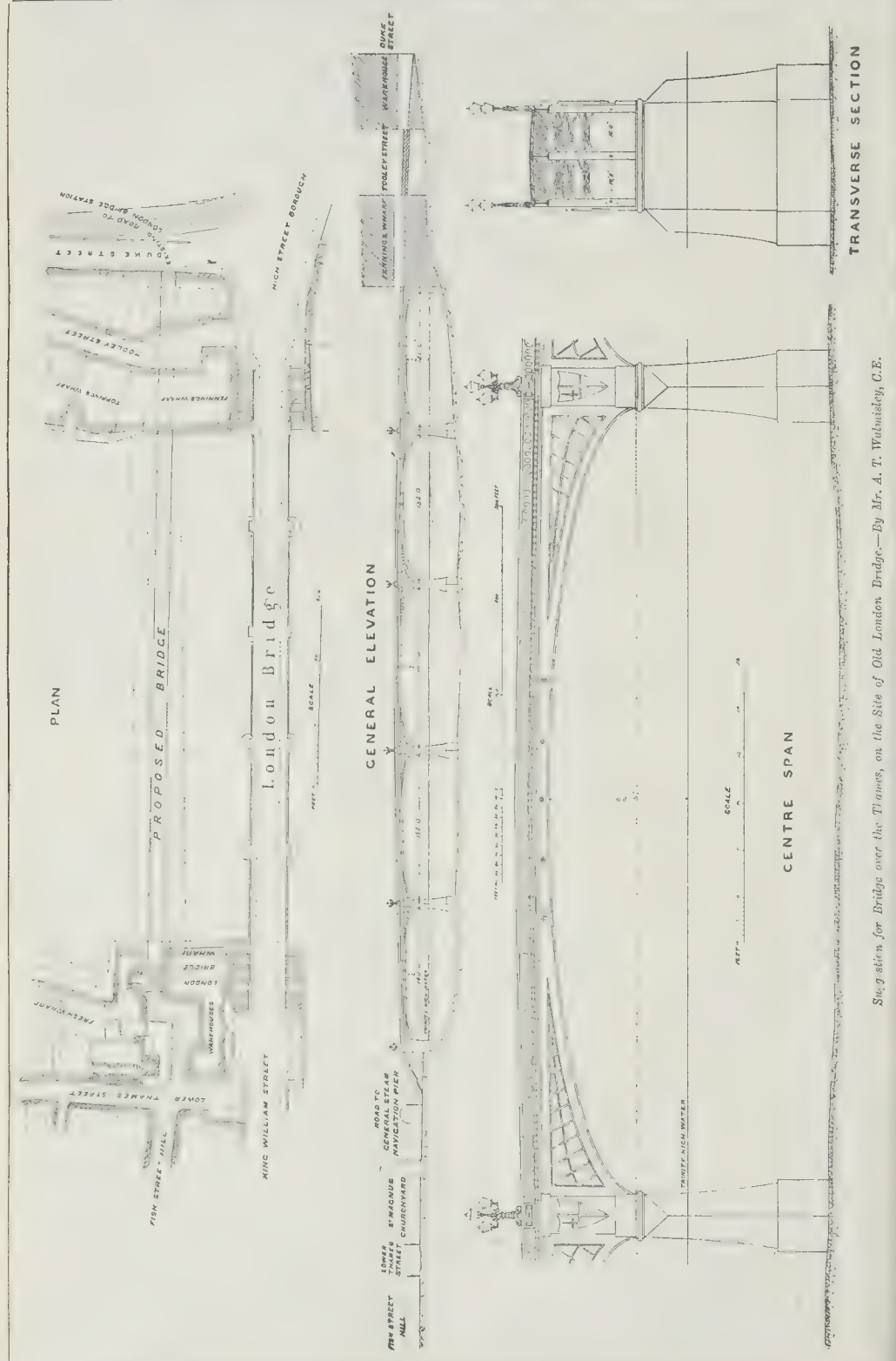
The trustees of the Ravenscourt Park,—the estate which it is proposed to purchase for the Hammersmith public,—have raised the price to 60,000*l.* It appears that the will provides that the highest offer must be accepted. It was understood that the trustees had resolved to accept 50,000*l.*; and that the committee of the Vestry, after having visited the estate, and been charmed with its beauties, and been made aware of the fact that the Metropolitan Board had agreed to bear a portion of the expenditure, were likely to report favourably upon the question of the purchase of the estate for the public. But an offer, it appears, has been received from a private individual of more than 50,000*l.*; and the trustees, to place themselves in harmony with the provisions of the will, have let it be known to the Vestry, though in an informal way, that they require 60,000*l.* for the estate. The Vestry are evidently in this dilemma: that even if they offer that sum for the estate, and a higher offer from another quarter is made, they may be told that they will have to increase their offer still further. It is not expected that the Vestry will advance upon these indefinite lines of negotiation.

WE understand that the Works Committee of the Metropolitan Board of Works have agreed to advise the Board to re-appoint Mr. Vulliamy, in a temporary capacity, as Superintending Architect for a period of twelve months from the 25th of December next, at which time his resignation would take effect.

WE are glad to observe that Mr. Parratt, the well-known musician and organist, in a paper read at the Church Congress, "protested against the custom of stifling the organ by placing it in a chamber on one side of the chancel, where it was entirely lost as an architectural feature, and destroyed as an instrument for the support and encouragement of congregational singing." We hope church architects will make a note of this. Many of them are still great sinners in this respect, and keep on building these miserable "organ chambers," as they are called, though experts have condemned the system over and over again.

A PROPOSAL FOR A NEW THAMES BRIDGE.

THE is a design for a proposed iron bridge just below London Bridge. It is shown upon the site of old London Bridge, about 130 ft. below the existing London Bridge, and would lead from Fish-street-hill by a few granite steps laid transversely in the Middlesex abutment, on to the new bridge, where a platform 15 ft. or 20 ft. wide could be provided, supported on iron arches similar in span and of not less clear headway than London Bridge, so that the piers could be arranged to be built without impeding the navigation. The foundations of old London Bridge being good, the cost of foundations to the new bridge would be considerably reduced. These foundations can be seen during a low tide. They varied from 25 ft. to 34 ft. in width, and were built on platforms supported on strong elm piles driven into the bed of the river and cut off at low water-mark, their area being surrounded by the old starlings which surrounded that ancient structure, and which were filled in with stone and chalk. The contract for the removal of old London Bridge included filling up the holes in the bed of the river (which had been dug out by the great fall and scour produced by the contraction of the waterway) to a level of 14 ft. below spring tide low water-mark, or 6 ft. above the lowest point of the foundation of the present London Bridge. The old bridge, which was 40 ft. wide, contained a drawbridge for large vessels, in addition to nineteen pointed arches, the piers of which occupied so much space that only one-third of the width of the river was reserved as waterway. In old Westminster Bridge, which consisted of thirteen principal and two smaller arches nearest the abutments, about two-thirds of the width of the river at the point of crossing was reserved as waterway. In Vauxhall Bridge, consisting of nine arches, only one-sixth of the waterway is obstructed by piers; at the new Westminster Bridge less than one-sixth is



Suggestion for Bridge over the Thames, on the Site of Old London Bridge.—By Mr. A. T. Wadsway, C.E.

obstructed; and thus we have gone on advancing from one-third clear space to leaving the whole width of a river unimpeded by the adoption of large spans. In the present case I have considered it advisable to show arches which would in a measure harmonise with the present grand masonry structure. Any one who passes over Blackfriars Bridge and contrasts the two railway bridges adjoining, sees at once how a parallel girder, in spite of all efforts to hide it, fails to harmonise with surrounding objects. A continuous pier is also preferable to separate columns, not only as regards appearance, but because the weight and strength of the bridge becomes distributed over the whole width of the pier. Where, however, the weight may be assumed to be transferred to distinct fixed bearings, as in the case of railway and suspension bridges, isolated cylinder foundations may be adopted.

No wharf property need be pulled down on the Middlesex side, there being already an opening of 24 ft. at the end of Fish-street-hill, leading to the General Steam Navigation Pier. The pier would remain just below the first arch of the bridge, and be approached from the side of the steps leading to the bridge. London Bridge Wharf would become a warehouse above bridge instead of a warehouse below bridge, and thus would be slightly reduced in value, but could be approached from below bridge by an archway under the steps leading to the new bridge. Passengers could thus walk along the quay wall from Fresh Wharf to London Bridge Wharf as well as being able to cross the road between St. Magnus Church and the proposed steps to the bridge as at present. The approach road would lead in a straight line on from Gracechurch-street, and form a direct communication across the river from the Monument Station of the Metropolitan District Railway. The lower end of Fish-street-hill might further be considerably improved by adding to it the garden adjoining St. Magnus Church or making a footpath through the garden. The approach to old London Bridge passed close by St. Magnus Church, and hence it would be only reinstating things as they before existed, as well as instituting a great public improvement. On the Surrey side the bridge platform could be continued by an arched passage of the required width through the warehouse on this side of the river, and entering it at a high level the landing stage to Fanning's Wharf could be retained under the abutment arch, while the remainder of both the warehouse and wharf would stand as at present. Then, passing by a bridge over Tooley-street, an arched passage through the buildings between Tooley-street and Duke-street, the approach would terminate opposite the South Eastern Railway bridge over the present railway approach, entering Duke-street at Bolton's Sussex Hotel. Thus a nearer way to the railway stations would be provided for the passengers, and the new bridge would relieve both, but especially the eastern footpath of London Bridge of a large amount of pedestrian traffic. It is estimated that at least 10,000 pedestrians upon the average daily cross London Bridge to and fro.

The Tower Bridge, when completed, will doubtless relieve London Bridge of the dock traffic which now passes over it, but there will still remain a large pedestrian traffic to be considered, which makes its way between London Bridge railways and the City, the natural tendency of a population being towards a country rather than a town life. The late General Manager of the London, Brighton, and South-Coast Railway Company stated, in evidence before the Select Committee of the House of Lords, some six years ago, that in all about 22,000,000 passengers are conveyed in and out of the two railway stations annually; 16,000,000 by the Brighton line, and 6,000,000 by the South-Eastern line, averaging about 40,000 passengers per day in and out of the Brighton Company's station; that the majority of these passengers make their way over London Bridge, and that something like one-third of the passengers cross in vehicles, to avoid the discomfort of the insufficient width of the footpaths on the bridge, as well as the nuisance of the dust which, on account of the closed parapet, collects in a kind of continuous trough, so that in whichever direction the wind blows, it creates an eddy against the parapet on the opposite side, having no opening by which to escape. The eastern footpath is always the most crowded, and hence it is upon the down river side that an increased width is

required. The extension of the South-Eastern Railway, conveying passengers to Cannon-street has doubtless relieved the traffic over London Bridge a good deal, and the construction of the new City and Southwark Subway between Arthur-street on the City side and the Elephant and Castle upon the Surrey side may further reduce the crowded footpaths of the bridge, but the Brighton Company, which, as stated above, introduce the bulk of the traffic, could not continue their line into the City at London Bridge without crossing the South-Eastern Railway, and this is the least likely plan to be entertained. Various schemes for widening London Bridge on one or both sides have been proposed, but the late Sir John Rennie always objected to any scheme which would extend the area, or which would add extra weight to the foundations of London Bridge, principally because the bridge was never calculated to bear the additional weight which would be thrown upon it, and because the structure having attained its final bearings, it would be injudicious to do anything that might have a tendency to disturb it. London Bridge is at present overcrowded, not because it is of insufficient width for what it should accommodate, but because it has thrown upon it an enormous amount of traffic which does not properly belong to the traffic of its approaches. By the construction of the Tower Bridge, and the relief of the railway passenger traffic which does not properly belong to its approaches, London Bridge would remain unaltered and quite commodious enough to accommodate both the pedestrian and the road traffic passing between the Borough and the City. The cost of the new bridge as here proposed would be about 70,000L. The width of the opening existing between the buildings on the Middlesex side permits of the construction of a bridge sufficiently wide to carry a cable tramway worked by a stationary engine, by which passengers could be conveyed to the termination of the new thoroughfare at Bolton's Sussex Hotel from the steps leading to Fish-street-hill on the City side, or, by continuing the thoroughfare by means of an easy slope, the tram line might run as far as Thames-street, stopping opposite St. Magnus Church. The stationary engine could be placed either on the Surrey or Middlesex side. The system proposed is found to work admirably at Highgate, and there are many who would gladly pay a penny to cross the river in this way under cover from London Bridge Station, even in fine weather. As three-fourths of the width of the proposed new bridge would be ample for running cable trams, the remaining fourth could be utilised as a public footpath, which the company who make the bridge might offer to reserve free.

The cost of the tramway would be 8,000L., and cars running at the rate of seven miles per hour on a double track throughout might make 1,800 journeys daily in fifteen working-hours. Allowing an average of eight passengers per car on each journey, 14,400 passengers would be carried daily, or 5,256,000 passengers annually. The receipts would give probably 20,000L. a year, and the annual working expenses would not exceed 2,000L., or one-tenth of the receipts.

A. T. WALMSLEY, C.E.

THE ECCLESIASTICAL ART EXHIBITION, WAKEFIELD.

THAT a small Exhibition, open for only a few days, and consisting, as regards the more important section of it, of objects gathered from private collections in a more or less haphazard manner, should cover a somewhat wider area than is indicated by its title, and should be chiefly made up of things which, though sufficiently interesting, one has seen a dozen times before, is only to be expected. That the catalogue, too, should be incomplete is hardly to be avoided under the circumstances, and that it should be arranged upon a system differing from that adopted for the objects themselves, though productive of much inconvenience, may be excused.

The Ecclesiastical Art Exhibition which has been held this week at Wakefield in connexion with the Church Congress being of the character described might, therefore, be pronounced a success if there were nothing more to criticize; for, mingled with a mass of comparatively commonplace objects and a certain percentage of rubbish, there were many things of exceptional interest and beauty. But we do

not think that in all other ways the greatest possible success was attained. It is at least unfortunate that some firms who were once important exhibitors were allowed this year to open a sort of opposition show close to the entrance, and it is still more to be regretted that the "Loan Exhibition" of ancient and Mediæval work, which is, or should be, the most interesting section, was relegated to a couple of dark little back rooms, where the gas had to be burned all day, and which were consequently so close that many persons merely came to the doors, and declared they could not stay.

The Drill-hall, which was occupied by the stalls of various societies and firms exhibiting church furniture, fittings, and decorations, religious publications, photographs, flowers, and other things connected,—some of them rather distasteful,—with ecclesiastical art, is a well-lighted and spacious apartment, well adapted to the purposes of an exhibition, and we may commence our description with some notice of the section to which it was devoted.

The Arundel Society, which stands first in the catalogue, exhibited a considerable number of those careful chromolithograph copies of works of the old masters which it produces from time to time, and some of the representations of Italian architecture, which we rather regret the Society publishes, though they are beautiful, and, as we can testify in many cases, faithful representations of the objects.

Messrs. Benham and Froud showed a collection of ecclesiastical metal work, consisting of candelabra, lamps, gas fittings, some fine eagle lecterns, alms dishes, church plate, &c., and particularly a brass altar-cross with silver medallions representing the conventional Agnus at the crossing and the four beasts at the extremities.

Messrs. Brindley & Foster, of Sheffield, exhibited a small church organ, with their special mechanism, and photographs of those they have erected in the English churches at Paris and Moscow, and elsewhere.

Messrs. Mayer & Co., of Bond-street, were chiefly represented by a carved oak reredos, consisting of a rather heavy architectural framework surrounding a representation of the Lord's Supper, sufficiently conventional in treatment, and modelled with knowledge and skill; a stained-glass window by the same firm at the other end of the room showed remarkably rich colouring.

Among the works exhibited by Messrs. Jones & Willis, who had a large collection of church furniture, fittings, plate, &c., we particularly noticed some materials for curtains and wall-hangings in nice quiet colours and of good patterns; also some very good hand embroidery, and a new and comparatively cheap pattern for brass eagle-lecterns for small churches and poor parishes.

Mr. Alfred Heming exhibited a large number of drawings and cartoons of stained-glass and ecclesiastical wall-decorations, among the former being a design for a window in the new church of St. Thomas, Brentwood.

Any one who could not suit himself with a chair from among the specimens which occupied Messrs. West & Collier's stall must be difficult to please; all possible rush, wooden, and cane-seated patterns appeared to be represented, and among them a particularly comfortable church chair designed by Mr. William White, F.S.A.

One of the most interesting stalls in the room was that occupied by the exhibits of the East Grinstead School of Embroidery, Queen-square, London, among which were some of the best specimens of hand embroidery in the Exhibition, which was unusually rich in such work. We may notice particularly a dossal for the Lady Chapel, Hereford Cathedral, and a beautiful cover for a super-altar, having passion flowers worked on a white-figured silk ground. With the modern work was a fine old Italian white chasuble, worked with sprays of flowers, which, we are told, is to be remounted as an altar frontal.

Messrs. Luscombe & Son, of Exeter, had an exhibit of carving in oak, their most important work being a partly-finished rood, consisting of a crucifix and the usual figures of St. Mary the Virgin and St. John the Evangelist; but the best things on the stall were some vaulting bosses carved with much knowledge and spirit.

Among the drawings and cartoons of stained glass and wall decorations by Mr. Edward Frampton, the series representing the life of St. Charles Borromeo were of exceptional

interest. The small collection of similar drawings, by Messrs. Heaton, Butler, & Bayne, though showing beautiful work, hardly did justice to this well-known firm. Messrs. Powell Bros. sent a beautifully light transparent specimen of stained glass, and a small collection of drawings and cartoons for similar work, and there was a similar exhibit in the next room, by Messrs. Shrigley & Hunt.

Large collections of ecclesiastical embroidery for vestments, banners, altar-frontals, &c., were exhibited by the Mother Superior of the House of Mercy at Horbury, near Wakefield, and by the Wimbledon Art College for Ladies; among the works of the former we particularly noticed a white altar-frontal; and among those of the latter a still more beautiful one, also white, with a powdering of exquisitely-worked and designed conventional flowers.

We must not omit to mention Messrs. Earp, Son, & Hobbs's collection of photographs of architectural carving executed by them; nor the improved dual desks and adjustable music chair shown by the North of England Furnishing Company.

Mr. F. Johnson, of Leicester, among some good specimens of metalwork, showed a number of cast-iron grave-crosses and headstones which we really cannot approve of. Our ordinary graveyard monuments certainly might be improved upon, but hardly by the introduction of cast iron as a material for them.

Mr. Reuben Bennet, of Manchester, showed some specimens of his material for wall decoration, a substance for rendering on walls, and which will remain moist long enough to be worked upon by hand, afterwards becoming hard and tough, though always remaining elastic enough not to be easily cracked.

It is not within our province to notice the large exhibits of religious and semi-religious publications, and the photographs, flowers, and clerical tailoring, but we may have more to say about the interesting collection of ancient and Medieval objects lent to the management for the occasion.

PROFESSOR ROGER SMITH ON LEARNING TO DESIGN BUILDINGS.*

THIS is the subject upon which I am to address you to-night. We all hope to learn this if we intend to be architects. Designing buildings is believed by many people to be the sole occupation of an architect. This is an error; it is only a part of his work, but it is the part which, so to speak, earns for him the distinction of being an architect. A man who cannot originate a building may be excellently fitted to fill some other position, but not that of an architect.

The services which a good builder, an accurate surveyor, a correct draughtsman render to the progress of a building are most important; but it is the architect's duty, foreseeing what the result is to be, to say what each of these is to do. His plans represent a building which as yet does not exist, but which is to be. His specification describes it. The quantities dissect it minutely. The perspective view represents it on the spot where it is to stand, with its light and shade, its grouping, its outline, and all its qualities, while as yet it has no existence.

It is the act of originating a new building or part of a building which we mean when we talk of architectural design. This process is the crucial difficulty in our profession. To master this difficulty is to accomplish success, to be mastered by it is to fail.

Designing a building I admit is at first difficult, but so is everything which is worth doing, and I shall not dwell on the difficulty, and only try to point out how it is to be met.

The first thing to do is, perhaps, to ask what it is which we propose to originate when we attempt to design architecture. What, in fact, is a building? This may seem a simple question to those who are not as yet very familiar with buildings. It is one, however, of which the answer appears less and less clear as one comes to know more about the matter. At last we come to know that a building (as such a thing is understood by those who know at most about it) is a very complicated affair, not at all easy to describe or to define. You and I think we know pretty well what a human being is,

but we really are profoundly ignorant of what goes to make up a human being as understood by those who study anatomy and physiology. So, though in a far less degree, a building is a complex matter, and the better it is known the less simple it turns out. There are at least four main characters with which any building must be invested in order to be really good; that is to say, really architecture.

First, a building is a contrivance. By that I mean that every building, from a dog-kennel upwards, is contrived for a definite purpose. The art of disposing the plan of a large building so that each room it contains shall be of the size or shape for its intended use, and the right access to each and the communication between all shall be thoroughly convenient, and every part shall be light, and the whole so put together that there shall be no lost space. This art is part of the originating or designing of a building, and good planning goes far to secure that as a contrivance the structure shall answer its purpose. That purpose, of course, must be thoroughly understood by the designer, and as the purposes of buildings are very various, a vast amount of general knowledge is desirable for an architect, and such knowledge should be not only varied in extent, but accurate in its nature.

Let me next point out that a building is a structure as well as a contrivance; that is to say, it is put together piece by piece, and made up of a series of different materials, each more fit for some purpose which has to be served than any other. Now, the due employment of the various materials,—such, for example, as bricks, stones, lime, sand, slates, tiles, timber, iron, lead, copper, glass, &c.,—requires to be understood and allowed for in the design; and in a good building each is made to serve its turn. A building, moreover, is exposed to the ceaseless attacks of causes, seen or unseen, which tend to wear it down and destroy it. The action of wind and weather, the force of storms, the heat of the sun, fire, flood, damp, drought, neglect, use, and misuse,—these agencies, and a thousand others, are conspiring to shorten the life of every building, and are only too often well seconded by the insecurity of foundations and the unsoundness of workmanship. You are sure almost to begin your career with the notion that buildings are erected to stand; by slow degrees you will come to realise that they are actually built to come down, and that it is only a question of time when that shall take place. Now, in the design of a building, the designer ought so to construct it as to employ every material upon the duty to which it is best fitted, and he ought so to provide for the soundness of the structure that decay shall be warded off as long as possible, and as much resistance shall be offered by the fabric to its many enemies as may be.

I might also call a building an economy. I do not exactly mean by this a saving of money, but I use the word in its larger and primary sense of a well-managed undertaking. A wise and well-judged administration of a certain definite measure of resources. Of course, these are to a large extent measured by money, and to say that in a good building the owner gets good value for his money is one way, if an inexact way, of expressing part of what I mean.

There is, for example, such a thing as an economy of material. Marble is a finer material to build with than brick, but even were marble plentiful it would be false economy to prefer it to brick for the exterior of a building to stand so cruel a climate as that of London.

Ornament, again, is the life of a building, but if an architect, in the wish to make his building elaborate, covers it with ornament, he will, unless he be a very rich man, fall to produce half so rich an effect as if he preserves a sufficient amount of plain surface to make a contrast.

An architectural building should be well contrived, soundly constructed, judiciously economised. But if it stop here it can hardly hope to be reckoned architecture. It must also be a work of art. It must satisfy the eye, and through the eye produce an impression on the mind. What is it that distinguishes St. Paul's Cathedral from the brick boxes with square holes in them, of which the heavy front walls are apparently balanced on the edge of the huge sheets of plate glass that form the shop windows? It is not the size, or the material, or the purpose of the building so much as the fact that St. Paul's Cathedral is architecture,

and Dakin's Tea Warehouse and Hitchcock's mercery shop are only buildings. The humblest lodge, designed so as to please a cultivated taste, is better architecture than the mansion to which it gives access, if the latter be vulgar and ostentatious, or ill-conceived and shapeless.

Now designing has to do with all these things, and has to take cognisance of them all. A design that fails in either of these respects is so far a bad one, and a building erected from it would not prove an architectural success; but it is especially necessary that it should not fail as a work of art. The artistic merits of any design depend not a little upon the designer's having recognised and conformed to the requirements, often exacting enough of arrangement, construction, economy,—but they consist chiefly in the added grace and effect, in dignity if the purpose of the building be noble, solemnity if it be grave, charm if it be for elegant and light uses, solidity if it have to withstand obvious hard work.

Now, if every one who designs a building had in respect of even the more ordinary requirements to master all from the beginning as though it had never been done before the undertaking would be overwhelming. Fortunately buildings have been erected successfully ever since civilisation began, and we inherit from our forefathers. So in part, at any rate, the architect has only to do what others have done before. In short, in every structure there is much that is old, but should be something that is new, if it is to be in any sense original.

Take a simple case of planning as an illustration. Say it is a stable that has to be designed. When the plan has to be considered, the architect has not to begin by measuring a horse, and then thinking out all that he requires to make him safe and comfortable; that, fortunately, has been done, and the result is known. The dimensions for each horse are well established, the proper fittings are known also, and when it is once settled whether the stable is to be a luxurious one, or a cheap one, or a medium, you ought to know within a trifle how much space to give to each animal. The same thing is more or less true of the other parts of the building.

Turn to construction. The architect of a building to stand in a London street has not to superintend or direct the making of the bricks or burning the lime. He does not need to try experiments to settle what scapting of floor-joists is safe enough to bear ordinary loads, and what additional scapting is necessary to prevent his ceilings from cracking; nor will it be necessary to work out for himself *de novo* how bricks should be bonded. Sufficient experience is accumulated as to ordinary construction for it to be right to accept its results and make use of them, and, therefore, the first duty of a student of construction is to learn what is already generally accepted; and if something not previously tried, or not on all fours with past experience so far as it is known, becomes requisite, then the architect has to draw upon his power of designing new construction as well as selecting old. Were it necessary it would be easy to show that the rule just laid down holds good equally in the economy of building. Here also the designer has not to work in the dark; but the old and established facts will help him in dealing with a new case.

Last, and of chief importance in designing, are the qualities that make the building a work of art. And when we come to inquire what they are we shall find that here also the principle which I have laid down holds good. Our designs should contain much that is old, but something that is new. Let us consider how it will work, but first let us consider whether any other principle would answer.

Sometimes people have attempted to design buildings, making use entirely of what is old. There is a ruin at Edinburgh which is an unfinished copy of the Parthenon at Athens, and was intended for a public purpose. Had this modern reproduction of an ancient Greek temple been completed, it would have been a most beautiful object, because the original is so, but the design of it was no more an original design than a copy of a picture is original.

At the time when this building at Edinburgh was schemed early in the present century, the public mind had recently opened to the beauty of Greek architecture, and many exact copies, as far as form went, of Greek features, such as porticos, pediments, &c., were made use of. Here, again, there was copying, not designing.

* Being the Public Introductory Lecture in Architecture at University College, London. Delivered on Thursday evening, October 7.

Something very much like this occurred sometimes during the Gothic revival, and churches could be found that are just as much copies as the Edinburgh Parthenon. It may be safe to reproduce something that has been done already, but it is not design.

On the other hand, the attempt has sometimes been recommended,—to students and others,—and has, I believe, been made to produce architectural designs that should be all new. This, however, is far more difficult than might at first be supposed, though of course, if it could be done, the result would be certainly, at least, original.

It is difficult, however, to imagine a building that shall not have a floor, walls, a roof, doors, and windows, and however diverse these may be from what has been customary, still there is something about every door a little like every other; and so of windows, roofs, &c.

But, allowing for the elements of a building being in themselves of old sorts, the attempt may be made to give them new features, i.e., to treat them in a new way, so for example that the windows or doors or other features shall indeed be openings, but different in shape or in size or in the ornaments applied to them from any yet known; and, so far as my experience goes, no such attempts are successful in producing designs that are good as well as novel. Perhaps the Pavilion at Brighton may fairly illustrate the degree of architectural merit usually attained by a determined attempt to originate something perfectly new. The reason of this is not far to seek. So many buildings have been erected and so many experiments made in many particulars almost all reasonable possibilities have been tried, and we can treat these existing works as a series of experiments of which the results are stored up for our favor, one result being that, as regards many parts of buildings, the best thing possible is known.

Now somewhere between these two extremes of a design all old and a design all new there lies a combination of the old with the new, which forms satisfactory architecture. Let us try to find it.

If a person having a good knowledge of architecture examines the design of an important building of any period he will find reason to conclude that the bulk of the features and the general principles of disposition had been used before and were known and familiar at the time when the building was erected, but that even in the design of these variations were imported by the architect; while in the manner in which these known features are employed there is something peculiar to the building, partly growing out of the conditions under which it was built and partly due to the creative genius of the architect.

To illustrate this, let us examine the finest architectural work in the metropolis, which I take to be Westminster Abbey.

The building as we see it was erected at various periods, from the reign of Henry III. downward, on the site of, and in substitution for a large church which had become old-fashioned in the eyes of those who worshipped in it. We know the dates at which the main portions of the present Abbey-church were built, and we know exactly what sort of windows, tracery, mouldings, vaulting, and other features were in use at the time,—and a careful comparison will show that these features where they occur in Westminster are not so different from similar parts in other buildings of the same date as to be in any sense new; although many of them have subtle differences which show that the taste and skill of the architects and masons at Westminster were more refined than their contemporaries. These subtle differences are part of that new element which the genius of the architect contributed to the design of the separate features. How was it with the general design of the structure?

The plan of Westminster is in the main that of a great church,—of the time,—and it had taken a thousand years of slow changes gradually to bring Christian church-planning to that point. But though its nave and aisles, its transept and presbytery, its cloister and chapter house resemble the same parts of other cathedrals, they are full of originalities. For example, there is no other church in Christendom known to me where the cloister and the transept are intermixed precisely in the same way. There is at the eastern end an arrangement of radiating chapels which a casual observer would say was just the same as in half

the cathedrals of France. Yet when it is carefully examined it turns out that it differs from all others,—in its planning, and consequently in its effect. As we rise from plan to proportions, composition, general treatment, we find strong marks of originality, so much so that we recognise that the architect who designed the building and carried it as far as the transept, has impressed upon it a character distinct from that of any other great church of England or France; and in the use of known features disposed according to a known plan he has found it possible to show the greatest possible freedom, originality, genius, and in short creative power. So that the design of Westminster was at the time when the building was erected quite new as a whole, though as a congeries of features it was to a large extent made of old materials.

A principle is so much better understood if you learn it from a theory than as a bare statement (or to put it in a more magniloquent way), in the concrete instead of in the abstract, that I venture to take the design of another great building as an illustration of the combination of new and old; and I cannot do better than select a second great London example, so that you may be able to go and verify what I have said yourselves. So I will take St. Paul's Cathedral.

Sir Christopher Wren, in designing St. Paul's, had, somewhat against his will, to proceed upon the orthodox church plan, and at first sight the plan very much resembles that of other great churches. Still, in some points even the planning is novel, and (without stopping to explain them) I will just draw your attention to the planning of the western chapels, the apsidal ends of transepts, the exact position of transept, and above all the piers that carry the dome, all which are unusual. In construction the general excellence of the design is remarkable, and the contrivance of the principal features, the dome, though not entirely without precedent, is, on account of its great size, its great height from the ground, and the completeness with which the triple disposition which the section displayed, is worked out, far in advance of any other example standing at the time, and has not been surpassed since.

Some points in the design of St. Paul's illustrate what I mean by *economy* excellently well. The proportion of solids to voids, for example, is less than in most great churches, showing a judicious sparing of material. There are, however, one or two examples where the piers are still more slender, but these have not proved so secure as St. Paul's. The stability of our cathedral consequently shows that sound judgment was exercised in determining the mass of the walls and piers, and that they are just stout enough,—neither too thick nor too thin. The material employed,—Portland stone,—is of all the quarries within tolerable reach of London the stone which has proved itself the most durable under the trying influence of a town climate. Here, then, the design has shown the sound judgment of a true economist.

It is, however, with the design of the cathedral as a work of art that we have to do chiefly. The art materials employed were old indeed. The most important are the Classic orders,—things which were foreshadowed in Assyrian and Egyptian times, regularly established in Greece some 500 years before Christ; worked up afresh by the Romans; disused for well nigh a thousand years, and then resuscitated by the artists of the Classic revival,—now better known as the Renaissance. These have, moreover, been used in hundreds of buildings by Wren's immediate predecessors and contemporaries. The dome, the most conspicuous part of the design, was also anything but new, and there is hardly a moulding or an ornament that might not with justice have been described as hackneyed at the time the design was made. And yet the originality with which these familiar features are handled appears in every part of the sacred edifice, especially of its exterior. The dome crowns its substructure as no other dome does, and the beauty of its outline, the skill with which effect is given to the ring of columns below it, and the admirable proportion of its height to the mass with which it is associated, gives a charm to St. Paul's that is all its own. The west front, again, where the designer laboured under difficulties of a special kind, is a triumph of skill and original handling; and so strong is the impress of genius on this work, that it stands out to this day as a triumph of architectural art, not only

among the buildings of its day, but also as superior to similar cathedrals which have succeeded it, whose architects might have taken it as a point of departure if they could.

I have lately had an opportunity of examining a series of three buildings, near Liverpool, of which the likeness and the unlikeness may illustrate the same point. I allude to three modern churches, standing on the same side of the city, and built from the designs of three men of genius. The problem is much the same in each case,—a large and rich church for the service of the Church of England, the artistic material is much the same,—Western Gothic,—and yet it is hardly possible to imagine a greater contrast than these three works of art, owing to the originality of the three designers and the consequent novelty of their treatment.

Messrs. Paley and Austin's church is a grand commanding structure, of great height, transeptal, and with a noble tower at the crossing, of fine dark stone, and producing an effect of much dignity. The interior harmonises remarkably with the exterior in its dignity, loftiness, and richness. It is full of light, and it has a splendid ritual choir. Mr. Pearson's church has no tower; it is very plain externally, and is chiefly marked by the lofty windows, on which he is fond of relying for effect. The interior is a total contrast to the exterior in colour, is light stone, while the exterior is dark red, and is as elaborate as the exterior is plain. It is vaulted in stone throughout; it has, both in plan and section, all the features of a cathedral; and there are some exquisite pieces of stone groining in the substructures of the organ. Except that it also possesses a ritual choir, well marked, this church has hardly a feature in common with the first-named.

Mr. Street's church resembles Mr. Pearson's in being unostentatious outside, but there is no striking contrast between the outside and the in. The nave is very wide, giving a great air of spaciousness,—the shafts of the arcade are of splendid polished marble. The interior walls and roof are covered throughout with colour decoration. There is no clerestory, and but little light; the choir, though highly enriched and divided off, is not so strongly marked in the general construction of the church; and the whole structure is simpler, while the decoration is more complete, than in either of the other examples. Nothing can be better known to architects than the general ideas, the forms, the mouldings, the sculptures, employed by these three artists in their work. I hardly saw a scrap of anything unfamiliar, yet so individual and original was the spirit infused into the three works that it is hardly possible to compare them; they contrast in every respect. Each is a noble work of art, yet each differs from the other two in the principles upon which it is designed, and in almost every part the aim of each artist has been different. In each case the result is a success; but the great value of the new,—the original element of design,—impresses one in the most remarkable manner when one has the opportunity, as I lately had, of visiting the three buildings in one morning.

It can hardly fail to strike you that in the examples I have quoted far more of the old was present in the design than of the new, yet it was the new part which added value to the whole. So it always is with every work of any original nature. The old furnishes the material, the new is the animating spirit to which it owes its form and substance, and, let me add, that in the majority of cases, modern architects have to be content with a small infusion of the new and to rely largely upon the quality of the old for the excellence of the buildings they erect.

There are two reasons for this. First, that with regard to many architectural features, almost every possible modification of them has been tried, and the best is known; and to do anything new is often only once more making an experiment which has been done before with unsatisfactory results, or which has been far surpassed by other methods.

Take, for example, a window-head filled with tracery. No more beautiful feature exists, but it has been so well done by the architects of the Middle Ages that any attempt to make a different sort of tracery from one or another of the varieties they have left appears to be foredoomed to failure. There seems no reasonable probability that any designer could ever originate a sort of tracery that will bear comparison with what we possess already.

The second reason is that most of the features and forms used in building belong to great groups, each of them appropriate to one period or country. We are in the habit of talking of styles of architecture, and, though the word is used rather vaguely, it always means a method or fashion of building, all the parts of which are harmonious with one another. You all probably, even those who are quite fresh to the subject, know of the division of architecture into Gothic and Classic styles, and these are again subdivided. The books are full of references to the English Gothic style, the French Gothic style, the style of the thirteenth or of the fifteenth century, and so on. Now, each one of these styles had a kind of elective affinity, as the chemists call it, for certain forms, and an intolerance of others. A Gothic building, for example, ordinarily admits only arches that are pointed, and very rarely tolerates semicircular ones, which are, on the other hand, the proper ones for a Classic building,—where it has arches at all. Further, although exceptionally the form of arch used in the one style may be employed in the other, such a thing is impossible in the case of mouldings, and hardly possible in the case of ornaments; and it is rarely possible to depart from these strict rules without the result being out of keeping.

There is thus not much left for an architect to originate; and even in the use of known things, he is as limited to those proper to the style in which he is working, as a writer is to the words of the language which he is making use of.

But there is plenty of room for original talent notwithstanding all this. There are refinements and new touches which a skilled artist can give to old and familiar forms. There are, from time to time, new materials or fresh purposes, giving an opportunity for the origination of new forms; but chiefly, and of by far the greatest importance, the new combinations possible to be given, the fresh outlines, proportions, contrasts of light and shade and colour, which are rendered possible by the varying size, shape, and disposition required to meet fresh wants. These furnish the best opportunities for original work.

He who would design architecture must, then, have a good knowledge of what has been already done. The works of the past are, so to speak, our inheritance, and we cannot enter into the enjoyment of it without long and laborious study. In this respect the student of the present day is far more burdened with work than he must do than architects at some periods have been. There have been times (as, for example, in this country from the twelfth to the fifteenth century) when only one style was known or used, and that was the style of the day, growing out of, and based upon, the style of the past generation, but different, and for the moment in exclusive possession of the field. At the present day this is not the case; we are working in more styles than one, and we are bound in order to be properly furnished for our work to know more styles than one. You will, I hope, understand that when I speak of knowing a style I do not mean merely acquiring a familiarity with it as it was at a certain date. You require to understand how it grew to be what it was, and all about the development of its various parts, as well as to be familiar with its best examples, so that the study is historical, or should be, in part of its method.

Besides the very obvious truth that the man who is ignorant of the nature of any thing cannot properly employ it, there is also this very important truth that no man can work thoroughly well in a matter so intellectual and artistic as architectural design unless he knows a good deal more than what is barely sufficient to meet the ordinary calls upon him.

I must not be understood as meaning that you ought to master thoroughly all the elements of many styles of architecture which you will never be called on to use. Perhaps a complete and exhaustive acquaintance with two styles is as much as most men can accomplish, and to know one style thoroughly is enough for most men. But then you ought to add a very good acquaintance with the leading facts of various styles, or you will not be properly able to use even your own acquisition.

It appears, then, that learning to design buildings may be divided into two parts:—(1) Mastering to a sufficient extent what has been already done; (2) Acquiring the power to do something fresh;—and that the second acquisition

depends upon the first, and cannot be made by itself.

Here in the classes of this College an opportunity is offered you of learning much of what has been already done. In the A class,—the one which deals with Architecture as a Fine Art,—a historical method is adopted, and something like a connected history of the development of architecture from its distant origin in Egypt and Assyria down to what we are doing at the present day is offered you. I cannot pretend to notice all past architecture, or to give anything like a complete analysis of all the styles that are passed in review, or of any one of them in the time at our disposal; but, as far as opportunity serves, we shall examine each, as we come to it, with sufficient care to enable you to form an idea of its main features, and to put you in the way of carrying the examination further in the case of those styles which best merit exhaustive study. The diagrams and photographs which act as illustrations are, under certain precautions, lent to the students; and I strongly urge those who enter this class, by their help and that of other appliances, to do their very best to make themselves familiar with the forms and details of what comes before them, especially of Greek architecture. Greek is virtually the parent of almost the whole of European architectural design; and Greek art may be said to be the only art which has been carried to absolute perfection from its own point of view.

Our engineers are fond of saying that in certain directions they have gone as far as it is possible to go. In measurement, for example, they can measure to the millionth of an inch, and no mechanical methods can ever go further. So the architects of Greece in the age of Pericles seem to have carried architecture and the sculpture that goes with it to a point beyond which it is impossible to go. Study, then, thoroughly this remarkable development of art, perhaps the only one for which perfection can with any reasonable grounds be claimed.

Next to Greek I urge on your attention English Gothic, for two reasons. First, it is a very fine and highly-wrought-out style, or rather sequence of styles. It is quite impossible to say of anything so complicated as Gothic architecture that, at any moment in this or any other country, it touched perfection as Greek did; but it came very near in the best works of the thirteenth century, and again, to my judgment, in the best of the fifteenth. In addition to this, the works which remain are accessible to you. Even in London, though they are not numerous, enough examples remain to give a student ample subjects for study during the summer weather,—when alone sketching and measuring buildings is possible in our climate,—of several years. There is in the chapel in the Tower, St. Bartholomew's, Smithfield, the chapel in Ely Place, the Temple Church, Westminster Hall, St. Saviour's, Southwark, and, last and best, Westminster Abbey, a wealth of architecture which very few of you will be able to exhaust. Remember that architecture cannot be truly mastered except from buildings. Books, drawings, and lectures can teach you a good deal about it, but buildings only will reveal the whole secret of the matter.

The study of recent buildings is one which now ought not to be neglected. So much excellent architecture has been and is being done at the present day that not only London but many of our large towns will supply excellent examples, and to most pupils and assistants the works on which they are engaged form a good modern school. In London such buildings as the Gothic and Renaissance works of Barry, Scott, Street, Pearson, Waterhouse, Norman Shaw, Aitchison, and many others are accessible, and will well repay study; but the beginner must not forget that there are many modern buildings which are only fit to teach him what to avoid.

I spoke of the construction of a building as an element in its design. The Class B, for the study of construction, is intended to give you so much information as time permits as to the nature of the materials of which buildings are made and the mode of making use of them. Here a different, but a necessary, side of the study of architecture is pursued, but it is one essential to be mastered before you can design buildings. A person who designs things that are not structural may be a scene-painter, but cannot claim to be an architect.

It is not, however, attendance here alone, or such study of buildings as you may be able to

accomplish, to which you must look to fit you for that part of the future work of your profession which will consist in designing buildings. You are all, I presume, engaged as pupils or assistants in the offices of practising architects, and are doing your share of office-work. This it is to which you must mainly trust to make you thorough and practical. In the office you will master, or, rather, may master if you make proper use of your opportunities, the whole routine of building operations, and may if you will come to know pretty thoroughly the construction, arrangement, economy, and design of such buildings as may be going on. I cannot too earnestly recommend you to make the best of such opportunities. Let nothing pass you without your making an attempt to master it and understand it, and consider your office training as most valuable, even for the purpose of laying the basis of the art of designing architecture.

Try during this, the seed-time of your life, to enrich your mind, train your eye, cultivate your power of drawing, and fill your note-book and sketch-books. Saturate your mind and power as far as you can with architecture, and that of the best, as far as possible; and master all the difficulties which attend drawing till architectural draughtsmanship becomes perfectly easy to you.

I ought not to pass from the question of laying up stores of architectural knowledge without urging on you very strongly the advantage of seeing the work of other countries. If possible, an architect should make one good long journey through Italy, taking in Greece, if he can, and should visit Germany, Belgium, and France. No sacrifice is too great for the accomplishment of this object, which I hope all of you will put before you as one to be attained if you possibly can manage it.

In the life of Sir Charles Barry we have the history of the greatest English architect of modern days, and it may serve to show how long a preparation is requisite before a high level can be reached by an artist in architecture if we consult that memoir. We find that Barry was ten years from the time when he was articulated to the time when he began practice. And the whole of this time was spent either as a pupil or a student on the continent of Europe.

If, however, a student goes no further than the point I have indicated, he is like David, who collected the materials and the money for the temple at Jerusalem, yet himself built no part of it, but left it for Solomon his son to build.

The something new, to which I have again and again alluded, is like this making use of the materials. You must be David and Solomon in one in the matter of designing architecture.

Perhaps it may give point to this part of my tale if I try to describe what generally happens where an architect has to design a building. The first thing is to master the requirements and to estimate the means which will be placed at his disposal for meeting them. Mastering the requirements is sometimes simple, sometimes an arduous task. It may perhaps be a familiar and straightforward affair, such as to design a small dwelling-house with so many living-rooms, so many bedrooms, and the ordinary offices. At other times, as in the design of a vast public building, it will involve providing for hundreds or even thousands of people, and varied services of the most diverse and apparently irreconcilable character. Whatever it be, it must be mastered, i.e., the architect must get into his head what is wanted, and he must also know the site, its extent, aspect, levels, &c., the outlay intended, and every other consideration which limit or extend his means of meeting the requirements.

The ordinary course is, first, to think over the problem, and then to make a sketch or sketches of the plan of the principal floor,—usually beginning to a small scale, and, with a view to getting the general arrangement fixed, neglecting at first the minutiae of the plan. Sometimes together with these, sometimes after, the sketches of section and elevation are made. Of course, this process of making first sketches differs in its nature: many designers sketch in and rub out again and again, thinking pencil in hand, and, to a large extent, through the point of the pencil, if I may be allowed the expression. Few men have the enviable power of sometimes getting even a first sketch right at once; most require to alter, and re-draw, and reconsider, again, and

again, and again. Meantime, the mind is gradually filling with the subject; the idea is, perhaps unconsciously, crystallising there, and the ordinary result is, with many men, that after hours, or days even, of unsatisfactory effort, the whole becomes rapidly, perhaps suddenly, obvious, and a plan is sketched which meets the requirements, and upon which a treatment can be based which promises to be successful as architecture. Something of the same nature often occurs in the development of the sections and elevations. A wise man, if he has gone through the process and come to this point, closes his preliminary work here, and begins the process of elaborating his sketch.

The more practised or more gifted the designer, the sooner does he arrive at the point of making a good sketch, though not always at the point of satisfying himself, and with most, perhaps with all, men, the faculty of original design, if they possess it at all, varies a good deal. Health of body, ease of mind, freedom from distractions, and the stimulus of having a problem worth solving, all help a man to do his best; but far beyond anything else is the facility which comes from constant practice and from a large and accurate acquaintance with the forms of the style being used, and from readiness with the pencil.

After a ground plan has been fairly settled it not infrequently happens that the elevations and sections are very much reconsidered. It must rest very much with the individual himself how often he recasts his designs, but, on the whole, I am inclined to believe that many men do more harm than good by repeated alterations and changes. As the work proceeds it is drawn, with much precision, to a larger scale, and with more attention to details and ornaments, and by degrees approaches the form of a set of complete plans. Not infrequently a perspective study is tried to see how the proposed building will compose, and if the result is not satisfactory the warning ought to be taken and changes made. In the later stages of the work upon the design for any building that is not extraordinarily plain there is a great field for the exercise of knowledge and skill in the details, profiles of mouldings, enrichments, &c., all of which should be most carefully drawn out, full size, bearing in mind that they must be in keeping with the style and the general design, and yet if possible stamped with some originality, such as may often be imparted to them without rendering them inconsistent with their style. In all this work the measured drawings and sketches which the designer has made as a student of buildings will be of more help than anything else. Next probably in value will be the practice he has had as a pupil or assistant in working upon the designs of other men, and then the hints and suggestions to be drawn from good publications, photographs, and prints.

Assistance is derived in the process of designing from general principles such as are best learned by the critical examination and analysis of existing examples. The man who can satisfy himself that he understands the design of a good existing building, the principles which underlie its composition, and the means by which its effects are attained, is far advanced on the road towards the power of making a similar design himself.

Lastly, and by no means least, the power of original design, like every other power, can only be called out by constant practice. No doubt in some persons it exists to a larger degree than in the average, while others have little or none of it. But in most cases exercise and effect will strengthen and develop it, and if a keen, unprejudiced, but intelligent and enlightened critic will take a man's designs to pieces and show him their defects, and then tell him how to amend them, he will learn much from such discipline, if he can stand it.

A very necessary equipment for a designer of architecture, and one which is perhaps too much overlooked, is a thorough knowledge of construction. I have, in an earlier part of this lecture, pointed out that, unless a design can be built, it is not a truly architectural work. There is, however, another aspect of the matter, which is this, that when upon the lines of a plan which provides for the requirements the masses of a structure which it is practically possible to build are raised the germ of an architectural design, and in fact much more than the germ is attained, for the result is often to suggest all that is wanted, suppos-

ing the designer to have sufficient knowledge and taste to impart to the form arrived at good proportions and to ornament it with proper details.

The question rises, and it is one of growing importance, can architectural design be taught? It has been almost a canon among a certain set of architects that it cannot. I have, however, I hope, shown that it can be learned, and, if I am correct in my view of its dual nature and of the way in which it may be acquired, I think I have done something to show how far teaching can be usefully relied upon.

That which is old, at any rate, can be taught, at least to a willing learner, and those students who attend these classes come here to learn a part of it which cannot easily be acquired elsewhere. A systematic study of materials and construction and of the architecture of the great building nations cannot be, as a rule, attempted in the offices where you are pupils, and cannot easily be carried on by the help of books alone. There is something in the actual teaching of a lecture which gets better hold of the attention and perception of the learner than a book can have. The old facts, then, of construction, of architectural growth, are to be learned here, and from time to time some criticism on the principles of design observed in the works of which illustrations come before you will help you to understand them. Advice as to planning and composition will naturally be suggested by the dissection and examination of the designs of existing buildings.

Beyond this point I do not think it is easy to teach much about design by lectures. A professor can tell you about the past and can point out to you the buildings, when you must for yourselves study and draw architectural detail. Planning and composition, like other acquisitions which require practice, require, I think, to be learned in classes of a different sort, and which we have not, at any rate as yet, seen our way to establish at this college. The Royal Academy offers the best instruction in architectural design at present attainable in London, and some of the classes of the Architectural Association give instruction and afford opportunities of practice in the same way. The Junior Class of Design at that Association has generally adopted the excellent plan of proposing some existing building as a *point de départ*, and expecting that the designs shall be based upon it to a large extent.

The many prizes that are offered by the societies, and sometimes by the professional journals, and of which regular programmes are issued, afford to students excellent opportunities of exercising themselves in the art of dealing with a definite set of requirements, and framing an architectural design to meet them. And the competitions from time to time open to the entire profession offer opportunities of the same sort which are most valuable to young architects, and perhaps in no profession is there exactly the same means of measuring one's strength against others, and trying one's hand at real problems, as in ours. Let me add that the man who really masters architectural design, as I have endeavoured to shadow it forth, will find sooner or later that the attainment will bring him fame and work. I cannot say fame and fortune, but such modest rewards as are not unwelcome.

If original design is to be good as well as new it must not only make use of good materials, but it must proceed on sound principles. Perhaps nothing is more likely to implant these in the mind than the study of such books of analysis and criticism as show acumen, and which lead the reader to think for himself. A foremost place among books claiming to be critical should be given to Ruskin's "Seven Lamps." It is not a work overflowing with information, like Fergusson's history, or the *Abécédair* of De Caumont. It is not a book likely to be of much use to a person unfamiliar with architecture or with scanty knowledge of it; but to those who know enough to enter into its spirit and meaning, it is both a delightful and an instructive book. I am far from wishing you to accept Ruskin's teaching as always right, but every page is worth careful reading, for you cannot avoid thinking for yourselves about the subject if you read Ruskin with any intelligence. The seven lamps of architecture stand, as some of you, I hope, know, for the inspiring spirit, which may serve to give life, power, beauty, expression, grace, picturesqueness to piles of stone and brick, and every one who wants to be a designer should learn to think

about the spirit as well as the substance of his work.

A useful book, more modest in aim and smaller in dimensions, is Garbett's "Principles of Design in Architecture," a volume which is easily accessible and very suggestive.

Another writer on architecture who writes a power of critical analysis with vast learning is Viollet le Duc—and his "Entretiens,"—which you shall read in French if possible, but of which a translation exists under the title of "Lectures by Viollet le Duc,"—is well worth reading by those who want to understand the spirit in which architecture should be thought out and designed.

Many other writers on architecture from time to time introduce criticism and analysis, which is of the greatest possible benefit, for sometimes a very few lines may suffice to show the principles upon which an important work was designed. Among books which contain occasional passages of this sort, it occurs to me to mention that admirable work, the *Lectures on Architecture* of the late Sir Gilbert Scott.

A good deal has been said this evening on the necessity of making a suitable provision of what may be called artistic raw material; in other words, obtaining a familiar and exact acquaintance with the mouldings, ornaments, forms, features, out of some of which all architectural designs must grow. A man cannot deftly combine windows, doors, columns, cornices, into one whole, and cannot successfully produce the best forms of these and other features till he has studied them much, drawn them frequently, and stored his memory with their forms. This may be looked upon as a stock of architectural raw material.

Ease, speed, and force in handling these are, however, only to be got by practice, and I strongly recommend you to practise yourselves in handling, and modifying, and combining architectural forms and features, showing your work from time to time to some one competent to point out your mistakes and recognise your success.

A student would gain great facility in dealing with architectural material of all sorts, if he would follow the practice of altering existing designs or portions of them, and of basing new designs upon the designs of existing buildings. Many modes of doing these things may be suggested: among them would be to take such a feature as, for example, a window, and (preserving the proportion) to re-draw it more rich than the original, and, again, less rich, without altering the style. Again, to alter the style, as to translate it from Roman to Romanesque, and again to Pointed; then to make it the basis of a new design for a different window, as, for example, to take the drawing of a two-light Gothic window, with a tracery head, and design a three-light, or a five-light, that shall correspond.

The same kind of treatment might with advantage be pursued in dealing with whole designs, as, for example, a section of a church might be taken and treated more plainly than the original, more richly. Its proportions may be made more lofty, more depressed. Its style may be made more early, more late,—and so ease in dealing with design may be gradually gained.

Practice in the design of very simple subjects that do not seem out of the reach of even a beginner is, perhaps, quite as instructive, and as likely to stimulate the inventive faculty, and to lead to skill in handling the architect's raw material as if the subjects were more ambitious.

A chimney-piece, a door, a casement window, a lych-gate, a cottage, a lodge, are subjects that are not formidable, but there is scope for original design in them quite as much as in something more ambitious, and the student who would do nothing with a cathedral may succeed in getting a lesson in design that will benefit him for life if he will limit himself to a fountain, a tomb, a chair, a porch, or something of that sort not too large or too difficult for his present power,—and this may prove a stepping-stone to the cathedral later.

The course of this lecture has been directed first to describing the nature of a building and the work to be done by its designer, when we arrived at the conclusion that old artistic materials animated by a new spirit were essential to a good architectural design.

This position was illustrated by describing a case where, at Edinburgh, a building that should be all old was attempted, and another at

Brighton, where one all new was tried, neither of which can be called a success, by an analysis of the nature of the design of Westminster Abbey and of St. Paul's, and by a reference to some modern architectural works and a sketch of how a modern designer may proceed.

We then proceeded to consider at some length first how the old part of the architect's equipment may be obtained, and then how the power of inspiring it with the new spirit is to be cultivated.

It only remains to say one or two words to commend to you the subject of architectural design. From your point of view, regarding you as gentlemen who intend to become professional architects, a power of original design is to yourselves everything. With it, you will succeed; without it, you must fail in taking a high position in the profession which you propose to adopt. But there is another point of view from which to consider the subject. I wish, in closing these words, to say something about its intrinsic nobility, quite apart from its importance to us as professional men.

In many respects the designs of architecture do more to originate a fresh creation than the labours of the painter or the sculptor. These artists can, it is true, simulate, the one light and shade and colour, and the other form, and they can preserve the aspect of events, people, or scenes, some of which they partly create. But splendid as the results are, the limitations are galling, and the painter and the sculptor can rarely hope to show their originating power to a very great extent. The original design of most good pictures or statues is due as much to the poet, the dramatist, the historian, as to the painter.

A really noble design, such as Salisbury or Lincoln, Canterbury or Westminster, is a more original creation, from the very fact that it is more artificial than any picture or statue, and its very position as a public monument gives it a claim on national affection and admiration which no other work of art can hope to attain. To design a really great work of architecture is to accomplish one of the most noble works which an artist can attempt; and whoever accomplishes that feat can only do so by the aid of the two acquisitions which I urge you to make. He must possess a good mastery of that part of architecture which is old. He must possess an equally good power of so handling the old elements that the result shall be new.

Illustrations.

SUGGESTED DESIGN FOR LIVERPOOL CATHEDRAL.

WE publish to-day the ground-plan and exterior view of a design for the Liverpool Cathedral, prepared by Messrs. Hay, and exhibited at the Liverpool Architectural Society in January last.

On that occasion a paper was read by Mr. James M. Hay on the St. John's site, and its fitness for a great cathedral; and the drawings were afterwards exhibited at the Walker Art Gallery along with the designs of the invited competitors.

Mr. Hay spoke strongly in favour of the site, on condition that the design should be Classic. The genius of the place he considered demanded it. The popular mind was in favour of Gothic, but the incongruity of placing a Gothic building in juxtaposition with one of so severely Classic a character as St. George's Hall being more or less recognised by every one, the site by many was on that account disapproved. Admit that the cathedral might be Classic, and the site stood forth as the finest in the city.

The authors explain their intention and idea in the design as follows:—

"The style adopted, therefore, is Classic externally, but in the interior, where the designers were fettered by no conditions, the style is Gothic, some external intimation of which is given in the doors and windows. The growing principle of the interior style is further manifested in the central dome, which rises above the horizontal lines of both buildings, and finally reaches its fullest development in the upper portion of the western towers.

The amount of Gothic sentiment thus imparted to the external design makes it become a connecting link between the Gothic of the interior and the purer Classic of St. George's

Hall, and at the same time helps the better to define its own individuality.

The central axis of the building is placed at right angles with St. George's Hall. The ground floor is 17 ft. lower than it, so that the entrance to the north transept would be level with William Brown-street. The area of the site towards the west end is raised, and would show the building as resting upon a level plateau, from which two flights of steps would lead to the western portico, and two of lesser height to that of the south transept.

The object aimed at in the plan has been a large, capacious, and unobstructed central area, and to what extent this has been attained the following references will show:—

The nave of York Minster, the widest in England, is 46 ft.; St. Paul's, the next widest, is 41 ft.; Lincoln, the third widest, is 37 ft. In this plan it is 54 ft.

The arch opening into the central area of Peterborough, the widest in England, is 37 ft.; St. Paul's, the next widest, is 35 ft.; Gloucester, the third widest, is 34 ft. In this design it is 50 ft. To put it in another way, and to show the greater comparative freedom of area over that of St. Paul's,—a much larger building,—the central dome of St. Paul's is 112 ft. diameter, while the arch through which the four limbs of the cross are visible is only 35 ft.; in this design it is 50 ft., while the diameter of the dome is only 90 ft.

The building is lighted from above by seven domes, one over the centre 90 ft. diameter; one over the nave, 54 ft.; one in the choir, 36 ft.; one of 18 ft. in each transept, at the extreme west end, and over the apse. The principle of gradation is further observed in the height of ceiling, for the ceiling gradually increases in height, as well as the lighting in brilliancy, from the west end up to the central dome, and thence as gradually declines eastward, northward, and southward.

The objection appertaining to most domes, viz., of being too high, relatively, and forming, as it were, the ceiling of a separate chamber in the centre of the building, is thus avoided."

Without saying that we are prepared to accept as satisfactory the rather odd combination of Gothic with Classic detail displayed in the design, we think it certainly deserves credit as a spirited attempt to apply a novel and original treatment to an architectural problem. Leaving the detail of the design apart, and looking to the general plan and its disposition in relation to St. George's Hall, we must say that we regard it as the best plan, for the site, that has been produced; though, of course, from a clerical point of view, it is not what is called an orthodox church plan. Whether this is to be regarded as a defect or a merit, depends of course on the view which is taken of the intent and purpose of a modern cathedral. Our own opinion, with all deference to the ecclesiologists, is that the Mediaeval cathedral plan is *passé*, and that the altered spirit of modern worship demands a corresponding alteration of the cathedral plan, in the direction of giving it more distinctly the character of a congregational church,—a wide area rather than a long avenue. Those, of course, who think that the Church should not change, and has not changed, in any essentials of its creed or ceremonial, since the Mediaeval period, are perfectly logical in demanding a Mediaeval church.

MANCHESTER EXHIBITION BUILDING.

WE give a view and plan of the design selected, in limited competition, for the building for the Manchester Jubilee Exhibition, to be held next year. The site chosen is at Old Trafford, adjoining the Botanical Gardens, which it is proposed to incorporate with the Exhibition. It will cover a space of about thirty-two acres.

The main building consists of a central nave, 1,022 ft. long and 56 ft. high, with a transept across the centre, 370 ft. long, and the same height, and two lower transepts near the ends of the nave 60 ft. wide. At the intersection of the nave with the central transepts is a dome 90 ft. diameter and 140 ft. high, and at the intersection of the nave with the low transepts are square pavilions of a lower altitude. The spaces between the nave and the arms of the cross are filled with exhibition courts, in bays 30 ft. wide.

The machinery in motion will be provided for in a large annexe, separated from the main

building by a 70-ft. roadway, with a covered fireproof gallery of communication.

The section devoted to fine arts is completely isolated from the main building by stout brick walls, with iron sliding fireproof doors; the brick walls will be covered inside with Parian cement, to secure immunity from damp.

The architects are Messrs. Maxwell & Tuke.

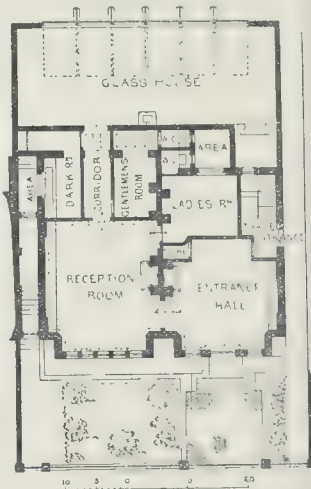
NEW WAREHOUSES, ST. PAUL'S CHURCHYARD.

THESE buildings consist of three large warehouses adapted to suit the requirements of the wholesale Manchester trade. The fronts to St. Paul's Churchyard and Watling-street are carried out in Portland stone, with granite columns and pilasters to the ground-floor. Each warehouse has two entrances, the entrance to the end warehouse being placed at the corner, which has been carried up, as a feature, in the form of a turret, with a lead-covered dome as finish. In elevation the treatment is of a plain but substantial character. The whole of the works have been carried out from designs prepared for Mr. W. Shepherd by the architect, Mr. F. Hemings.

The view of the building, as we give it, is partially concealed by the angle of the cathedral; but as the question of widening the street here and placing the new buildings further back from the cathedral has been so much discussed (unfortunately to no purpose), we prefer to show the relation of the building to the cathedral as it really is, instead of publishing an imaginary view which cannot really be seen.

NEW STUDIOS, GLOUCESTER-TERRACE, FOR MESSRS. ELLIOTT & FRY.

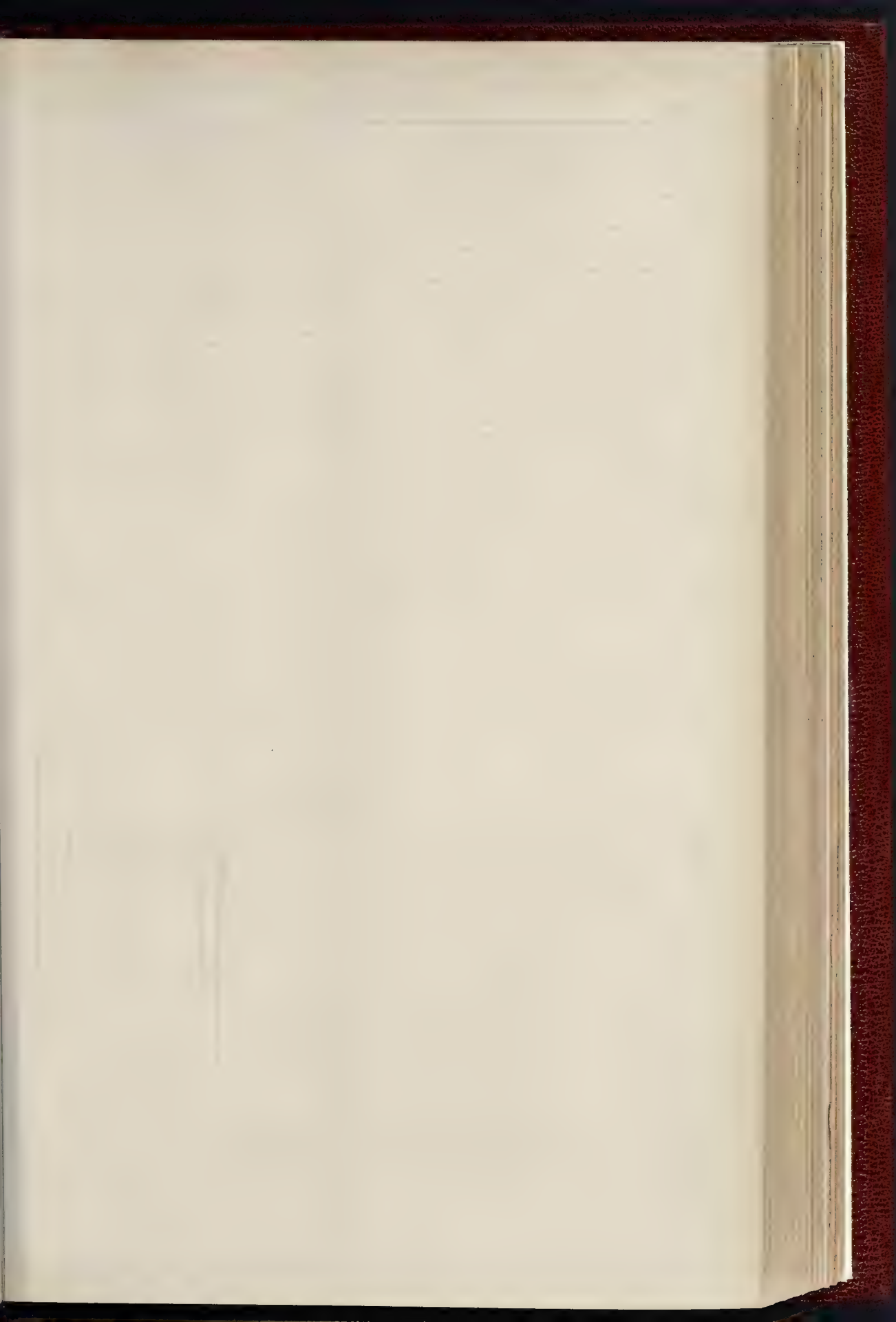
THIS work consisted of reconstructing the pair of old semi-detached houses which formed Nos. 7 and 8, Gloucester-terrace, so as to adapt them to the requirements of high-class photographic studios; the fine pure light available behind being taken advantage of for the erection of the glass house, which is on the ground floor, and the construction of which differs considerably from other glass houses hitherto erected. We append a plan of the ground floor. An effort has been made in the treatment of the front elevation to recall the character which prevailed in English work towards the end of the sixteenth, and beginning of the seventeenth century.



The work was carried out by Mr. George Shaw at a cost of 3,000l. Mr. MacCulloch did the stone carving, and the ornamental ceilings on the ground-floor were executed by Messrs. Battiscomb & Harris.

The drawing was in the Royal Academy Exhibition. WILLIAM ELLIOTT & FRY.

The Metropolitan Sewage Sludge Question is to engage the attention of the Board of Works at this week's meeting, on the motion of Mr. John Jones.

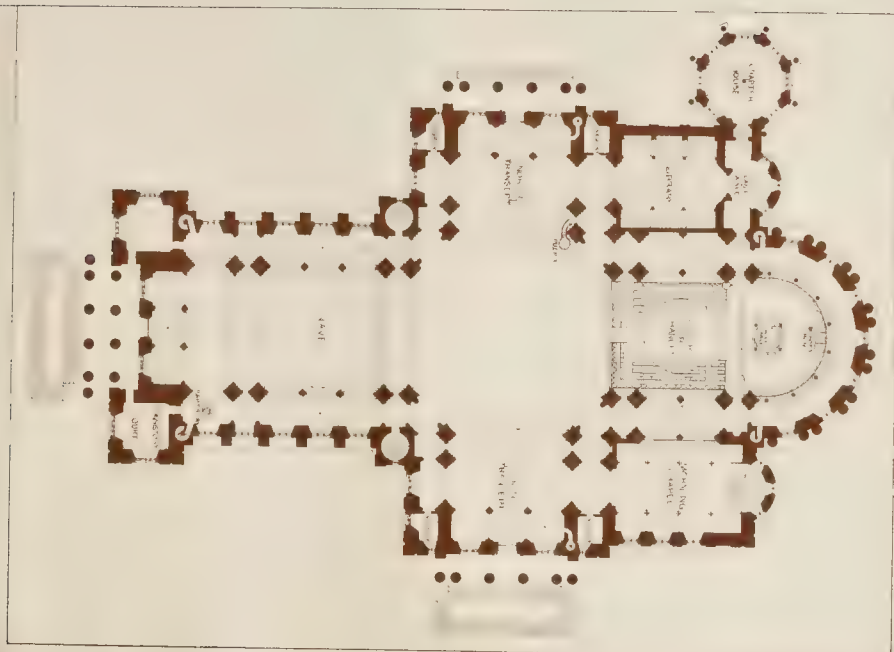




DESIGN FOR

Treated with special reference to its

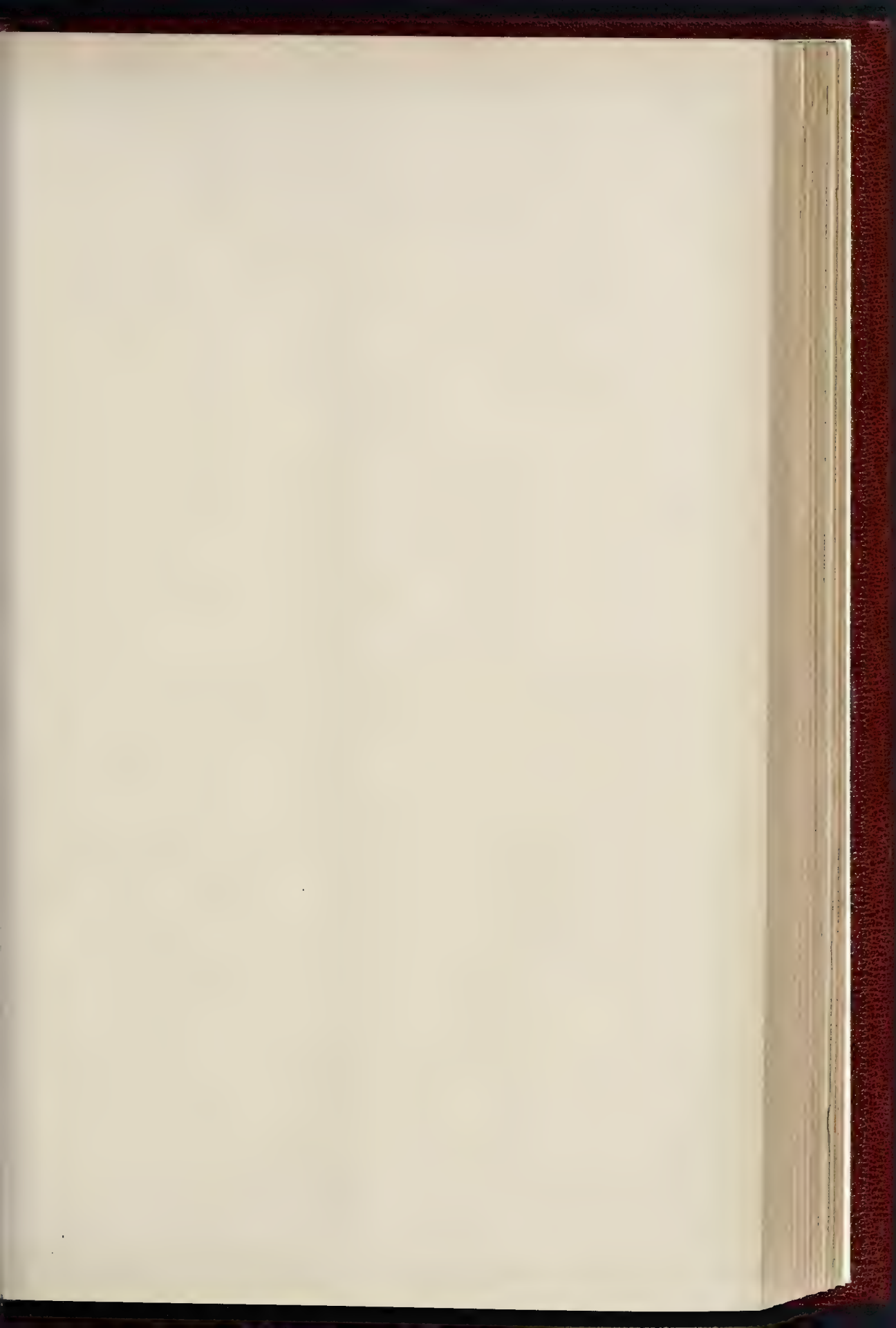
By MR. J. A.



ATHEDRAL.

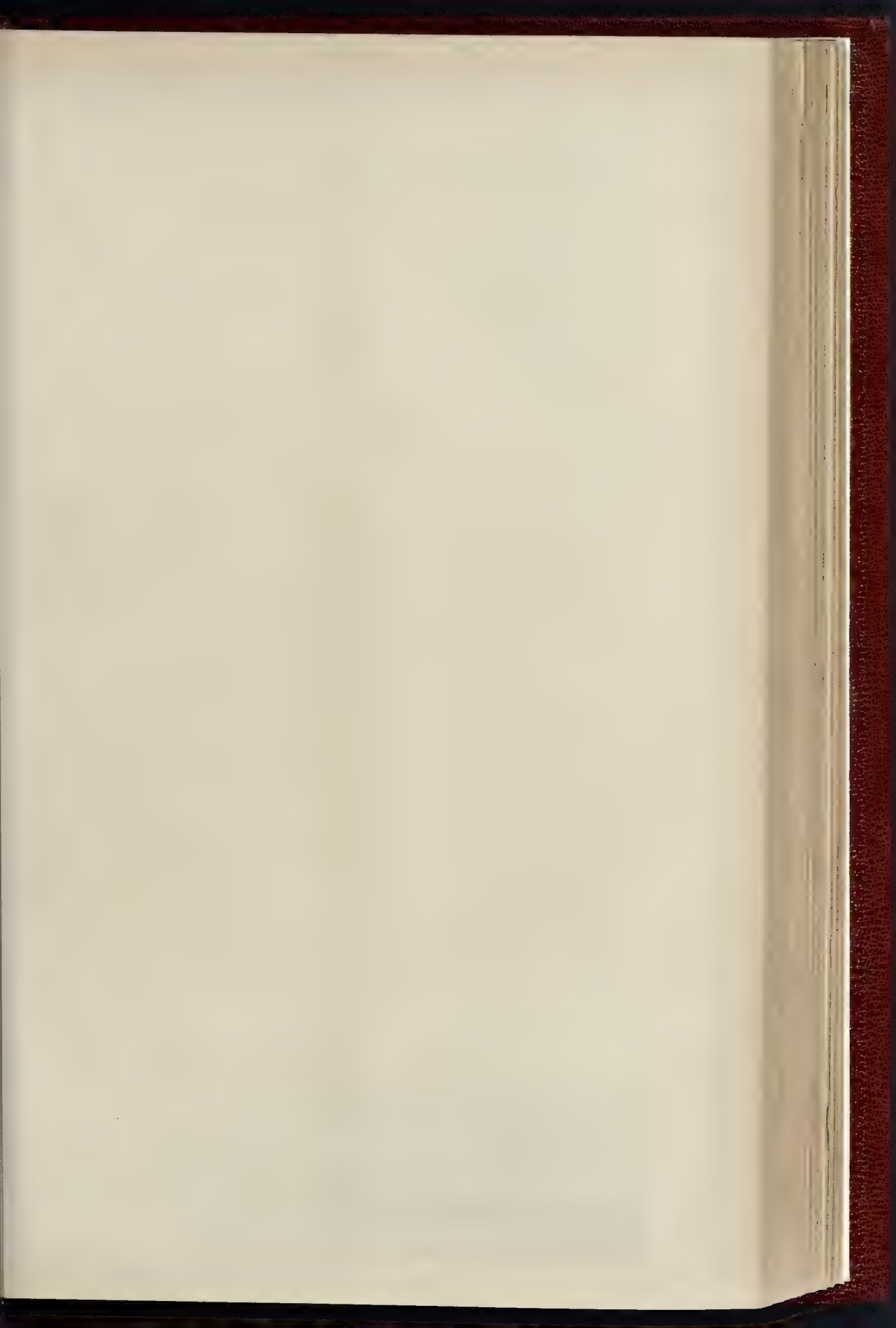
uping with ST. GEORGE'S HALL.

HITECT.





NEW STUDIOS, SOUTH KENSINGTON.—MR. WM. FLOCKHART, ARCHITECT.



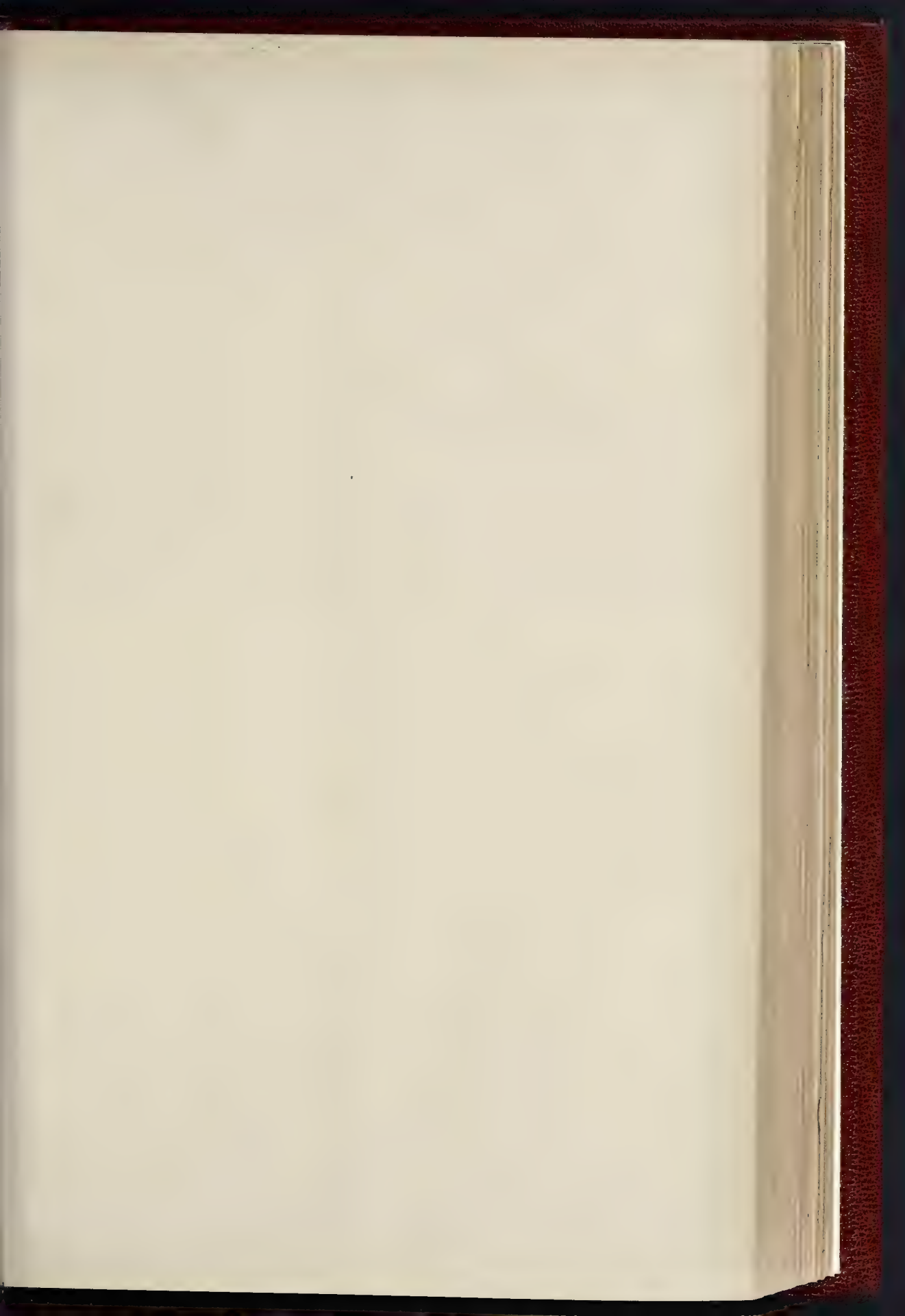


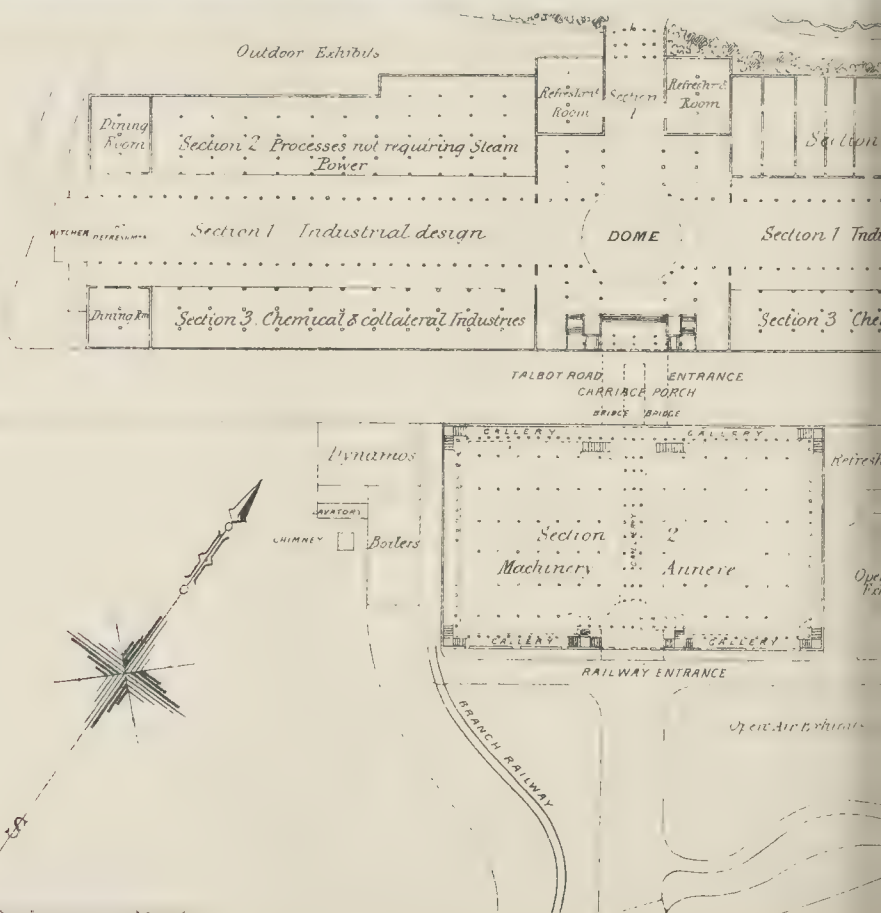
WAREHOUSES, ST. PAUL'S CHURCH





NEW BUILDING FOR THE UNIVERSITY, OXFORD.—MR. T. G. JACKSON, M.A., ARCHITECT.







Arts
Section 7 Music Room
General Industries

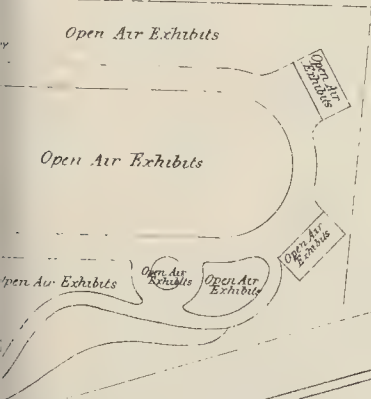
L B O T

R O A D

The Manchester Jubilee Exhibition

Plan & View
of Exhibition Building.

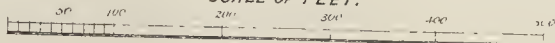
Messrs Maxwell & Tuke,
Architects.



ALTRINCHAM RLY

To Manchester

SCALE OF FEET.



NEW BUILDINGS FOR THE UNIVERSITY OF OXFORD.

This drawing is taken from the water-colour which was in this year's Royal Academy Exhibition. The building shown in our illustration is designed to contain a library, lecture-rooms, and offices, for the delegacy of the non-collegiate students of the University. It also provides accommodation for the delegacies for the Public School Examinations and for the Oxford Local Examinations.

It is to occupy the space left vacant at the junction of High-street and King-street, adjoining the new schools, which were also built from Mr. Jackson's designs a few years ago, and a communication will be made between the two buildings, on two of the floors.

THE CONSTITUTIONAL CLUB, NORTHUMBERLAND AVENUE.

The Constitutional Club-house, in Northumberland Avenue, which was opened to the members on Monday last, presents, both in colour and design externally, an important and striking variation from the Portland and Bath one frontages of the other large buildings in its new thoroughfare. The terra-cotta used externally, and with which the main facade is entirely faced, is of two colours, buff and reddish-brown, and not only is effect obtained by the contrast of these two colours, but a great deal of the detail ornament has been specially made from models prepared for the purpose by Mr. Frampton under the direction of the architect, Mr. Robert W. Edis, F.S.A. The site being wedge-shaped, with its narrow end looking towards the river, and having a frontage of 200 ft. frontage to Northumberland Avenue and about the same in Northumberland-street, with an extreme width, at its widest end, next the Grand Hotel, of about 110 ft., considerable skill and ingenuity of planning were demanded in the arrangement of the various rooms and the general disposition of the interior, and the architect seems to have been equal to the occasion, and has boldly emphasised the narrow end of the wedge by a well-designed circular end with open arches, giving on the first floor and a circular turret above, forming a picturesque termination to the high-arched roof of the main building. On the ground-floor he has grouped all the principal rooms round an octagonal centre hall, which was an important feature on the plan. The main entrance is placed at the northern order end of the site, and, in addition, separate entrances are provided for access to the members' bedrooms or chambers above the principal floors, and for tradesmen, in Northumberland-street. The basement and the mezzanine floor between it and the ground-floor are devoted to the general service rooms of the Club, and contain a kitchen, 50 ft. by 30 ft., with all the necessary offices; servants' hall, 12 ft. by 24 ft.; still rooms, steward's rooms, larder, and boiler and engine rooms for the electric lighting and steam pumps. The ground-floor contains a lofty entrance hall and vestibule, 20 ft. by 20 ft., with hat and cloak room and reception room, 27 ft. by 25 ft., for use of the members. The large octagonal entrance hall, which, together with the outer hall, lined with delicate white-toned marbles (varnished and veined), is 30 ft. in diameter, and off this are the morning room, 120 ft. by 12 ft., with central recessed portion with circular bay, 50 ft. by 26 ft.; smoking-room, 12 ft. by 26 ft.; and lavatories, &c., with bath dressing rooms on mezzanine. The service rooms on each floor are arranged in the centre of the building, with hydraulic lifts from the basement, still-room, and wine-cellar opening to them. These rooms are arranged on the ground floor so as to communicate directly with all the principal rooms of the Club. On the first floor, which is approached by a well-lighted broad marble staircase, 6 in. wide, with balustrade of rich buff or purple-violet marble, is the central coffee-room, 140 ft. long by 30 ft. wide, a central portion recessed with circular bay, and an extreme width at this portion of the room of 52 ft., and finished at the narrow end by an open circular loggia, facing the river; a library, 51 ft. by 27 ft., with librarian's room, a billiard-room, 45 ft. by 26 ft. 6 in., and a bar with service room, lavatories, &c. The rooms on ground and first floors are 20 ft.

high, those on the second floor being 16 ft. The second floor is devoted to a large general smoking-room, 100 ft. long by 31 ft. wide; billiard-room, 50 ft. by 28 ft.; card-room, 32 ft. by 22 ft.; committee and house dining-room, 46 ft. by 24 ft.; lavatories, service-room, and secretarial rooms. In the third, fourth, and fifth floors are arranged about eighty bedrooms for the use of members, with separate staircases, bath-rooms, &c., and accommodation is also provided on these floors, and on the various mezzanine floors facing Northumberland-street, for about sixty servants. The building generally is for the most part of fire-proof construction, and is provided with hydraulic lifts for service and luggage and an hydraulic elevator to each floor for the use of members. The principal portions of the rooms will be lighted by a novel system of electric lighting specially designed by the architect. The treatment of the electric lighting arrangements, in fact, really forms one of the features of the building, as it entirely dispenses, in the principal apartments, with any form of brass or iron fittings. Most of the electric lights are fixed right up in the ceilings, the disposition of them being different in the various rooms, so as to give groups of two or three, or in some cases only a single electric lamp. This prevents any set appearance of the incandescent lamps, and in some cases, in order to still further vary the lighting, the lamps have been set into the rich ornamentation of the deep friezes, as in the case of the library and grand hall. The general result at night time is that a brilliant uniform glow is distributed throughout the whole area of the room, and the lights being in the ceiling, and so high, there is no dazzling effect on the eye. Though no doubt there is a certain amount of light lost by thus placing it so high up, yet this loss is minimised by the whiteness of the ceilings, which act as reflectors. The electrical machinery, which generates current for 750 lights in all, is placed, as before mentioned, in the basement of the buildings. The engines and dynamos are both in duplicate, to prevent any breakdown, as one engine and dynamo supply the necessary current, while the other is kept ready in case of emergency. All the wires in the building are not only coated with several layers of insulating material, but are protected throughout by wood mouldings. The electrical circuits are guarded by positive and negative pole cut-outs, to guard against any accident from damage to the wire, &c. The whole of the electric arrangements were entrusted to Messrs. B. Verity & Sons, of King-street, Covent-garden. Each floor is fitted with high-pressure water-mains, by Merryweather & Co., and the whole of the rooms throughout are ventilated by a system of exhaust tubes going to the top of the building, with one of Blackman's Air-Propellers worked by steam-power from the basement. Fresh air is admitted by tubes or shafts on the so-called "Tobin" principle. All the internal fittings, including the richly decorated plaster ceilings, stoves, and mantels, have been specially designed by Mr. Edis. Some of the stoves and mantels are very good in design and execution; a few did not so favourably impress us. The modelling of the whole of the exterior ornamental work has been executed in terra cotta, from models prepared from the architect's designs and under his supervision, by Mr. George Frampton, a young sculptor who has gained various medals in the Royal Academy School. The whole of the terra-cotta and tiles used in the building were supplied by Mr. J. C. Edwards, of Raabon, whose terra-cotta is well known for its hardness and general excellence, the whole of the work being self-coloured and burned from the local clays. The general works have been carried out from the designs and under the supervision of the architect by Mr. Boyce, builder, of Eagle Works, Hackney. Messrs. Matthew T. Shaw & Co., of Millwall, manufactured and erected complete the whole of the constructional ironwork, and constructed the whole of the fireproof flooring. As might be anticipated from the fact that the site is partly on or very near to what was once the foreshore of the Thames, the foundations have had to be carried down as much as 50 ft. below the level of the pavement at the south end, the foundations of the other frontages going down to an average depth of about 40 ft. The superstructure is carried almost entirely on a series of legs or piers of brickwork, there being only a short length of continuous wall below the

pavement level, and that occurs underneath the south or curved end of the building. All these legs or piers, however, stand on continuous footings, the continuity of which is ensured by the insertion between the courses of strong hoop or bond iron, 2 in. by 2 in. by $\frac{1}{4}$ in. These hoop-iron bonds are placed, not only in the outer footings, but in those of the various cross walls, and wherever the lines of hoop iron intersect they are riveted together. We are informed that there has not been the slightest sign of settlement so far. The grand staircase, although cased with marble, is really constructed of concrete, and is practically monolithic in construction. Embedded in each tread is an iron joist of I-section, with bearings at each end, and by means of a temporary centering these joists were encased in the concrete in the manner so well known and used in the construction of fireproof floors. The marble work was executed by Messrs. Burke & Co., of Newman-street; the heating, ventilation, and kitchen fittings, hydraulic lifts and mains, and boiler work by Messrs. Benham & Sons, of Wigmore-street; the ornamental plaster ceilings, &c., by Messrs. Jackson & Sons, of Rathbone-place; the mantels and stoves, &c., for the principal rooms were supplied by Messrs. Yates, Haywood, & Co., and Messrs. Longden & Co.; and the sanitary fittings and plumber's work by Messrs. Matthew T. Hall & Co.; Mr. Holloway acted as the architect's clerk of work, with Mr. Wilkie Edis as assistant. The gas fittings and electric bells and speaking tubes have been done by Messrs. Stode & Co. Messrs. Starkie, Gardner, & Co. have done the wrought-iron work, but just as "all is not gold that glitters," so all is not wrought-iron work that appears to be such. For instance, the balusters to the back staircase giving access to the members' bedrooms are of cast iron, and though of pleasing design, are sheer imitations of wrought work, even to the representation of rivet-heads. (These balusters were supplied by another firm.) We had thought that Mr. Edis was too much opposed to shams of all kinds to sanction this sort of thing. Another sham which we may note is seen in the "concealed" doors which open from some of the principal rooms to the service department. These doors, cut through dado and skirting, are very ill-concealed at the best, and the concealment will be still less when the inevitable finger-plates are attached.* Altogether they are suggestive of nothing so much as the "practicable" doors sometimes cut through the "walls" in scene-painters' interiors. The building has been furnished by Messrs. Maple & Co., and Messrs. Shoobred & Co., of Tottenham Court-road, the latter firm supplying the carpets, blinds, &c.

It may be added that the Club already consists of 5,300 members, of whom 1,500 are town, and the remainder country members, with a waiting list of about 1,200 candidates; and that the whole of the works have been well and satisfactorily executed at a cost well within the contract amounts.

FURTHER NOTES OF THE SANITARY CONGRESS AT YORK.†

We this week bring to a close our notes of this very successful and interesting congress. Large as has been the amount of space we have devoted to it, so great was the number of papers submitted in the various sections that in regard to most of them we have only been able to give brief extracts from or comments upon them. But we nevertheless hope that we have succeeded in giving a fair idea of the scope and variety of the papers read, and of the far-reaching issues involved in many of them.

Captain Douglas Galton's Lecture to the Congress.

This was a very able address, and was devoted to the discussion of one or two of the lessons derivable from the reports and writings of Dr. Farr on "Vital Statistics." Speaking firstly of the economical value of sanitation, the author of the paper said:—"By the term economical value, I would wish to imply not only the large money value which a healthy population may be said to possess, as compared with an unhealthy population, by reason of its greater power of work and diminished outlay

* Since this was written we find that these are even now being fixed.

† See pp. 427, 468, 467, 498, ante.

for defraying the cost incidental to disease, and to the support of the diseased and incapacitated members of the community, but also the much larger amount of individual happiness which the healthy population enjoys. . . . In order to estimate the money value of life, we must bear in mind that in its production and education a certain amount of capital is sunk for a longer or shorter time; capital thus sunk, with its interest, as a general rule, reappears in the wages of the labourer, the pay of the officer, and the income of the professional man. The labour of the parents, and the expense of attendance, nurture, clothing, lodging, education, apprenticeship, practice, are investments of capital, at risk, extending over many years, and the return appears in the form of the wages, salaries, or incomes, of the survivors. The outgoings increase from infancy up to a certain age; the earnings then commence, and are long equal the outgoings; the earnings continue subsequently in excess throughout manhood, but, as life advances they decrease, until they are extinguished amidst the feebleness and infirmities of old age. The present value of the person's probable future earnings, minus the necessary outgoings in realising those earnings, is the present value of that person's services. Like capital invested in the soil, in the vintage, or in a commercial adventure, the capital invested in the life of a man returns, in happy natures, profit of a hundred-fold; in other cases fifty, twenty, ten-fold; in others it is barely returned; in some it is entirely lost, either by death, sickness, vice, idleness, or misfortune. At first it is all expenditure, and a certain necessary expenditure goes on to the end, to keep life in being, even when its economic results are negative. The value of any class of lives is determined by valuing first at birth, or at any age, the cost of future maintenance, and then the value of the future earnings. Proceeding on this method, Dr. Farr estimates that for an agricultural labourer on good wages the present value of a child at birth is 5*l.*, at five years old 56*l.*, at ten years old 117*l.*. The present value of a youth at fifteen is 192*l.*. The present value of a young man at twenty is 234*l.*, and the man at twenty-five is 246*l.*. But after that age the prospective value decreases, and at thirty years of age it is 241*l.*, at fifty-five years of age it is 138*l.*, at seventy years of age it is 1*l.*. The cost of maintenance afterwards exceeding the earnings, the value becomes negative: at eighty the value of the cost of maintenance exceeds the value of the earnings by 41*l.*. These values are borne out on a comparison with the former cost of slaves in Rome, in the United States, and in the West Indies. The amount of capital sunk in the education of professional men is not only much greater, but it is probably of greater risk, and it has to remain longer under investment before it is returned. The maximum value of such a man is attained later in life, probably at forty years of age, and in the highest orders of the Church, law, and politics, where experience and great weight of character are requisite, the life still increases in value as higher ages. Thus, until the period of old age is reached, life has a definite money value, small in childhood, increasing to middle age, and then declining in old age. This money value is, however, dependent on the health of the population. Dr. Farr gives an average, but the average in a healthy population would be very much higher than in an unhealthy one, in which the children were sickly, the youths stunted, and manhood weakened by early disease, and cut off in its prime." Captain Douglas Galton then proceeded to speak of the sanitary dangers resulting from increasing density of population, and said that unless special care be taken to provide for the sanitation of a population in proportion to the increase of its density, it might be assumed that if a population on a definite area increased in an arithmetical progression, the dangers to its health would increase in a geometrical ratio. Amongst preventive measures to this end the reader of the paper suggested that "if the various municipal authorities could and would insist that all buildings in towns should be designed and built in such a manner that air could penetrate freely and directly from the outside to every part of the inside of the building, and if they could and would, moreover, provide that, both in front and at the back, all buildings should be separated from adjacent buildings by a space at least equal to twice their height, we should ensure free circulation of air between and around all buildings. It may be

urged that the property in towns would not fetch so high a price if it were not allowed to be crowded with buildings, but no owner of property has the right to allow it to be used so as to be a source of injury to the community; and where populations aggregate together in the way they do in our large towns, the owner of property, to whom so large a profit comes from what has been termed the unearned increment, would have certainly little cause to complain if he were required to pay some attention to the health of the occupants of both his and of the surrounding property, from whom his enormous profits are derived." With regard to the direction of sanitary effort, Captain Douglas Galton said there were four matters greater attention to which would be followed by material improvement in the public health, viz.,—(1) Sanitary Education; (2) Legislation; (3) Trained Sanitary Advisers; and (4) Notification and Isolation of Infectious Disease. "In the first place, the study of sanitary science has not been made an integral part of the education of our children. It has been well said that it is through the education of the young that you must influence the life of a nation. In the next place, our legislation is defective, our sanitary areas were arbitrarily fixed, and are not satisfactorily adjusted. We have no adequate supervision over our rivers. The density of our population leads to pollution of our rivers, and yet we are satisfied to take no steps to prevent this pollution. We take no steps to prevent floods, which leave their traces in sickness and low health of the population exposed to their influence. We have no adequate supervision over the sanitation of houses, especially in towns. . . . In the third place, we require trained advisers in practical sanitation. Your medical officer of health has qualified himself for his position, for he cannot be admitted into his profession until he has passed necessary examinations; but it seems to be considered that any engineer, whether he has studied sanitary science or not, is qualified to have charge of the sanitation of a town, and often that any person, whatever his previous occupation, will do for a sanitary inspector or inspector of nuisances. But this is a fallacy; for consider for a moment the variety of matters by which the health of the community is daily endangered. We are touched at every point by disease-causes. . . . Sanitary work, to be of much value, or of a comprehensive nature, must be undertaken with a clear idea of the dangers to be averted, and the good to be obtained. It is a scientific work, and scientific methods must be adopted." With regard to the fourth head, already indicated, the author of the paper clearly showed the advantage of general and compulsory notification and isolation of cases of infectious disease.

The Ventilation of Factories and Workshops.

This was the subject of a paper submitted by Mr. William Tattersall to the "Engineering and Architecture" Section of the Congress. We extract the following passages,—"The construction of factories or rooms will govern the application of any system of ventilation to them. The ordinary method of ventilating weaving and other sheds has, I think, usually been inefficient by reason of the contrivances for exhausting the foul air being inadequate at their best, and uncertain in action when most needed, and also because the inlets for fresh air were not under control as to the quantity, temperature, or direction of the air admitted. The exhaust has usually been by means of automatic ventilators of various kinds plentifully sprinkled about in the roof, and without in many cases any particular provision for inlets, or simply holes in the walls which allowed the air to enter in gusts, and ensured their being speedily closed or stopped up with rags or anything else convenient. The lobster-back cowl, and other wind-driven ventilators, are liable to get stuck and act as inlets, and the same remark applies to other forms of ventilators which are driven by the wind, besides which, in hot weather, when they would be most needed, there would very likely be no wind to cause them to act. This last remark applies also to induced-current ventilators, besides which none of those mentioned produce, at the best of times, sufficient movement of air to carry away the particles of floating dust, so that for this purpose an appliance is needed which will move air in large volume constantly, and be under control, as to the quantity moved; this is found in a type of exhaust fan, dealing with large

volumes of air at low pressure, and requiring small power to drive, and which, placed near the centre of a shed, will exhaust air in proportion to the speed at which it is driven, and may be regulated to suit the temperature and other requirements, or the amount of impurities existing. We thus get a current of fresh air traversing the sheds from all sides to the centre, and there being constantly discharged, irrespective of wind or weather. In some large sheds several may be necessary, and in one very large one I put four fans, having an aggregate displacement of 120,000 cubic feet of air per minute, or 7,200,000 cubic feet per hour, which changed the contents about eight times per hour. The best results have been achieved by placing one or more exhaust ventilators near centre of shed roof, and arranging the inlets at regular distances around the walls. The amount of air to be passed through will depend on the temperature and rate of pollution inside, and the inlets may, if needed, be carried down from the roof, and the entering air warmed, cooled, or moistened at pleasure. There are plenty of appliances to be had by which air can be admitted without draught. A series of rooms, one above the other, may, if not too large, be dealt with by one exhaust ventilator, placed at the top of a vertical shaft, extending through the several stories and with outlets from each room, the inlets for fresh air to each room being so arranged that the air may, in its course from inlet to outlet, traverse the room, and especially that part in which the greatest source of pollution exists. It is obvious that a series of small rooms on the same floor level may be dealt with in a similar way, by a horizontal air duct with openings to each room, and inlets as suggested above. In storied rooms too large to be dealt with in this manner, each room may be treated separately, and many large workrooms are so treated, by having one or more exhaust fans placed on one side of the room, and fixed either to discharge through windows or openings specially made. The inlets in this case would be arranged on the opposite side of the room, and possibly at the ends, if required, so as to cause the current of air to traverse the sources of pollution, whether dust, heat, fumes, or steam. Generally, the requisite effect in removal of polluting matters is obtained by running the fans entirely free from any kind of tubes on the feed or room side; and where possible this is best, as less power is needed to drive them, and more air is moved when the area of feed is unrestricted. There are, however, some cases in which it is necessary, and many in which it is advisable, to carry away polluting matters immediately they are set free, so as to prevent their distribution in the atmosphere. In these cases it becomes necessary to construct tubes with openings near the source of pollution, and connected at the other or exit end with a fan, which, when working, produces a powerful exhaust, and carries away the polluting matter as fast as it is produced. This arrangement may be, and is, applied with perfect success to remove dust, heat, steam, and fumes of various kinds. . . . In conclusion, looking at the important bearing that the efficient ventilation of factories and workshops not only in the cases mentioned, but also in very many others, has upon the public health, it seems to me that there should be some authority with power to compel the best known (or, at any rate, a satisfactory) means of ventilation to be carried out in what may be termed unhealthy trades; what that authority should be, or the circumstances under which it should act, I do not pretend to suggest; but I think that the Council of the Sanitary Institute might profitably consider the matter, and prepare a recommendation on the subject."

American Sanitation.

Mr. John B. Cass, Godwin Bursar and Medallist of the Royal Institute of British Architects, read a paper on this subject. In one of the opening paragraphs of his paper he said:—"It is only of late years that much attention has been given in America to the sanitary arrangements of towns and buildings, and the better understanding of what precautionary measures are necessary for the public health. Architects and engineers recognise the importance of sanitary matters, and manufacturers are stimulated to develop appliances to meet the latest sanitary requirements. The American public mind has been stirred in these matters, and the National

Board of Health at Washington, and the Boards of Health of the various States, are doing excellent service. The reports of the Washington Board, which (I believe) are in the Library of the Sanitary Institute, and which I brought over for the Library of the Royal Institute of British Architects, contain information of much value, though, unfortunately, the last report is only of small dimensions, owing to the limited appropriation of money granted by the Government. In many of the cities there are stringent sanitary regulations, which are very good, but, unfortunately, they are not always carried out, as the curse of the speculating and jerry builder hangs over America as well as England. Building inspectors are not always able to insist on a full carrying out of the regulations, and perhaps even building inspectors have the 'itching palm' with which the American public service is so much credited. In one city, where the plumbing regulations are very strict, I was told that the purchasers of a row of good houses, on entering into possession, found that all the elaborate plumbing fixtures were without any service or waste piping at all." Having described some of the most "advanced" methods and appliances in use in the States, Mr. Gass concluded his paper with the following words:—"The remarkably rapid growth of most of the Western cities, and the natural difficulties of the disposal of refuse, conjoined with the general apathy in matters of sanitation from which both Americans and we ourselves are only just emerging, leave a great deal to be done everywhere, and it must take many years to bring most of the American cities into a thoroughly sanitary condition. Even in enterprising and wide-awake a city as Chicago, for example, behind the fine houses in its famous Michigan-avenue, there is hardly a single house, I am told, where proper provision is made for the disposal of the refuse of the household. The decaying vegetable and animal matter is simply thrown into the unpaved back street, or on to the nearest unoccupied ground, and allowed to lie and rot there. At all times these alley-ways are filthy, and in hot weather both disgusting and a source of great danger. But the American public mind is rapidly awakening to a recognition of the necessity for proper sanitation, and, with its hospitality to all new ideas, the inventive genius of the people, and their insatiable desire for 'progress,' I think it is very probable that they will move much more rapidly than we shall be able to do in our own country, with its conservative instincts and its archaeological love for the dear old cesspool."

Open Spaces and Physical Education.

This was the title of a well-reasoned paper by Lord Brabazon, pleading for the provision of an increased number of parks, gardens, playgrounds, and gymnasia, which, he contended, were not to be considered as mere luxuries, but as absolute necessities in maintaining the health and physique of our vast town populations. Therefore, he regarded the provision of such places as a most legitimate object for the expenditure of public money.

Medical Climatology.

Mr. Charles Roberts, F.R.C.S., read an interesting paper "On Medical Climatology: a scheme for Defining Local Climates by Combined Meteorological and Phenological Observation." He said we must not confound the study of climatology with that of meteorology. Meteorology is the science of the atmosphere in its purely physical aspects, but climatology is the science of the atmosphere in its physical, chemical, and biological aspects, and also of the physical, chemical, and physical aspects of the earth's surface in contact with it. Meteorology deals with the weight, temperature, aqueous vapour, movements, and electrical condition of the atmosphere, in one word, with the weather; it in addition to the weather, climatology deals with the quantity and quality of the air, the sun, and the soil. If to these numerous elements we add their influence on biological phenomena, we have the very comprehensive science of medical climatology.

The Filtration of Water for Town Supply.

Mr. Percy F. Frankland, Ph.D., F.C.S., &c., read a paper on this subject. He said,—"The filtration of water on the large scale which has been carried out in London and other

places for so many years past, has resulted in much valuable experience being collected by the engineers to whom this process has been entrusted. In this work of improving the processes of filtration, engineers have, however, been but little assisted by science, and have been guided almost entirely by empiricism. It is true that from time to time the subject of filtration has been investigated by chemists with a view of ascertaining the value of this process in removing the organic matters present in water, but these inquiries have resulted in little of practical value beyond demonstrating that in the process of sand-filtration it is only new sand which effects any noticeable reduction in the dissolved organic matter present. Engineers have, however, not modified their practice in consequence of this information, inasmuch as they are aware that old sand as well as new will produce water clear to the eye, and the removal of at best a small proportion of organic matter has not, in their opinion, justified the additional expense which a frequent renewal of sand would entail. Briefly, therefore, the object of the water engineer has been to obtain for each acre of filter-bed as large a volume of water which is clear to the eye, regarding the organic matter in the water as a factor which is beyond his control, and which can only be modified by changing the source of supply. Sand-filtration has, therefore, not unnaturally been held in little repute by chemists, who fail to recognise, as of any sanitary importance, a process which has no material influence upon the dissolved organic impurities of water. For many years past we have, of course, been fully alive to the fact that the real danger in sewage-contaminated water, does not reside in the organic matter discoverable by chemical analysis, but in the presence of minute living organisms capable of producing zymotic disease. But until the last five years very little was known either of these organisms themselves or of the manner in which they would deport themselves under the various processes of purification to which water is subjected. It is to the beautiful methods of bacteriological investigation which we largely owe to the genius of Robert Koch, that is due the great advance which has recently been made in our knowledge of the sanitary conditions of water supply, and more especially of water purification. Indeed, it is difficult to over-estimate the stimulus which has been given to this important branch of science by the introduction of these novel methods of investigation. By the light of researches on the bacteriology of water made with the assistance of these methods, the process of filtration assumes an altogether new aspect, as its efficiency can now be gauged by another standard besides the naked eye of the engineer or the organic analysis of the chemist,—a standard, moreover, which is far more closely connected than are either of the others with the sanitary aspects of the question."

The Sanitary Condition of the Country, with Special Reference to Water-Channels.

Mr. Robert T. Cooper, M.A., M.D., read a paper bearing the above title. He said:—"It is a fact beyond dispute that our rivers, and the tributaries and sub-tributaries of our rivers, are silting up very rapidly; and, indeed, the only possible inference is that accumulations are being thrown down in a proportionately greater quantity than when we had a less population. If, then, this be the case,—and a mere 'walk over' our fields will convince the most sceptical, by the very tangible evidence of the beds of dried-up streams, of the urgency of the situation, and, inferentially, of the danger that exists to the health, well-being, and safety of the community, the situation is the gravest,—it admits of no delay. The agricultural poverty of this country will most assuredly and most unmistakably intensify the present disastrous condition of our streams; it will be followed by the most calamitous consequences, if Government refuses to take in hand the supervision of the water-ways and the proper planting of the country. Our imperative duty is to warn the Government and people of England of the fatal results which inevitably ensue from a continued neglect of water-channels, and of the need there is of an immediate outlay of national funds in the interests of the land and of the people of the country. It cannot be too often or too perseveringly impressed upon the notice of the public that if the smaller streams throughout the country are allowed to silt up

and become inoperative during times of drought, the effect will be the desiccation of the soil and consequent loss of fertility, and the lessening or even complete exhaustion of the water coursing through the rivers themselves. . . . This being the case, it becomes to us to consider very earnestly what steps ought to be taken to effect a consummation so devoutly to be wished as the restoration and conservancy of the natural storage channels of the country, and the strict protection of their catchment areas. In the first place, it will be necessary to seek, nay to demand, Governmental aid in the accomplishment of this purpose. A Woods, Forests, and Rivers Preservation Department for the United Kingdom should be instituted, and an Act passed having for its object the Governmental direction of the country generally, and the imposition of powers over owners of land to compel them to reforest hills and uplands being the sources of streams and rivers, and to replant river banks, and do other things necessary to the maintenance of the natural storage and sufficient supply of flowing water throughout the country. The streams and river channels of the country, the aggregate length of which in England and Wales alone amounts to, roughly, 200,000 miles, are, as we said, silting up very rapidly. The work of restoring the natural beds to all the lengths of rivers and streams of the country will of course be a very considerable undertaking, and will require much time for its accomplishment, as well as a colossal expenditure of capital. As a set-off against this, however, we may safely affirm that it will be in every way remunerative, and will promote the health and happiness of the present generation, and of generations to come, while it will distribute wealth throughout the country, and lessen, if not altogether neutralise, the undesirable ardour of the working classes to flock into and crowd the towns."

The Landes of Gascony.

"The Story of Bromontion and the Reclamation of the Sand-wastes of Gascony" was the subject of Dr. G. V. Poore's address to the working classes on the Saturday evening following the Congress. The paper graphically described the chief facts of a great sanitary work accomplished within the last century by our friends and neighbours, the French, viz., the reclamation of the great sandy district, covering nearly two millions and a half of acres, known as the Landes or Moorlands, situate on the coast-line of the Bay of Biscay and extending from the mouth of the Gironde to the mouth of the Adour. These moorlands had been the despair of agriculturists for centuries, and were once regarded as among the dreariest and most unwholesome districts of Europe. As to the causes which brought about this state of things Dr. Poore said:—"The reputation of the Bay of Biscay is familiar to every Englishman. It is there, if anywhere, that the force of wind asserts itself, and the winds are generally westerly in direction, and blow with fearful violence from the sea over the land. The shore of that part of the bay with which I am dealing is composed of unmitigated sand. The effect of the wind upon sand is familiar to all of us, for the sand is borne upon the wings of the wind and travels considerable distances. Now, in the Bay of Biscay, the rise and fall of the tide is considerable, so that the sand washed up by the sea is left high and dry to the extent of many feet at low water. Again, in the latitude of the Bay of Biscay the sun is far more powerful than here, so that in the interval between the times of high water the sand is greatly heated by the sun, and is so thoroughly dried that the particles no longer tend to stick together,—glued by natural moisture,—but are easily driven before the furious blast which comes roaring from the sea. When the wind is not very strong it blows the sand into heaps along the shore. These heaps or hills may reach an elevation of from 65 ft. to 300 ft., with an inclination of about 30° towards the sea. These heaps of sand are called 'dunes,' a word having the same origin, probably, as the English 'down,' and formerly the whole fore-shore of the Bay of Biscay, between the Gironde and the Adour, presented an undulating appearance, as though a portion of the swelling, rolling sea had been turned to sand, and become stationary. If these sandhills had been really stationary, they would have formed a natural rampart against wind and waves, and it might have been possible to drain

and cultivate the land behind them. But this was not the case. The scanty herbage of grass and reed which grew upon the dunes was not enough to fix them. It only required a gale of moderate force to completely alter the face of the country,—hills became flat, valleys were filled up, the lakes which formed behind the dunes became dry land, the water which the lakes contained was forced in some new direction, and what happened to the lakes also happened to the water-courses, with the result that the whole country was waterlogged, and fields and gardens which had been painfully and industriously cultivated were submerged by the drifting sand. It is even stated that villages disappeared completely in this way, and that the enterprising agriculturist in digging his estate was liable to the surprise of finding just beneath the surface the brazen weathercock on the steeple of some long-forgotten parish church. It is a great labour, even at the present day, to keep the mouths of the Gironde and the Adour free from drifting sand, and it is certain that a century or so ago the course of the Adour was completely changed, owing to the channel getting dammed by sand blown into it. If an accident such as this could happen to a mighty stream like the Adour, one may judge of the great uncertainty which attended the course of smaller streams, and the absolute impossibility of draining the land. A few feet below the average level of the surface of the district there is an impermeable stratum, locally known as *allios*, which keeps the water from flowing away, and beneath the impermeable stratum was more sand sodden with undrinkable water. The result of this condition of things naturally was that the district of the Landes during the wet season was a swamp, and during the dry season a pestilential morass. The district was uncultivated, and produced nothing but scanty herbage, which served as pasture for a few wretched sheep, tended by shepherds doomed to spend their lives upon stilts, for the country was such that it was impossible to walk far in any one direction without sinking to the waist or shoulders. The country produced no corn, and the population was the scantiest in proportion to acreage of any district in France. The population was kept down also by disease. Fevers of all kinds,—and especially those of a malarious type,—were exceedingly common." How some of these tracts of sand were prevented from shifting by the sagacity of Nicolas Bremontier, an officer of the Ponts et Chaussées; how his work was continued and extended by order of the First Napoleon; and how, as a consequence of these works, the whole tract of country formerly devastated by these shifting sand-dunes has been reclaimed, drained, and rendered healthy and fertile, and now actually includes such health-resorts as Arcachon,—all this was narrated by Dr. Poore in a way which was suggestive of a chapter in Smiles's "Lives of the Engineers." Shortly stated, Bremontier prevented the sand-dunes from shifting by planting them with the kind of fir-tree known as the *Pinus Maritima*, taking special means (described in the paper) for protecting the young saplings. The whole paper was of great interest, not only from its subject-matter, but from the able manner in which it was treated.

The Supply of Water to Towns.

This was the subject of another address to the working classes, by Mr. James Mansergh, Member of the Council of the Institution of Civil Engineers. Having very lucidly explained the *rationale* of rainfall and natural water-storage, he described the various ways in which Nature's provision of fresh water is drawn upon by engineers for the supply of towns, and incidentally gave a brief history and description of the York water supply, which is derived from the Ouse. Before concluding, he referred to the neglect, and even inaccessibility, of storage cisterns for domestic supply, and urged reform in these respects.

The Collection and Storage of Rain-Water.

This was the subject of a paper by Surgeon-Major R. Pringle, M.D., late of the Bengal Army, who showed how rain-water might easily be collected and stored in a cleanly condition ready for use, by the adoption of his "Sursam" cistern shield, which we described last year, when it was exhibited at the Leicester Exhibition (see p. 416 of the *Builder* for September 26, 1885).

In the discussions which took place on some of the papers, considerable differences of opinion were manifested. For instance, on the subject of disposing of the dead, while nearly every speaker agreed with the views expressed in Mr. Eassie's and Mr. Robinson's papers on cremation (one speaker, Surgeon-Major Pringle, stating that from his experience as a medical officer in India he was prepared to say that, but for cremation, towns where cholera had raged would have been uninhabitable), no less a light in the sanitary world than Mr. Baldwin Latham expressed his strong opinion that the "earth-to-earth" burial reformers, who wish to hasten the corruption of the body after it is buried, are mistaken. The more quickly that process takes place, especially where burials are numerous, the greater, he said, must the evil be. Mr. T. H. Harrison, in his paper on "The Classes who administer the Public Health Acts," told some wholesome truths, although they may not be applicable to all local authorities. Anyhow, he succeeded in bringing the occupants of a hornet's nest about his ears. No doubt some of the gentlemen who protested against the general application of Mr. Harrison's charges are fortunate in respect of the local authorities with which they are connected, either as members or officers, and which they, as sanitary experts, no doubt do much to keep in the right path; but we fear that there is only too much ground for most of the allegations contained in Mr. Harrison's paper, which, it must be observed, only purported to be a compilation from returns furnished by medical officers of health. As already mentioned, only 25 per cent., or 200, of those applied to (800 in number) afforded any information. Who knows how many of the remaining 75 per cent., or 600, refrained from replying because they felt it to be an invidious thing to reveal to a private individual the sanitary shortcomings of the Authorities whose officers they were? So warm did this discussion become that it was suggested that the Council of the Institute were deserving of censure for printing the paper, and its "expurgation" from the "Proceedings" was hinted at. But more moderate counsels prevailed, and in the end Mr. Harrison was thanked for his paper. The success of the Congress was very largely due to the untiring labours of the Hon. Sec., Mr. S. W. North, M.R.C.S., Medical Officer of Health for York.

THE ARCHITECTURAL ASSOCIATION.

The following is the syllabus of meetings for the ensuing Session, 1886-87:—

- Oct. 8.—Opening *Conversations*.
- Oct. 22.—Address from the President, Mr. J. A. Gutch.
- Nov. 6.—Paper on "Pupilage," by Mr. Aston Webb.
- Nov. 19.—Paper on "Church Planning," by Mr. J. D. Sedding.
- Dec. 3.—Paper on "Decorative Metal Work," by Mr. H. Longden.
- Dec. 17.—Paper on "Fireplaces," by Mr. T. Pridden Teale, M.A., F.R.C.S.
- Jan. 7.—Paper entitled "The Complement of Architectural Instruction," by Mr. Thos. M. Rickman, F.S.A.
- Jan. 21.—Paper on "House Sanitation," by Professor Corfield.
- Feb. 18.—Paper on "The Architecture of Art," by Mr. Walter Crane.
- March 4.—Paper on "Welsh Churches," by Mr. A. Baker.
- March 18.—Paper entitled "Architect and Contractor," by Mr. H. Lovegrove.
- April 1.—Members' *Sorée*.
- April 22.—Paper on "Metric Projection," by Mr. H. H. Stannus.
- May 6.—Paper entitled "Stray Thoughts on Architectural Education," by Mr. G. Aitchison, A.R.A.
- May 20.—"Travelling Student's Notes on Gloucestershire," by Mr. R. W. Paul.

A New Carillon.—A carillon, specially constructed by Mr. J. W. Benson, of Ludgate-hill, for Didsbury Church, Manchester, was publicly tested on Tuesday last, when a series of seven tunes was played on eight temporary bells. The instrument is entirely automatic, and requires no attention beyond ordinary winding. Both carillon and clock have been presented to the church by Mr. William Roberts, of Didsbury.

THE ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

At the third annual general meeting of this Association, held on Saturday last, the Council presented their report, which congratulated the members upon the continued success which has marked the Association's career during the past twelve months, as shown by the increase in the number of members, and also by the increased average attendance at the monthly meetings. "When it is remembered that some members who are most regular in their attendance have thirty or forty miles to travel each way, and that the average attendance is thirty, it speaks well for the vitality of the Association; this is also evidenced by the large amount of interest manifested in the various subjects which came under discussion by the various papers and addresses given during the past session. The present number on the roll is as follows:—Members, 195; Associates, 11. The list of honorary members has been added to by the election of Dr. E. Seaton and Mr. J. W. Knights, F.I.C., F.C.S. Altogether the number at the present time is 235; this, compared with last year, shows a total increase of twenty-seven. At the same time, the Council have to announce, with much regret, the removal by death of several members. The Council also beg to refer to the deputation to the President of the Local Government Board on April 8th last, which is the first official representation hitherto made by sanitary inspectors or any other sanitary association. The Council had, after many meetings and much consideration, produced a report on 'Impending Changes in Sanitary Law.' This report was presented to a special meeting of the Association on March 19th last, and was adopted by that meeting. The report was afterwards sent to every member of the Parliament then existing, it was again presented with other papers by the deputation to the President of the Local Government Board; this report formed the groundwork of the views put forward by the deputation and it was so far successful that Mr. Stansfeld (who was the President), and was pleased to say the deputation had pointed out a particular flaw in the Sanitary Acts of which he was not previously aware, that was 'the inability of sanitary inspectors to serve a notice for the abatement of nuisance until the Authority had first given their sanction thereto,' no matter how necessary the abatement might be. The Council regret that the political atmosphere has been such as to preclude, up to the present, further sanitary legislation, but they have reason to hope that next session may see some realisation of their desires in this respect. They also wish to take this opportunity of placing on record their hope that the time is not far distant when a 'Public Health Act for England' will be placed on the statutes. The 'Public Health (Metropolis Bill), 1885,' was a step in this direction, and there is some prospect of its re-introduction next session. As it is important to be prepared for any emergency, our President suggests that if possible we should have another deputation to the Right Hon. C. T. Ritchie, M.P., the new President. The first provincial meeting was held at Birmingham on June 19th, and was such a success that the Council consider these meetings should be held annually as being necessary to the further progress of the Association, besides giving an opportunity for the provincial members to meet each other together with their metropolitan brethren; again, the Council hope that the outcome eventually will be the origination of District Centres, or branches of the parent Association. It is proposed to hold the provincial meetings on the Saturday next before Whit-Sunday, which will enable many to attend who could only do so at a holiday time, and the Council beg to recommend Eastbourne for the next provincial meeting. On July 24th a number of members visited the Sewage Works of the Metropolitan Board of Works at Crossness, to view the method adopted for the disposal of the London sewage south of the Thames. In the previous annual report, reference was made to a conference which had been held with the Sanitary Institute of Great Britain concerning a proposed combination in the matter of examination of Inspectors of Nuisances and granting certificates, it being considered desirable, if possible, to decide upon some joint action in this matter by the two associations. After much correspondence, the Council regret to say the whole matter of an amicable arrangement has fallen through, and therefore it will

for the new Council to consider what steps shall be taken to establish such an examination and grant certificates of the same, as shall be a thorough test of the candidate's qualifications by practical experience as well as theoretical knowledge. The President (Mr. Edwin Chadwick, C.B.), still continues to take a great interest in all that concerns the Association, and, notwithstanding his great age, contrives to render that active support which is so much valued by the Association."

ARCHITECTURAL ASSOCIATION SATURDAY VISITS.

The last of the Vacation Visits of the Architectural Association was made on Saturday, the 2nd inst., to Mr. Stonor's house at Ascot, in pursuance of erection from the designs of Messrs. Ernest George & Peto. The general arrangement of building consists of a hall entered from the deep porch and vestibule with a lobby communicating with the chapel; on the east side the morning and drawing rooms, which are separated from each other by sliding doors. On the south side of the hall are the dining and billiard rooms; the hall communicates with a large verandah on the south side. The treatment of the elevation is tile hanging and rough cast, the rough cast being made of Brighton sand and having red brick quoins. The oak, both internally and externally, has all been treated with ammonia and lime, which gives it a very dark colour. The oak timber in the billiard room is finished with an adzed effect.

The chapel is faced internally and externally with Bracknell red bricks with Ham Hill stone dressings. All the reception-rooms are panelled with oak, which is finished ivory white; the billiard room is panelled with sycamore wood.

COMPETITIONS.

New Town-hall, Bethnal Green.—We understand that eleven designs have been sent in, in limited competition, for a new Town-hall for Bethnal Green.

Merthyr Tydfil General Hospital.—We are informed that at a meeting of the executive committee, held on the 21st ult., at Merthyr Tydfil, the professional assessors appointed to examine the various plans submitted for the General Hospital (towards the erection of which the Marquis of Bute has contributed the magnificent sum of 1,000*l.*), delivered their report, which stated that, in their opinion, the best set were those furnished by Mr. E. H. Lingen-Barker, of Hereford. The judgment of the experts was confirmed by the Medical Council of the Institution, and subsequently the General Committee met and endorsed the decision made by the Executive Committee, on the motion of Mr. Frank James, seconded by Cresswell, who remarked that, apart from the report of experts, there could be no doubt that Mr. Lingen-Barker's plans were the best. There were seventeen sets in altogether.

New Buildings in Birchin-lane.—Two buildings have lately been erected in this street on land belonging to the Salter's Company, which abuts in the rear on the church of St. Edmund, Lombard-street. The design is that of the Guarantee Society; it was designed by Mr. E. A. B. Crockett. The elevation is formed of polished granite and red field stone, in the Renaissance style, and of highly ornate character. The ground floor is occupied by the company for business, and are fitted up with wainscot in the same style. The second building is that of the London Branch of the Commercial Bank of Sydney, which was designed by Mr. W. W. Gwyther. The elevation is formed of polished granite and Portland stone, in the Classic style, with bold Ionic columns, &c. The lofty ground floor and the upper part are occupied by the company for business, and are fitted up with antique fittings. The offices have been ventilated by the Aolus Waterspray Ventilating Company. In both cases the premises are well lighted, the lights being most excellent. Messrs. Ashby & Horner were the builders. The drawing was executed by Mr. Roscoe. Mr. Henry Dawson acted for the Salter's Company, he being their surveyor.

STANLEY'S PATENT SECRET-BALANCE CHANDELIER.

Mr. W. F. STANLEY, of Great Tarnstile, Holborn, whose versatile genius as a mathematical instrument maker is so well known to many of our readers, has been turning his attention to the improvement of the appearance of the ordinary balance or "hydraulic" chandeliers, and to some purpose, as we think will be manifest to the readers of this brief notice of one of his latest inventions. The ungainliness and the dangers of the ordinary balance-weights of sliding gaseliers have long been apparent, but in these "secret-balance" chandeliers of Mr. Stanley's these ugly weights are entirely dispensed with, the balance consisting of a leaden tube, which just slides softly over the inner or ordinary hydraulic tube. As will be seen by the section (fig. 1), this tubular weight, and all the chains, wheels, &c., connected with it, are covered by an outer tube or casing, which can be made of any desired ornamental design to suit the character of the apartment. The covering tube prevents the vibration and noise which accompany the movement of the ordinary weights, and secures the weight and chandelier from accidentally falling; it also guides the inner tube so as to permit of a stuffing-box being used with perfect security against escape of gas, instead of the ordinary hydraulic arrangement, which is well known to be a constant source of annoyance from inattention to its supply of water. The inner tubes in this improved chandelier are rendered non-corrosive by nickel plating. As loose swinging weights and chains, which are always liable to twist, are dispensed with, the stems of these chandeliers may be made of any length for lofty halls and public rooms, and in such cases would permit the chandelier to be pulled down nearly to the floor for lighting, or for dusting and cleaning the globes. This is particularly convenient for Wenham, chromatic, and other such lights. The patent balance is also admirably suited for billiard lights. The letter A, fig. 2, shows the

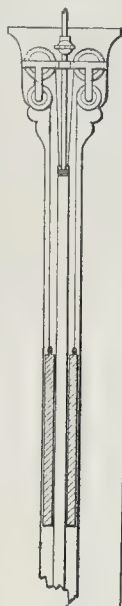


Fig. 1.

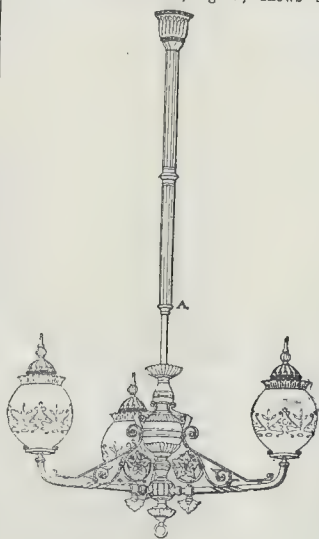


Fig. 2.

termination of the fixed tube, through which the sliding tube below it ascends and descends

as required. The corona or cup enclosing the wheels may be perforated, as shown in fig. 3,

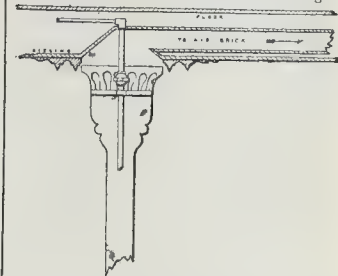
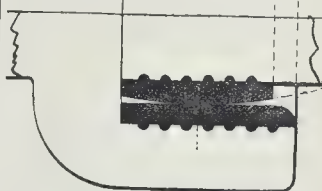


Fig. 3.

and the perforations may, as there shown, lead into a pipe or duct which, if properly arranged and of sufficient size, may be made to carry off the products of the gas combustion. But this arrangement will need care to prevent condensation and down-draught. This, however, is obviously not claimed as an integral part of the invention, which consists essentially in the mode in which sliding gaseliers and globe lights may be balanced without the usual ugly and unsightly balance-weights. We are informed that by a patented arrangement these chandeliers can also be perfectly adapted for electric lighting, candles, or oil-lamps. Mr. H. T. Tallack, of 28, Hatton-garden, London, is the sole agent for the patentee.

DOULTON'S SELF-ADJUSTING JOINT FOR DRAIN-PIPES.

The section of this joint which we gave in our last [p. 481] was not sufficiently large to be distinct. We now give an enlarged detail



section, which, looked at in conjunction with last week's diagram, and with our previous description, will make the form of the joint quite clear.

OBITUARY.

Mr. Walter Smith.—We hear with much regret of the death of Mr. Walter Smith, late Principal of the Art Department of the Bradford Technical College. According to the *Textile World*, he was the son of the late Mr. Thomas Smith, of Whitehall, Kemerton, Gloucestershire. He was for twelve years a student in London, twelve years an art-master in Yorkshire, twelve years in America, and three years in Bradford. In the latter town he organised the art teaching in connexion with the Technical College, and great hopes were entertained as to the educational results of his energy and experience as a teacher of art, and particularly in respect to the influence upon local industry which his lectures upon art as applied to manufactures would have. The United States Government publications contain numerous references to the useful work which Mr. Smith carried on as State Art Director of Massachusetts, and as Director of Drawing in the Boston Schools.

The British School at Athens.—We are asked to mention that a meeting of the general committee and of subscribers to the British School at Athens will be held at 22, Albemarle-street on Tuesday, October 19, at 5 p.m., the Earl of Carnarvon in the chair. All persons interested in the subject are invited to attend. A report will be submitted by the executive committee upon the present position of the scheme. It will contain the announcement that the house at Athens is complete, and that Mr. F. C. Penrose has accepted the office of Director for the first year.

THE DIMINISHING REMNANTS OF ROMAN BATH.

SIR,—There is no need to assure your readers of the singular importance of what remains are now extant of the unique and magnificent suite of baths, with their adjuncts, built by the Romans after they made Bath a colony. The highest local authority on the subject, Prebendary Scarth, Rector of Wrington (author of "Aque Solis," &c.), has, with others, urged the preservation of these remains and their protection from destruction. He has pointed out how the conservation of these remains would save many a student of archaeology a special journey to Rome. Unhappily for Bath, these splendid relics of antiquity belong to her Corporation. The Mayor, the majority (by one only) of the Town Council, also of the Baths Committee, including the City Surveyor of Works, Mr. C. E. Davis (who is likewise the designer of the new baths), have resolved that these Roman remains shall not be allowed to interfere with their scheme of extending the modern bathing arrangements. It has been repeatedly and distinctly shown that not only are other sites available, but that these would be more advantageous in every sense, and would not interfere with what Roman remains escaped the dire Vandalism of 1755-6. On becoming aware of the threatened destruction in part, and partial concealment, of the most valuable and instructive portion of the extant Roman baths, viz., the caldarium, hypocaust, labrum, &c., I ventured to call the attention, first, of the Society of Antiquaries, last April, then of the Corporation of Bath, to Mr. C. E. Davis's scheme. The result was a strong protest on the part of the former, a copy of which was forwarded to the Mayor, the Town Clerk, and to Mr. C. E. Davis, who (it will scarcely be believed) is the local secretary of the Society of Antiquaries. At a meeting of this Society, held on May 13th last, Mr. Davis was called upon by the President to explain matters. He concluded his reply by giving a solemn promise "That no destruction nor concealment of any portion of the Roman baths already, or to be, discovered, would take place." Subsequently, he also assured the Town Council of Bath that "most decidedly" he would "neither cover, destroy, hide, nor anything of the kind." It will be noticed how explicit and unconditional both these promises are. What has since been the result? The very remains contended for have been further excavated, revealing even more than was previously known. These are now built upon, and thus partly destroyed and partly concealed. No Vandalism has been more wantonly, unnecessarily, perpetrated, to the deep regret of antiquaries and the intelligent citizens of Bath.

Professor Middleton, M.A., F.S.A., Slade Professor of Art, Cambridge, and a member of the Council of the Society of Antiquaries, was deputed by the Society to make a personal investigation and report. Scarcely had he done so than Mr. Davis, believing the result to be unfavourable, "deputed" Mr. Penrose (whose high reputation gives his name exceptional weight) to make a counter investigation and report. The latter has been made public. There is every reason for believing that Mr. Penrose was not aware until some time afterwards that he executed this commission in opposition to Professor Middleton. The entire responsibility of the rests with Mr. Davis. It is necessary here to note that Mr. Penrose was brought to Bath to make a report, as the public were led to believe, upon archaeological grounds, exactly as Professor Middleton. The truth, however, is that the former gentleman made a report chiefly architectural. He has testified to this in a letter dated September 7th, viz., "As the question presents itself to me, it is not how the Roman baths could be exhibited in the most complete manner, but what is best to be done taking other circumstances into account," i.e., the extension of the new baths.

An anonymous writer, "Rathoniensis," disputes the accuracy of the plan sent you by Mr. Richard Mann, of the caldarium, &c. With your permission, I desire to offer you my solemn assurance that this plan is strictly correct and true in every detail. Having repeatedly and personally examined the Roman masonry now contended for, I am able to offer this testimony. This likewise, that Mr. Richard Mann possesses the fullest and most exact information of any one in Bath on the subject.

FREDERICK A. H. VINON, F.S.A.

EPISCOPAL HERALDRY.

SIR, Your correspondent, "J. B.," is right in giving his communication on October 2nd with reserve.

The blazon therein given for Newcastle is quite wrong, but that given before was right. X.

STAINED GLASS AT WINDSOR.

SIR,—In your last week's impression [p. 541], under the heading of "Stained Glass," referring to two windows executed by Messrs. Russell, Gibbs, & Co., for Windsor, you state they were designed by Mr. W. R. Brown.

* Cf. "Proceedings of the Society of Antiquaries," p. 155.

I beg to say that I both designed and painted this work, and trust to your sense of justice to correct this erroneous statement.
Horsney, Oct. 4. WILLIAM WARRINGTON.

The Student's Column.

STONE QUARRIES.—XV.

KINCARDINE GRANITES.

THE granite quarries in this county are all situated in the northern parts of it.

When the enterprising merchants who caused the loose stones to be worked on the surface of the high ground of Torry, on the southern side of the river Dee, began sending the fruits of their labour to the London market, they little thought that their energies would be the precursor of a gigantic trade, the seat of which was to be transferred across the river to Aberdeen.

A preliminary survey of the district, of the respective merits of the granites of the two areas, and the facilities of carriage, soon convince us, however, of the *raison d'être*. The rock at Torry is not worked to an appreciable extent at the present day, and no quarries have been opened there, to our knowledge. The student who starts from Aberdeen crosses the river into Kincardine, and makes his way to the quarries at Cove, will do well, however, to direct his attention to the exposures of the rocks on the beach at Torry, *en route*. We know of no section that so clearly shows the relation of the granite to its surrounding rock. It will also give an idea of the kind of stone that was formerly sent to the market; whilst the observant student will learn a great deal about the manner in which the atmosphere and water have attacked the granite, which information might be directly applied to his studies with regard to the granites of a similar nature which are now being used in the neighbourhood or elsewhere.

One of the first rocks met with on the beach at Torry is a schist,—a metamorphic rock,—which is highly contorted, and crystalline in places. As this is followed up a pink granite is seen penetrating the schist. This granite vein is only 10 yards in thickness. It is very fine-grained, and at its junction on both sides with the metamorphic rock, the appearance of the latter is very much altered. Small veins of granite branch off from the main vein, and the general result is that innumerable pieces of schist have been broken off from the body of that rock, and are included in the granite.

The interpretation of the phenomena presented is comparatively easy. The granite, whether originally derived from excessive metamorphism of the lowermost parts of the schist, or not, was clearly in a molten condition when it took up the position in which we now see it. From other indications in the vicinity, it would appear that the main body of the granite is not very deeply seated, nor far off; and no doubt the schist is a thin bed lying on it. As the igneous mass burst its way through the schist, it broke off portions of the latter, and endeavoured to melt them up. If we may judge from the thin lines and minute fragments of the schistose matter running parallel with the general direction of the main vein, and so closely incorporated with the granite at, and within a foot of, the junction of the two rocks, we should certainly assert that the granite had, to some extent, been successful in doing so. Many large pieces of the schist would not submit to the melting process. Some of these refractory substances are quite angular, and, with the exception of a slight alteration of both rocks at their junction for about 1 in., they look as fresh as does the main mass of schist. Not so, however, with others that seem to be the kernels of pieces, the edges of which have been melted up in the granite, portions of which are seen mixed up with it in such a manner as to make it exceedingly difficult, if not impossible, to define the limits of either.

We have by no means exhausted the interest attaching to this most instructive beach section, for we find that another kind of granite has penetrated the fine-grained variety, in the shape of a vein, about 4 ft. across. This newer rock, in spite of its small breadth, is colossal in grain, and does not, at first sight, look like a granite. But the fact is apparent that it is composed of quartz, felspar, and mica: so there cannot be any doubt about it. The ordinary quartz crystals in this vein range in size from 6 in. to

10 in. in diameter; the pink orthoclase felspar from 4 in. to 18 in., and the silvery brown mica from 4 in. to 8 in., being 1 in. or more thick. The contrast between this American-looking vein and the fine-grained rock in which it is found, is complete. At some points, the former granite is also in contact with the schist.

Proceeding towards Girdle Ness, we find that a considerable portion of the beach between this vein and the point at which the long breakwater runs out into the sea, is composed of schist. On nearing the breakwater, we find granite veins running through the schist in all directions, and rugged portions of them rise above the surface of the water, forming conspicuous objects. Here may be seen dozens of huge masses of schist, highly contorted, entirely surrounded by granite, presenting precisely the same phenomena at the junction of the two rocks as we have described. Just past the breakwater, the main mass of granite, of a dark grey colour, shows itself, and this is the fundamental rock of the district.

Cove Quarries.—These are situated about four miles south of Torry, close to the sea. The stone is very hard, and, owing to the presence of a great quantity of black mica, which occurs in minute flakes, the stone is of a dark hue, much more so than the ordinary granites of the district. It is medium-grained, and foliation is roughly marked. The white felspar is in very small crystals, is most probably oligoclase, and forms a comparatively small portion of the rock. The clear white quartz, on the contrary, occurs in rather larger crystals, not well defined, but tolerably abundant.

The rock is used principally for kerb, paving, &c. The few polished examples we have seen, show that it is capable of taking a fine polished surface.

Nigg is a village about two miles to the north of Cove. The granite obtained is fine-grained and of a dark colour. The three minerals are about equally abundant, and so much interlocked with each other that the rock is very compact; in fact, they are so intimately mixed that it is quite impossible to make out the boundaries of any of the crystals. The milky-white felspar is barely distinguishable from the quartz, and some of the black biotite, which on weathered surfaces is copper-coloured, occurs in such minute flakes that, although it appreciably alters the tint of the stone, cannot be distinctly seen without the aid of the microscope. This mica is also found in every intermediate size up to two or three mm. in breadth.

The stone is not extensively employed, the loose blocks being principally used for making dykes, and for other agricultural purposes.

Hill of Fare Quarries.—These are situated a little to the north of Banchory, a considerable distance inland. The stone is of a dark red colour, and is chiefly composed of quartz and felspar: both mica and hornblende being, however, present. The former is scarce, and might be said to be only accessory, whilst the greater abundance of the latter entitles the rock to be called a syenite rather than a granite. The quartz is the most striking feature in it. This mineral is found as little distinct crystals, each crystal, in the majority of the cases, showing in section two six sides, due to the fact that it so frequently crystallises in the hexagonal system. Although the boundaries of each of these crystals are so clearly defined, they are, as usual, not all regular. Twenty or thirty of them appear to have congregated together, squeezing up one another in their efforts to crystallise out, and some appear to have been much more successful in arriving at their proper form than others. The quartz causes the stone to have a dark speckled appearance, though, when closely examined, it is seen to be quite transparent. All the felspar present, so far as we have been able to determine it, is orthoclase. It must have a considerable quantity of peroxide of iron to be of such a dark red colour. It is not porphyritic, notwithstanding that perfect crystals are often twinned, and of common occurrence in the rock. In other words, as these orthoclase spars help to form such a great proportion of the mass of the rock, and as there is no distinct ground mass, the perfect crystals alluded to are not conspicuous, and are thus absorbed in the general appearance of the whole. The little hornblende is dark green, and the mica, when present, is black.

The stone is used in a great measure for tombs, monuments, and high-class polished

aments. It may be found in most of the granite-workers' yards in Aberdeen, and, when washed, looks very handsome.

This red Kincardine rock is often spoken of by quarriers) as though it had some connexion with the Birsomore, Corrennie, and Peterhead rocks. It appears to agree with them, in being of a red tint, but we cannot admit more; they are dissimilar from, and bear no relation whatever to, each other. It is finer-grained than any of them, and the only one it at all agrees with, in general structure, is the Peterhead one. The latter rock, however, so frequently as hornblende, in little minute specks congregated together, with the felspar of a lighter tint, that it is impossible to make a mistake in their identification.

It has been suggested to us by some that a kind of red rocks runs from Banchory to Peterhead, via Corrennie; and that at a little depth on the surface, red rock is found in the intermediate spaces. From this, they have advocated the opening of the ground to obtain this red stone, between these places. We think, however, that before doing so, the ground should be thoroughly examined, because we are quite certain that this red rock is not resistant—at least, not the whole of the way. For instance, if it is persistent a short way from the Kincardine quarries, it falls short of the Corrennie. The fundamental rock at the latter place, and, indeed, in the whole district, as far as we can make out, is a grey stone. The red one at Corrennie occurs at the top of the hill, but is apparently cut off on the north by a grey stone, which rises to a great height at Tillyfourie. Besides, we do not think that a Corrennie stone is a northward extension of that of Kincardine, the structure of the two rocks being so dissimilar, and having most likely originated under different conditions. The red rock, which is said to occur a little to the north of Tillyfourie, can also be shown to have no connexion with that of Peterhead,—at least, not in its quarrying bounds, as a considerable depth of metamorphic rocks is found to intervene. The best method of speculating on the nature of the rock underneath the surface of a granite area, is, no doubt, to examine the rocks above ground, or in the decomposed rubbish, as is generally done; and quarriers who have not gained considerable knowledge in geology must not depart from this rule, unless, indeed, they have plenty of money to play with, by must always keep before them the fact that igneous, unlike many aqueous, rocks are at all persistent in their occurrence. It is a fact that the outcrop of a large granite area is comparatively easily traced, but it is exceedingly difficult to be sure that rock of a certain colour, or texture, is persistent in that area, as is suggested by the remarks we have made to. If the rock under consideration was and stone there might be some foundation for the suggestion, because rocks laid down in series, as we have previously observed, generally speaking, are tolerably persistent for short spaces. But an igneous rock might burst up where, and in a very irregular manner; therefore, its persistence is just as uncertain, and being short of a close study of the geology of anite area can enable the quarryer to gain a rough idea of the extent of outcrop of a particular kind of rock within that area. Those who, by experience, have acquired considerable knowledge in opening up new granite areas will not find any difficulty in understanding the foregoing remarks. They know the boulders and blocks of rock at the place are the most practical guides in assisting the student. The less-advanced student must learn without careful observation, even these things might lead him astray. In a very early period of geological history the part of land of which we are writing, together almost the whole of the British islands, under the surface of the sea. Icebergs, broken-off ends of glaciers which have melted the sea,—floated over it, laden with boulders and pieces of rock. These icebergs, their freight, came from Norway and other parts, and when they melted up, they deposited the boulders, &c. Subsequently this bottom was raised into dry land, and the boulders and blocks of rock came with it. The owner, who may be opening up new ground, will thus occasionally meet with blocks of foreign stone, or stone not *in situ*, together with the normal rock of the district, the boulders of the latter stone being kernels of the underlying rock which have resisted the

decomposition that has taken place all around them; he must, therefore be guided by those blocks that are most prevalent, and few, if any, mistakes can then arise.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,164, Combination Ladder and Steps. R. J. Johnson.

The ladder is made in two lengths, so that the upper half hinges on the lower, and the ladder can either be used extended or the two halves can be formed into a pair of steps in the shape of the letter A. To the lower half of the ladder is attached at one or both sides a short iron bar, one end bolted to the side of the ladder and the other shaped as a hook, so as to hook into a socket or catch, to rigidly hold the two halves of the ladder either as a pair of steps or to prevent the ladder doubling up when extended at its full length.

12,620, Securing Sliding Sashes. F. S. Morris and J. H. Fox.

A rack or serrated bar is fixed in any suitable position on the sash frame, and a box or case is pivoted to the door or window frame. In this box a panel or tumbling piece is pivoted, which engages with the teeth of the rack. A projection is formed on the box, so that when it is moved outwards it comes against a corresponding projection on the panel, and thereby disengages it from the teeth of the rack.

12,609, Fireproof Safes and Strong Rooms. W. Diaper.

A strong middle body is riveted to a T-iron stay, and the inner door is so fitted that it laps over the edge of the inner body or case of the safe or strong-room, by which extra safety and economy are attained.

12,643, Fire-grates. H. J. B. Holland.

By the use of this invention the bars are kept cooler and the fuel is more slowly burned, whilst a brighter fire is ensured. A lattice framework of round bars, shaped in the form of a capital L, is used. This prevents the smallinders from falling through, and an air-space being left under the bottom of the framework a cleaner and hotter fire is obtained with less consumption of fuel.

13,173, Window Fasteners. W. J. Brewer.

The catch is formed somewhat like a hook, the end of which catches over the lower sash rail. When there a screw is turned in, which completes the fastening. The sashes are thus bound together so tightly as to prevent rattling, and great security is also attained.

13,354, Improvements in Gallies, &c. E. Aldous.

This is an improved form of retainer and trap, for the purpose of preventing the escape of sewer gas. It consists of a chamber of suitable shape into which dips the pan of the water-closet or the discharge pipe of the bath or sink, &c., the retainer containing water so as to seal the dip. An entirely separate trap is also fitted to the closet. The water in the retainer and the trap, although on the same level, is kept separate, so that if the trap should become unsynphoned, the retainer remains trapped. They are also so constructed as to be removed together for cleaning out.

5,991, Fanlight Latch and Stay. E. & J. M. Verity and B. Banks.

The latch has a small dead-weight device fitted to engage with a latch actuated by a ring. The stay is formed of a serrated bar, which is fitted at the side of the fanlight frame, and a link fastening which holds the light in place at any angle.

NEW APPLICATIONS FOR PATENTS.

Sept. 24.—12,135, G. Wicks, Fixing on Door Knobs, Handles, &c.—12,161, G. Austen, Brick Cover.—12,167, J. Tucker, Morris Bolt.—12,174, T. Barnett, Register Stoves.

Sept. 25.—12,295, H. Buchan, Plug Valves for Water-closets.—12,230, R. Chanony, Movable Elbow-rest for Balconies and Window Casements.

Sept. 27.—12,261, E. Tonks, Fastenings for Double Doors, &c.

Sept. 28.—12,277, J. Goodwin, Reversible Window Sash Fastener.—12,307, G. Ley, Ornamentation of Wood.—12,311, W. Morrison, Cooking Range.

Sept. 29.—12,330, J. Tylor, Waste Preventing Cistern for Water-closets.—12,333, J. Weatherhead, Cowl Heads for Ventilators.—12,358, O. Whitaker and W. Schofield, Flushing Water-closets and Soil Drains with Waste Water.—12,359, J. Nichols, Fencing Posts.—12,373, G. Wishart, Ventilating and Chimney Cows.

Sept. 30.—12,397, H. Whiteley, Opening and Closing Fanlights, &c.—12,400, J. Whitehead, Indicator for Door Fastenings.—12,401, E. Taylor, Opening, Closing, or Fastening Casements, &c.—12,407, W. Macfarlane, Fixing Pipes to Buildings.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,581, J. Hannay and E. Pape, White Paints.—10,544, H. Haddon, Tiles.—10,554, W. Lake, Preventing the Slamming of Doors.—10,788, A. Smith and J. Robertson, Portland Cement.—9,288, B. Pitt, Chimney-pot or Terminal for Ventilating, &c.—9,808, W. Thompson, Plumbers' Portable Furnace.—10,652, H. Provis, Self-locking Coal-cellar Plate.—10,672, W. McGill, Treads and Risers of Stairs.—11,023, F. Wicks, Paving, Flooring, and Building Material.—11,613, H. Macosvoy and others, Portland Cement.—11,712, J. Porter, Wall Brackets, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

10,292, L. Groth, Fixing Ornamental Ironwork.—14,457, E. Verity and others, Pivot and Weather-bar Arrangement for Swing and Reversible Windows, Doors, &c.—14,500, W. Musselwhite and W. Frewett, Sash-line Socket.—14,586, R. Somers, Fireplaces.—9,500, C. Oliver and others, Securing Wood Flooring without Nails or Screws.—10,531, A. Boulton, Construction of Houses, &c.—16,785, H. and T. Riddiough, Folding Table for Paper-hangers, Painters, Decorators, &c.—10,261, J. Broadfoot, Automatic Valves for Ventilating Pipes.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

SEPTEMBER 27.

By NAYLOR & MURPHY.

Clapton—43, MacLaren-street, freehold..... £390

SEPTEMBER 28.

By W. SWELMAN.

Lewisham—29, Thurston-road, 77 years, ground-rent 21. 4s. 245

By G. STOCKINGS.

Regent's Park—74, Osnaburgh-street, term 8 years

Elston-grove—The lease of 45, Great James-street, term 15 years..... 70

By F. JOLLY & Co.

Lower Clapton—63, Downes-road, freehold..... 2,250

By F. J. BIRLEY.

Rotherhithe—23 and 24, King-street, freehold..... 350

40 and 61, Derrick-street, do. 480

By F. J. BARNETT.

Haversham Hill—87, Prince of Wales-road, freehold..... 890

Ealing, Rainsford-road—Freehold house and shop..... 1,280

Twickenham—4, Crosby-villas, freehold..... 260

1 to 12, Prospect-place, freehold..... 1,820

Watlington—Two plots of freehold land, 6a. 2r. 5p. 620

Ealing—Two plots of freehold land..... 370

Harrow—Three plots of freehold land..... 285

By FULLER & FULLER.

Piccadilly-circus—49, Great Windmill-street, freehold..... 1,450

Ealing, High-road—The Residence, Elmdale, 62 years, ground-rent 26s. 2,600

By MOSS & JAMESON.

Strand—1, Strand-lane, freehold..... 810

Berkley-square—36, 3, term 11 years, ground-rent 20s. 1,370

Ruston-square—16, Hunter-street, 23 years, ground-rent 26s. 420

26, Hunter-street, 23 years, ground-rent 26s. 430

1, Judd-street, 30 years, ground-rent 21s. 250

SEPTEMBER 29.

By A. SAVILL & SON.

Buckhurst Hill—St. Mary's Lodge, and 1a. 2r., copyhold..... 750

By RAYMOND & ELSON.

City—43 and 44, Bishopsgate-street Without, freehold, area 5,400 ft. 3,000

By MESSRS. ELEGOD.

Westminster 33 and 39, New Peter-street, freehold..... 400

25a, New Peter-street, freehold..... 200

Chelsea—The lease of 5 and 7, Church-street, term 16 years..... 970

Greenford—The Factory Cottage, freehold..... 50

By BAKER & SON.

Sussex, near Horsham—Part of the Strood Park Estate, containing 630a. Or. 16p., freehold..... 13,930

SEPTEMBER 30.

By ALDERSON & CO.

Anerley-road—The Gables, 91 years, ground-rent 10s. 670

By J. & E. BURFORD.

Borough—1 to 3, Robert's-place, 34 years, ground-rent 12s. 850

4, Robert's-place, 32 years, ground-rent 4s. 290

St. John's Wood—31, Barrow Hill-road, 41 years, ground-rent 5s. 10s. 435

By W. F. NARR.

Mill End—38 to 42, Wentworth-road, 17 years, ground-rent 84s. 415

4 to 44, 43 and 49, Wentworth-road, 17 years, ground-rent 72s. 338

Upper Holloway—33, Milton-grove, 88 years, ground-rent 10s. 225

Hoxton—16, 17, and 18, Boot-street, 33 years, ground-rent 60s. 245

By H. J. BURN & SON.

Homerton—16 to 20 even, Nisbit-street, 81 years, ground-rent 7s. 10s. 255

By E. SIMMONS.

Old Kent-road—1 to 10, Jane-place, and 2 to 10, John-street, 114 years, ground-rent 226s. 6s. 270

Peckham—41, Meeting House-lane, 60 years, ground-rent 5s. 200

Brixton—60 and 61, Molesyn-road, 79 years, ground-rent 12s. 585

New Cross-road, Wilson-street—Freehold premises known as the "Colour Works"..... 1,710

Holborn—9, Orange-street, 41 years, ground-rent 26s. 465

By NEWBORN & HARDING.

Islington—92, Prebend-street, 40 years, ground-rent 4s. 4s. 300

Ialington—150, New North-road, 40 years, ground-rent 6l. 6s.	£430
Commercial-road, B-1 to 7 odd, Jane-street, and 2 and 4, Anthony-street, 14 years, ground-rent 14l. 6s.	650
10, Turner-street, 14 years, ground-rent 2l. 10s.	235
South Hackney—2 to 8 even, Christie-street, 68 years, ground-rent 12l.	985
Kingsland—12 to 22 even, Tottenham-road, 31 years, ground-rent 23l.	460
7 to 21 odd, Tottenham-road, and 57, Stamford-road, 32 years, ground-rent 4l.	751
By Wimpole & Hayward.	
Kent, Dover—4, Crabble Hill, freehold	245
The Three Cups Inn, freehold	960
Two freehold cottages	280
Lee Cottage, freehold	280
74, Clarendon-street, freehold	175
44, St. James's-street, freehold	350
A Pavement Bond for 200l., bearing interest at four per cent.	212

MEETINGS.

FRIDAY, OCTOBER 9.
Architectural Association.—Opening Concerts, 8 p.m.

MONDAY, OCTOBER 11.
Royal Academy.—Professor John Marshall, F.R.S., on "Anatomy." I. 8 p.m.

THURSDAY, OCTOBER 12.
National Art Training School, South Kensington.—Dr. G. G. Zeffl will deliver the first of a Course of Forty Lectures on "The Historical Development of Ornamental Art." 8 p.m.

WEDNESDAY, OCTOBER 13.
Royal Academy.—Professor John Marshall on "Anatomy." II. 8 p.m.

FRIDAY, OCTOBER 15.
Society of Medical Officers of Health.—Address by the President, Mr. Alfred Hill, M.D., on "The Various Modes of House-Refuse and Sewage Disposal." [Scottish Corporation Hall, Crane-court, Fleet-street, 8 p.m.]
Royal Academy.—Professor John Marshall on "Anatomy." III. 8 p.m.

Miscellaneous.

Liverpool Engineering Society.—On Saturday last the members of this society visited the River Weaver, and Mr. J. Thompson's rock salt mine at Northwich. The party, which numbered about forty, left Liverpool (Brunswick Pier) at 8 a.m., and proceeded to Northwich by boat, kindly placed at their disposal by Mr. G. Deakin. Entering the river Weaver at Weston Point, the party had the opportunity of studying the engineering works by which the Weaver has been converted into one of the most important non-tidal waterways in England. Arriving at Acton Locks, the members disembarked and examined the details of the construction and means of working the locks, of which there are two of different sizes side by side. The larger is 229 ft. long by 42 ft. 6 in. wide, and the smaller 220 ft. long by 25 ft. wide, the depth of water on the sill in each case being 15 ft. The gates of the larger lock are worked by means of a Schiele turbine. The smaller lock is opened by hand-power, by means of capstan and quadrant wheels. The cylindrical sluices, designed by Mr. F. G. M. Stoney, M.Inst.C.E., were also examined with much interest, the ease with which they were opened being specially remarked. After inspecting the Acton Locks the party walked over to the Dutton sluices, which were designed and erected some six years ago by Mr. L. B. Wells, M.Inst.C.E., for the purpose of passing away the excess of land water more rapidly, and so reducing the flood level, which at Northwich occasionally rose to 12 ft.,—at the same maintaining the additional height of the water level required by the growing traffic. The sluices are eight in number, each with 15 ft. clear span and 13 ft. head of water above, the difference of level being ordinarily 9 ft. 3 in. After re-embarking, the party proceeded up the Weaver to the Anderton lift, by means of which barges carrying from 80 to 100 tons of goods are lifted by hydraulic power from the river Weaver to the Trent and Mersey Canal, or through a vertical height of 50 ft. 4 in. The lift is double, and the barges are raised or lowered while floating in a box or trough full of water, so arranged that one trough containing barges in coming down to the river assists in lifting barges in the other trough up to the canal. Each trough is 75 ft. long by 15 ft. 6 in. wide. After viewing the working of the lifts, the party proceeded to Northwich, where the rock salt mines of Mr. J. Thompson were visited and explored, after which the members went through the works and witnessed the method of evaporating the brine, and the means of preparing the different qualities of salt.

Building Land at Lowestoft.—On Monday last the second portion of the Cliftonville Estate, Lowestoft, was offered for sale by Messrs. Baker & Sons. The estate occupies a position in the parish of Pakefield, immediately to the south of the town of Lowestoft. It is situated on the summit of Pakefield Cliff, which is 50 ft. above the sea level, commanding extensive views of the sea, together with picturesque scenery of the surrounding country inland. On the arrival of a special train from Liverpool-street a large number of conveyances took the company from Lowestoft to the estate, where the sale took place in a marquee, the principal roads being the Grand Avenue and the Cliftonville-road, each 50 ft. wide. "The Drive," a carriageway, 65 ft. wide and about half a mile long, has been formed in front of the estate, overlooking the sea. The stipulations provided that the lowest cost of the houses to be erected on the estate should not be less than 250l., and as regarded several of the lots, not less than 450l., 600l., and 900l., whilst a large lot on the summit of the cliff was not to cost less than 2,000l. Mr. Baker, in opening the sale, observed that Lowestoft was one of the healthiest towns in England, its death-rate for some years past having been much below that of any other town of the same size. He added that the direct railway to Lowestoft, via Darsham and Southold, would pass close to the estate. He also said that since the sale of the first portion of the estate last year a large number of houses had been erected, as the visitors might see, and were now nearly all occupied. On the sale proceeding the biddings became close and animated. Several plots, having frontages of 25 ft. and a depth of 150 ft., were sold for 35l. and 40l. each. A corner shop plot, 74 ft. by 146 ft., realised 89l., whilst other shop plots, having frontages of 45 ft. and 100 ft., were sold for 40l. and 50l. each. Plots having frontages of 20 ft. and a depth of 100 ft. realised from 20l. to 22l. each. There was an active competition for the hotel plot, on the summit of the cliff. It has a frontage of 200 ft. and a depth of 100 ft., and immediately in front of it an area of similar size, overlooking the sea, is intended to be laid out by the owner of the estate as a pleasure-garden. The hotel plot was sold for 575l., being at the rate of nearly 1,500l. an acre. The entire proceeds of the sale amounted to upwards of 3,500l.

Sale of Building Sites at Clacton.—On Monday Mr. Richard J. Collier offered for sale at the Public Hall, Clacton, seventy-four plots of building land belonging to the Clacton-on-Sea Marine Land Company. There was a numerous attendance at the sale, a large company having gone down to Clacton by train from Liverpool-street. One of the sites on the central Marine Parade, facing the sea, having a frontage to the Parade of 111 ft., and a return frontage to Russell-street, was sold for 320l. A plot situated at the corner of Pier Avenue and Wellesley-road, having a frontage to the former of 200 ft., and to the latter of 217 ft., realised 170l. Another corner plot, at the west end of the town, near the Martello Tower, having a frontage to the West Avenue of 140 ft., and 50 ft. to Ellis-road, was sold for 71l. Several adjoining plots, having frontages of 25 ft., and a depth of 140 ft., were sold for 38l. each, and other plots at the north-west end of the town, near the gas and water works, having frontages to the Old Parish-road, and a depth of 115 ft., realised 27l. each. Six plots in the North Avenue, leading from the railway station to the centre of the town, having frontages to the Avenue of 50 ft., and a depth of 100 ft., was sold at 95l. and 99l. each.

The Electric Lighting at the Sanitary Exhibition at York is, we are informed, the work of the Woodhouse and Rawson Electric Contract and Maintenance Company, Limited (Lancashire, Yorkshire, and Cheshire), of Bradford, Yorks., and not of the Woodhouse and Rawson Electric Supply Company, Limited, of Queen Victoria-street, London, as inadvertently stated on page 480 of our last week's number. With such a long title to deal with as the one first-named the slip was perhaps excusable.

Silage and the Dairy Show.—We are informed that both the first prizes and silver medals offered by the British Dairy Farmers' Association for "the best model of a silo" and for "the best method of mechanically compressing stacks of silage" have been awarded to Messrs. F. W. Reynolds & Co., of Acorn Works, Edward-street, Blackfriars-road.

Society of Engineers.—The Society of Engineers held its first meeting for the Session 1886-7, on Monday evening, October 4th, at the Town Hall, Caxton-street, Westminster, Mr. Perry F. Nuresey, President, in the chair, when a paper was read on "The Lartigue Single-rail Railway," by Mr. F. B. Behr. The author commenced by observing that a single-rail line was not a new idea, as many patents had been taken out in that direction. Telford had suggested a single-rail line to be the correct principle, and Palmer in 1823 had endeavoured to make one in London, but had failed, as had others since. Although narrow-gauge lines had been introduced, they only partially remedied the evil of the expense involved in construction, the works being similar to those of ordinary railways. Cable transport could only be used for short lengths of line, except in very special cases, owing to its heavy cost, and in no case could it be made efficiently available for passenger traffic. The author then went on to describe the Lartigue single-rail system, in which the rail is carried on the top of A-shaped bearers or trestles, generally about 3 ft. 3 in. high, but varying in height according to the level of the ground. The vehicles are hung on the rail by vertical grooved wheels, and on passenger lines they have also horizontal wheels at the bottom on each side, which move along guide-rails fixed on the sides of the trestles and prevent oscillation. The passengers sit back to back as in an Irish jaunting-car. The experimental lines laid down near Victoria-street, Westminster, were then described by the author. The passenger line is worked by steam, and the special locomotive used was fully described. This line is constructed with very sharp curves and steep gradients, which are easily traversed and mounted, as may be witnessed any day. The author referred to several lines which have been constructed on the Lartigue principle on the Continent; notably one in the Esparto district in Tunis, which is worked by mules, and another in France at the mines of Ria, where electricity is the motive power. He also mentioned the experiments carried out in Russia by the Government for military purposes. The author finally described the Lartigue system as applied to overhead railways, supported on light columns placed in single line in the centre of the roadway in towns, to which purpose he claimed that it was specially applicable.

The Plumbers' Company.—At the quarterly meeting of this Company, Alderman Stuart Knill was elected Master, and Messrs. E. Machin and W. H. Bishop, Upper Varden and Renter Varden respectively. The Mastership of the Company has been held for the last three years by Mr. George Shaw, C.C., the duration of the office being exceptionally extended in recognition by the Court of the special value of the services rendered generally by Mr. Shaw to the objects of the Company, and especially with reference to carrying out practically the registration of plumbers and the establishment of the technical classes of instruction for plumbers now held in connexion with the City and Guilds Institute at Finsbury.

Melbourne Post Office Extensions.—The Melbourne General Post Office is about to be considerably enlarged. The old building is constructed of Tasmanian stone, but the additions are to be made of the material from the Stawell quarries. Mr. Kerr, the Government architect, states that the Stawell stone, although somewhat more expensive, is infinitely superior to that from Tasmania, and there will be no appreciable difference in colour or appearance between the two kinds of stone. The reason for the employment of the Tasmanian variety in the original structure was purely on the ground of economy. Messrs. Goss & Masson, of Melbourne, have contracted to carry out the extension at a total cost of 83,535l.

British Museum Lectures.—In recognition of the interest and success of lectures recently given by Mr. MacBride on the sculpture in the British Museum, the Trustees have given him the privilege of holding classes in the galleries for instruction in modelling from the antique, for ladies and gentlemen separately. Those who wish to join Mr. MacBride's classes, which open on Tuesday, the 12th, in the Elgin Marbles Room, may obtain particulars from Messrs. T. Bosworth & Co., 66, Great Russell-street.

Institution of Mechanical Engineers.—The next ensuing Ordinary General Meeting of this Institution will be held in the Yorkshire College, Leeds, on Monday, October 18th, by invitation of the College authorities, in celebration of the opening of the Engineering Department of the College. Prior to the commencement of the meeting, the Department of Civil and Mechanical Engineering will be open to the inspection of the members. The chair will be taken at half-past three o'clock, in the Lecture Theatre, by the President, Mr. Jeremiah Head. The following papers will be read and discussed, as far as time permits:—On "Triple-Expansion Marine Engines," by the late Mr. Robert Wylie, of Hartlepool; "Notes on the Pumping Engines at the Lincoln Water Works," by Mr. Henry Teague, of Lincoln; "Description of a Portable Hydraulic Drilling Machine," by Mr. Marc Berrier-Fontaine, of Toulon. At the conclusion of the meeting, the President will announce the formal opening of the Engineering Department of the College, and will proceed to visit the Engineering Laboratory.

Headingley.—Messrs. R. W. Wingfield & Co., of London and Birmingham, have filled the window opposite to the entrance-porch of Headingley parish church with stained glass, as a memorial of the late Mr. Wilkinson. The design is by Mr. T. W. Camm, under whose superintendence the window has been executed, and it illustrates the Transfiguration, the subject occupying the upper portion of the three lights, with the scene of healing the paralytic at the foot of the mountain illustrated below, in the base, also running through the three lights.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 0 0
ak, E.I. ....load	9 0 0	14 0 0
quois, U.S. ....foot cube	0 2 4	0 2 7
Canada ....load	3 0 0	4 10 0
roli ....load	3 10 0	4 0 0
Canada ....load	3 10 0	4 10 0
r, Dantico, &c. ....load	1 10 0	4 0 0
Canada ....load	2 10 0	4 10 0
Canada ....load	3 0 0	8 0 0
Canada red ....load	2 0 0	3 10 0
Canada yellow ....load	2 5 0	4 0 0
th, Dantico ....fathom	3 0 0	8 0 0
St. Petersburg ....fathom	4 0 0	6 10 0
kinnet, Bigs. ....log	2 15 0	4 0 0
Odessa, crown ....load	8 5 0	3 7 6
als, Finland, 2nd and 1st. ....std. 100	7 0 0	8 0 0
4th and 3rd ....load	6 10 0	7 0 0
Bigs. ....load	5 0 0	7 0 0
St. Petersburg, 1st yellow ....load	8 0 0	14 0 0
2nd ....load	7 0 0	8 0 0
white ....load	7 0 0	10 0 0
wedish ....load	6 0 0	15 0 0
White Sea ....load	7 0 0	17 0 0

TIMBER (continued).	£. s. d.	£. s. d.
Deals, Canada Pine, 1st ....load	17 0 0	30 0 0
2nd ....load	12 0 0	17 0 0
3rd, &c. ....load	6 0 0	10 0 0
Spruce 1st. ....load	8 0 0	11 0 0
3rd and 2nd ....load	5 0 0	7 10 0
New Brunswick, &c. ....load	5 0 0	7 0 0
Battens, all kinds ....load	4 0 0	13 0 0
Flooring Boards, sq. 1 in. x 6 in. ....load	0 9 0	0 13 0
pared, first ....load	0 7 6	0 8 6
Second ....load	0 6 0	0 7 0
Other qualities ....load	0 5 0	0 6 0
Cedar, Cuba. ....load	0 0 24	0 0 31
Honduras, &c. ....load	0 0 2	0 0 3
Australian ....load	0 0 4	0 0 7
Mahogany, Cuba ....load	0 0 4	0 0 7
St. Domingo, cargo average ....load	0 0 4	0 0 7
Mexican ....load	0 0 34	0 0 44
Tobacco ....load	0 0 4	0 0 64
Honduras ....load	0 0 44	0 0 64
Maple, Bird's-eye ....load	0 0 8	0 0 8
Bass, Rio ....load	7 0 0	10 0 0
Bahia ....load	6 0 0	10 0 0
Bor, Turkey ....load	5 0 0	17 0 0
Satin, St. Domingo ....foot	0 0 7	0 0 11
Porto Rico ....load	0 0 8	0 0 12
Walnut, Italian ....load	0 0 4	0 0 6

METALS.	£. s. d.	£. s. d.
Iron—Pig, in Scotland ....ton	0 0 0	0 0 0
Bar, Welsh, in London ....load	4 7 6	4 15 0
" " in Wales ....load	4 2 6	4 7 6
" Staffordshire, London ....load	5 10 0	6 0 0
Sheets, single, in London ....load	6 15 0	8 10 0
Hoops ....load	6 0 0	7 0 0
Nail-roads ....load	6 10 0	6 10 0

COPPER.	£. s. d.	£. s. d.
British, cake and ingot ....ton	43 0 0	43 10 0
Best selected ....load	44 0 0	44 10 0
Sheets, strong ....load	40 0 0	40 0 0
" India ....load	0 0 0	0 0 0
Australian ....load	0 0 0	0 0 0
Chili, bars ....load	41 0 0	41 10 0

YELLOW METAL.	£. s. d.	£. s. d.
Lead ....ton	13 15 0	13 17 6
Pig, Spanish ....ton	13 2 6	0 0 0
English, common brands ....ton	13 17 6	14 0 0
Sheet, English ....ton	13 17 6	14 0 0

SPRITES.	£. s. d.	£. s. d.
Silesian, special ....ton	13 17 6	13 15 0
Ordinary brands ....ton	13 15 0	13 17 6

TRIP.	£. s. d.	£. s. d.
Banco ....ton	0 0 0	0 0 0
Billiton ....ton	0 0 0	0 0 0
Straita ....ton	102 15 0	0 0 0
Australian ....ton	163 0 0	0 0 0
English ingot ....ton	108 0 0	0 0 0

ZINC.	£. s. d.	£. s. d.
English sheet ....ton	18 0 0	18 5 0

OILS.	£. s. d.	£. s. d.
Linseed ....ton	20 7 6	20 12 6
Cocoonut, Cochiti ....ton	33 5 0	0 0 0
Ceylon ....ton	25 15 0	0 0 0
Copra ....ton	9 0 0	0 0 0
Palm, Lagos ....ton	23 0 0	0 0 0
Palm-nut Kernel ....ton	0 0 0	0 0 0
Rapeseed, English pale ....ton	21 15 0	0 0 0
" brown ....ton	20 2 6	0 0 0
Cottonseed, refined ....ton	17 10 0	19 0 0
Tallow and Oleine ....ton	25 0 0	45 0 0
Lubricating, U.S. ....ton	6 0 0	10 0 0
" Refined ....ton	8 0 0	13 0 0

TURPENTINE.	£. s. d.	£. s. d.
American, in casks ....cwt.	1 6 8	1 6 9
Tar—Stockholm ....barrel	0 15 0	0 15 6
Archangel ....barrel	0 10 6	0 11 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
ons of Granite	Croydon Union.	Official	October 11th	ii.
Steam Roller	Sarkton Imp. Com.	S. Mather	do	xiii.
Wall, Dumb Dock, &c.	Wandsworth Bd. of Wks	Official	October 12th	ii.
Corinth Boilers	Edmonton Union.	T. E. Knightley	do	ii.
ph-bridge, Tar Paving, &c.	Guardians Mile End	J. M. Knight	October 14th	xiii.
Admiralty	Admiralty	Official	October 16th	ii.
tion of House, Working	Met. Asylum Board	J. Wallace Peggs	October 18th	xiii.
Drying and Storage Shed	Holborn Board of Wks.	L. H. Isaacs	October 18th	xiii.
rection of New Sewers, &c.	Liverpool Corporation	G. F. Deacon	do	ii.
roir, and other Works	Tottenham Local Board	Do	October 19th	ii.
plating Tanks, &c.	Hull Cor. Waterw. Co.	D. Maxwell	October 20th	ii.
son of Pumping Shafts, &c.	Hull Corporation	A. E. White	October 28th	ii.
on of Swing Bridge	Bor. of Burton-on-Trent	R. Waite	do	ii.
stead	Old Town Council	J. Wolfe Barr	October 30th	ii.
ty of Cast-Iron Water-Pipes	Craddock (Cape Colony)	J. G. Hall, C.E.	Nov. 9th	ii.
age Works	Municipal Council			
	Sevenside R.S.A.			

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
ctor of Nuisances	St. Saviour's Bd. of Wks	115l. and residence.	October 14th	xvi.

TENDERS.

AUDENSHAW.—For sewerage Audenshaw-road from Trail Dog Bridge to Manchester-road, for the Audenshaw Local Board. Mr. J. H. Burton, surveyor, Warrington-street, Ashton-under-Lyne:—

No. 1.	No. 2.	Total.
£ s. d.	£ s. d.	£ s. d.
Worthington & Ponnall, Manchester	271 2 0	344 6 6
F. W. Cullock, Manchester	226 0 0	275 0 0
Stansfield & Alcock, Ashton-under-Lyne	181 0 9	228 10 3
Cocks & Smith, Ashton-under-Lyne	180 8 6	203 16 6
John Rogers, Ashton-under-Lyne	140 18 6	104 15 9
Chas. Walmesley, Audenshaw	150 15 0	183 10 4
Surveyor's estimate.	183 15 0	181 18 0

* Accepted for Contract No. 1.

BRISTOL.—For the addition to the Bristol Lunatic Asylum, Fishpond, near Bristol. Mr. Henry Crisp, architect:—

Davies	£47,530 0 0
J. Wilkins	44,710 0 0
Wilkins & Son	43,650 0 0
Hayes	42,416 0 0
Horsman	41,877 0 0
Howell	41,400 0 0
Stephens & Bastow	41,369 0 0
H. A. Forse	41,235 0 0
Church	40,884 0 0
A. Bevan	40,768 0 0
Jalland	41,609 0 0
Cowlin	36,707 0 0
Kraus, Bristol (accepted)	35,980 0 0

CARDIFF.—For the erection of new Board Schools, Radnor-road, Canton, Cardiff, to accommodate 1,120 children, for the Cardiff School Board. Mr. E. M. Bruce Vaughan, architect, Cardiff. Quantities supplied:—

C. Dunn, Cardiff	£10,445 0 0
D. Davies, Cardiff	10,090 0 0
Shepton & Sons, Cardiff	10,045 0 0
D. Thomas, Cardiff	9,878 0 0
C. Bird, Cardiff	9,850 0 0
T. Evans, Cardiff	9,850 0 0
J. Allen, Cardiff	9,801 0 0
Jones Bros., Cardiff	9,450 0 0
R. Turner & Sons, Cardiff	9,268 0 0
Stephens & Bastow, Bristol	9,248 0 0
C. Burton, Cardiff	9,238 0 0
J. Haines, Cardiff	9,150 0 0
D. J. Davies, Cardiff	8,998 0 0
B. C. Howell & Son, Bristol	8,400 0 0

* Accepted.

CHEADLE HEATH (near Stockport).—For the erection of a school at Cheadle Heath, near Stockport. Plans and specification and quantities by Mr. J. H. Burton, architect, Warrington-street, Ashton-under-Lyne:—

T. Warrington, Newton Moor	£1,534 0 0
J. Clayton, Denton	1,773 0 0
A. Mason, Disbury	1,718 0 0
Butters & Carson, Manchester	1,678 10 0
T. Rome, Manchester	1,623 0 0
J. Broadhurst, Stockport	1,622 0 0
H. J. Hampton & Co., Manchester	1,612 0 0
T. & W. Meadows, Stockport	1,574 17 0
W. H. & H. C. Brown, Stockport	1,540 0 0
R. Bateson, Stockport	1,513 0 0
Froggatt & Briggs, Stockport	1,480 0 0
J. McFarlane, Manchester	1,472 0 0
J. Ross, Manchester	1,468 0 0
T. Dean, Ashton-under-Lyne	1,460 0 0
S. Robinson, Hyde	1,440 0 0
J. Brown & Co., Hyde	1,440 0 0
W. Winnard, Wigan	1,432 5 8
Dayson & Carr, Manchester	1,414 0 0
J. Lee, Stockport (accepted)	1,400 0 0

ENFIELD.—For alterations, &c., at Chase Hill Farm, Enfield. Mr. W. D. Church, architect. Quantities by Mr. C. Slanger:—

Field & Son	£2,332 0 0
J. Holloway	2,031 0 0
W. Shurmer	2,027 0 0
S. Godden	1,935 0 0
J. Patman	1,898 0 0
Fairhead & Son	1,797 0 0

FULHAM.—For St. Clement's Vicarage, Fulham, for the Rev. W. Patoe Hindley, M.A. Mr. Charles Henman, architect, Cannon-street. Quantities by Mr. Charles Fitzroy Doll, F.S.I.:—

Maides & Harper, Croydon	£1,789 0 0
Goddard & Son, Farnham	1,704 0 0
J. Holloway, Lavender Hill	1,680 0 0
J. Smith & Son, South Norwood	1,667 0 0
W. Marriage, Croydon	1,660 0 0
Holland & White, Fulham	1,630 3 0

* Accepted.

HINDLEY (near Wigan).—For additions and alterations to Hindley Vicarage. Mr. John W. Alexander, architect, Middlesbrough. Quantities supplied:—

C. B. Holmes, Wigan	£680 0 0
France & Smith, Farnborough	681 0 0
A. Wigou, Ince	646 17 0

LONDON.—For rebuilding Nos. 86 and 87, Strand, for Mr. W. Campbell. Mr. Alfred Drewe, architect:—

Langdale & Hallett	£9,973 0 0
Wall Bros.	8,173 0 0
Rider	7,543 0 0
Higgs & Hill	7,464 0 0
Scrivenor	7,297 0 0
Downs	7,205 0 0
Wells	7,169 0 0
Drew & Godman	7,150 0 0
Johnson	6,746 0 0
Jerrard	6,490 0 0

LONDON.—For erection of premises, 104, Bishopsgate-street, E.C., for Messrs. Moore & Moore. Messrs. T. Chatfield Clarke & Son, architects:—

G. S. Pritchard	27,977 0 0
Clark & Bracey	7,791 0 0
J. Brown, Son, & Blomfield	7,718 0 0
Colls & Son	7,710 0 0
J. & J. Greenwood	7,687 0 0
Abby & Horner	7,681 0 0
Altherton & Latta	7,695 0 0
W. Shormur	7,685 0 0
Patman & Fotheringham	7,497 0 0
C. Cox	7,477 0 0
Hall, Beddall, & Co.	7,416 0 0
J. Morter	7,393 0 0
Lawrence & Son	7,370 0 0
M. Patrick & Son	7,369 0 0
J. Woodward	7,273 0 0
B. E. Nightingale	6,129 0 0

LONDON.—For alterations at the Northampton Arms, Goswell-road, for Mr. James Durant Spire. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—

H. Smith & Son	2,838 0 0
S. R. Lambie	689 0 0

Painter's Work.

T. Heath (accepted)	110 0 0
---------------------	---------

LEICESTER.—For twelve houses and enlargement of brewery factory, Dunstable-lane, Leicester, for Mr. J. Haines. Mr. W. S. Burton, architect. Quantities supplied:—

Excavator, Bricklayer, Mason, Slater, Plasterer, and Carpenter.

J. Stevens	23,523 0 0
Hutchinson & Son	3,488 0 0
J. Flude	3,456 0 0
T. Bland	3,294 10 0
W. H. Kellott	3,266 0 0
J. Cox	3,210 0 0
J. E. Johnson	3,171 0 0
Jewsbury	3,160 0 0
T. C. Tyers	3,109 0 0
C. Wright	3,103 0 0
G. W. Harrison (accepted)	3,060 0 0
Timson	3,796 8 6

Ironfounder.

Ilston	224 0 0
Wright Bros.	217 7 8
Jayes & Co.	215 8 0
Cort & Paul	214 13 0
Goodwin & Barsby (accepted)	202 10 0

Plumber, Gasfitter, and Glazier.

Hudson	200 17 0
Smith	198 6 0
Matta & Biggs	191 0 0
Norman & Underwood	186 10 0
Fearnle	184 7 0
Whitmore	176 15 0
Hill	168 10 0
Gasdiffe & Matthews (accepted)	161 19 6

Painter.

Whitmore & Pratt	106 15 0
Millis	96 17 0
Barker	95 10 0
Groves	92 10 0
Eaton	89 10 0
Brown	88 5 0
E. H. Shipley (accepted)	79 16 2

[All of Leicester.]

MAIDA VALE.—For outside repairs and painting to Nos. 1, 2, and 3, Blomfield-terrace, Maida Vale. Messrs. Glazier & Sons, surveyors:—

Bird & Co.	2163 0 0
Clark & Mannoch (accepted)	88 0 0
Clark & Mannoch (accepted)	82 0 0

MARYLEBONE.—For the internal painting and decorating 25, Margaret-street, W., for Mr. J. Lewis. Mr. A. E. Hughes, architect:—

McIntosh	2128 0 0
Shiers	98 0 0
Clark & Mannoch (accepted)	98 0 0

MILLWALL.—For alterations to the Great Eastern public-house, and erecting a cottage to adjoin same, Millwall, E., for Messrs. Charrington & Co. Mr. John Hudson, architect, Leman-street, E. Quantities not supplied:—

Little, Whitechapel	21,497 0 0
Eaton, Whitechapel	1,895 0 0
J. & H. Cocks, Mile End	1,310 0 0
Gladling, Mile End	1,310 0 0
Counsell Bros., Bethnal-green*	1,125 0 0

* Accepted.

NEWBY-IN-CLEVELAND.—For the erection of a mission-room, with fittings. Mr. J. W. Alexander, architect, Middlebrough. Quantities supplied:—

WHOLE TENDERS.

J. B. & W. Sturdy, Middlebrough	2,236 5 0
J. Johnson, Middlebrough	817 7 0
Craggs & Benson, Stockton-on-Tees	313 15 0
A. White, Guisborough	285 5 8

SEPARATE TENDERS.

Excavator, Bricklayer, Mason, Slater, and Plasterer.	
W. Pearson, Great Ayton	2,161 19 1
R. Walker, Newby-in-Cleveland	165 6 8
W. Bulmer, Great Ayton	149 0 7
A. White, Guisborough	128 17 0
Carpenter, Joiner, and Ironmonger.	
W. Sturdy, Middlebrough	2,138 2 0
G. Morley, Newby-in-Cleveland	110 2 8
Hudson Bros., Middlebrough	98 19 0
F. Stainborpe, Slatton-in-Cleveland	92 11 3
F. Robinson & Son, Seamer	89 16 0
S. Wrightson	87 6 7
J. Harbottle, Great Ayton	78 6 8
Founder and Smith, Plumber, Glazier, and Painter.	
D. Wilson, Middlebrough	256 3 10
J. Hudson, Middlebrough	48 10 0
J. Rowlands, Yarm	47 13 7

Revised Tenders Accepted.

A. White, Guisborough	2,139 11 0
J. Harbottle, Great Ayton	89 6 8
J. Rowlands, Yarm	48 13 7

NEWPORT (near Middlebrough).—For the erection of a mission-room, with fittings. Mr. John W. Alexander, Diocesan Surveyor, architect:—

W. Sturdy, Middlebrough, (accepted)	2,237 0 0
-------------------------------------	-----------

NTFIELD (Surrey).—For erecting houses from ground line (cellars and foundations already carried out), for Mr. Charles Maw. Mr. E. J. Dibble, architect, Dorking:—

Pearless, Eastbourne	210,889 0 0
Brass & Sons, London	10,335 0 0
Colls & Son, London	8,745 0 0
Goddard & Son, Farnham	9,190 0 0
Smith & Sons, Guildford	9,065 0 0

PADDINGTON.—For repairs, painting, and decorating to the Prince of Wales Hotel, Eastbourne-terrace, for Mr. T. Grammer. Mr. H. Wilkinson, surveyor:—

Langridge & Co.	2,181 10 0
Berdett	183 13 0
Barrett	174 10 0
Clarke & Mannoch (accepted)	182 14 6

PENARTH.—For alterations and additions to Presbyterian Chapel, Penarth. Mr. J. H. Phillips, architect, Duke-street, Cardiff:—

Cadogan & Williams	21,192 0 0
D. Thomas	960 0 0
Small & Thompson (accepted)	780 0 0

[All of Cardiff.]

UPMINSTER (Essex).—For the erection of a pair of labourers' cottages on Hacton Farm, Upminster, Essex, for Mashiter's Trustees. Mr. John Hudson, architect, Leman-street, E. Quantities not supplied:—

Sibthorpe, Hornchurch	2,565 0 0
Hook, Upminster (accepted)	489 0 0

WALTHAMSTOW.—For stables and cart-shed at Low Hall Farm Sewage Works, for the Walthamstow Local Board. Mr. G. B. Jorram, architect. Quantities by Messrs. Hovenden, Heath, & Berridge:—

Cooper & Leaky	2,185 0 0	21,380 10 0
W. & T. White	153 17 1	1,196 6 11
J. Church & Co.	149 3 6	1,096 0 0
A. G. Barton	165 0 0	1,095 0 0
J. Stone	118 2 7	1,094 10 0
C. Reed	147 17 0	1,091 0 0
W. J. Davenport	149 0 0	1,033 0 0
W. Munday	150 0 0	1,000 0 0
E. Fuller	163 0 0	996 0 0
W. Thompson	194 0 0	990 0 0
J. Webb	149 10 0	975 0 0
T. Ede & Son	152 0 0	974 0 0
J. Godfrey & Son	130 0 0	968 0 0
W. Wood	140 0 0	965 0 0
W. A. Palmer & Co.	140 0 0	949 0 0
C. Barnes	141 0 0	928 0 0
J. Holland	145 0 0	893 0 0
G. Vais	109 0 0	874 0 0
W. J. Beale	100 0 0	856 0 0
Geo. Parker	120 0 0	836 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

C. & R. H. T. A. T. W. B. L. H. (shall be glad to hear from you again).—S. W. (rather a matter for advertisement).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

All communications relating to literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Colonial and Foreign Postage.

AN EDITION OF "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone.

WESTWOOD GROUND,
Box Ground, Combe Down,
Corsham Down, And Farleigh Down,
RANDELL, SAUNDERS, & CO., Limited,
Corsham, Wilts. [ADV.]

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [ADV.]

Doubling Freestone.

THE CHELYNCH STONE.
The stone from these quarries is known as the "Weather Bed," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England. It is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.
Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset. London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [ADV.]

Doubling Free Stone

For prices, &c., address S. & J. STAPLE, HAM HILL STONE, Quarry Owners, Stone and Lime Merchants, Stoke-under-Ham, (Ground or Lump), Ilminster. [ADV.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 88, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.

Seyssel, Patent Metallic Lava, and

White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [ADV.]

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important Exhibitions.

BANNER SYSTEM OF SANITATION AND SANITARY APPLIANCES

WERE AWARDED AT THE

International Health Exhibition, 1884, One Gold Medal, Three Silver Medals, and One Bronze.

For further Particulars and Prices apply to

BANNER SANITATION COMPANY.

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

ILLUSTRATIONS.

Marlborough College Chapel.—Messrs. G. F. Bodley, A.R.A., and T. Garner, Architects	556-557
House near Stockholm, Sweden.—Mr. J. Howard Ince, Architect	560-561
House at Oxford, Kent.—Messrs. Roger Smith & Gale, Architects	564-565
Park Lodge and Entrance-Gates, near Kingston.—Mr. E. W. Lacey, Architect	568
A House in Hampshire.—Messrs. Wyatt & Spiers, Architects	569

CONTENTS.

Ancient Buildings and "Restoration"	545	"House in Hampshire"	571	A Cement Quarry	573
The Berlin Museum	546	New Town Hall, Motherwell (Illustrated)	571	New Boat-House, Christ's College, Cambridge (Illustrated)	574
Notes	547	The Superintending Architect: Metropolitan Board of Works	571	The Student's Quarters: Home Quarters.—XVI.	574
Experiments on Colonial Woods	548	Notes from Sweden	572	Books: Kapp's Electric Transmission of Energy (Whittaker);	574
Changes at Scotland Yard	549	East Coast Watering Places and Railway Extensions	572	Maler's Arc and Glow Lamps (Whittaker); Wanklyn's Gas	
Bradford Historical and Antiquarian Society	550	Obituary	572	Engineer's Chemical Manual (Scientific Publishing Co.);	
The Ecclesiastical Art Exhibition, Wakefield: The Loan Collection	550	The Floor of St. Mark's, Venice	572	Techno-Chemical Receipt Book (Baumson Low); Kelly's	
The Lion in Heraldry	551	"Federation of Architects"	573	Directory of the Building Trade	575
The Founder of the Iron Trade	552	The Architectural Association Conversations	553, 573	Vaporum	576
New Chapel, Marlborough College	554	Sculptured Stones in St. Nicholas, Ipswich	573	Recent Patents	577
Saltak, near Stockholm	554	St. Ignace R.C. Church, Preston	573	Recent Sales of Property	577
House at Oxford, near Sevenoaks	554	Railway Rates	573	Metallurgy	578
Park Lodge and Entrance Gates	571	Automatic Couplings	573	Miscellaneous	578
		New Warehouses, St. Paul's Churchyard	573	Prices Current of Building Materials	579

Ancient Buildings and "Restoration."



GREAT deal has been said during the last week or two by various correspondents in the leading journal on what has for some time been a "burning question,"—the principle on which ancient buildings are to be added to, "restored," or let alone. The most contradictory opinions have been expressed, both by those who have good claims, from their special knowledge and education, to speak on the subject, and by those who have none, but who, for reasons we do not pretend to understand, have obtained the opportunity to pose as lecturers on architecture and architectural propriety to a public which, unfortunately, for the most part, knows too little about the subject to discriminate between one guide and another; perhaps, we may add, cares too little to attempt to discriminate.

A great deal of the apparent confusion and contradiction about the subject really arises from the fact that those who argue about it constantly mix up together in their considerations what are really three distinct questions. There is, first, the question of making architectural additions to ancient buildings. Next, that of "restoring" as it is called, those portions of an ancient building which have become dilapidated, and have lost, by ordinary wear and weather, or by defacement at the hands of former generations, portions of their detail. Thirdly, there is the question of the preservation of ancient remains which are in an actual state of ruin, but which are of high interest or beauty, even as relics of what they once were.

This latter, or third head, may be dismissed briefly, as it is not complicated by any of the difficulties which beset the other two branches of the subject. No educated people differ on this point, that disused remains or "ruins" exhibiting ancient architectural workmanship, or showing anything of the plan and arrangement of buildings erected under conditions of life which have passed away and become a portion of history, are, even when little of beauty is left in them, relics of great historical value and interest, and that it is a duty we owe both to ourselves and to students who may come after us, not to allow them to subside into further ruin or actual obliteration. Where, indeed, such remains are found in crowded cities, there will sometimes arise the question whether their preservation should be allowed to stand in the way of much-needed

modern accommodation or improvements. For such cases it is impossible to make a rule; each must be decided on its own merits, and on the comparative value of the remains. Where these are not of very ancient date or of unique interest, it is foolish to insist, as some in a spirit of blind antiquarian bigotry would insist, on their retention at the expense of the comfort and convenience of the present generation. There are other cases, such as that of the Roman remains at Bath, to which we referred last week, where the remains, though dilapidated in themselves, are of such special historical interest that a sacrifice ought to be made to preserve them intact; and probably the more education progresses the more generally will this be felt and admitted. In the case of ruins standing, as most of our most valuable examples do, in open spaces in the country, the question is merely one of responsibility,—not of what ought to be done, but who ought to do it. Mr. Hamo Thornycroft has called attention to the threatened decay of the remains of the Roman villa at Brading, for want of proper protection; and Mr. Loftus Brock, in a long and able letter to the *Times* of the 13th, on the subject which he understands so well, suggests that the provisions of the Ancient Monuments Bill of 1882, which at present are only applicable to what are called "prehistoric monuments," should be revised and extended so that the owner of a Norman keep or a ruined abbey may constitute the Commissioners of Works the guardians of such monument, as at present the owner of a dolmen or a British pit dwelling may do. There would be some opposition, no doubt, on the part of those who delight to call themselves "practical people," against devoting public money to these purposes; but public opinion has been somewhat educated since the absurd opposition to the early stages of Sir John Lubbock's Bill, and perhaps people may recognise in time that it is an ignoble thing for a country to be careless and indifferent about the monuments of its past history.

The question of the repair or restoration of buildings in actual use and occupation is a much more complicated one. The question of St. Mark's has been the subject of some fencing between Mr. Aitchison and a correspondent in the *Times*, who signs himself "Beo," and who absurdly charges modern architects with not being original, and not making a style of their own, as if any individuals or even any generation ever did or could make a style of architecture, of deliberate forethought. He overstates the case, however, when he says that no original details are designed by modern architects. The real fact is that all architectural detail, by the architects of any age, has been a development from the

work of their predecessors; the greatest originality that can be credited to any one generation of architects has been to improve on or develop something better, or something different ("lest one good custom should corrupt the world") from the work of their predecessors. Really, we believe the truth to be that there is more originality in the works of many of the best English and French architects at the present moment than there has been in most former periods of architectural history, and that perhaps the fault even lies, in some quarters, in a rather too restless straining after being original. This, however, is by the way. Mr. Aitchison hardly makes a happy parallel in comparing the restoration of features which have decayed on an ancient building with the restoration of the lost books of Livy. The work of Livy was a literary record of facts,—or what Livy believed to be facts; it was a work written to give information, which, except in the case of pure poetry, is the primary object of a literary work. Now, the object of the builders of St. Mark's was not to give information to posterity, but to build a grand church; as "Beo" puts it (and he certainly scores a point there), "St. Mark's was built for worship, and not for the education of the S.P.A.B." We are speaking now, not of large additions, such as a new façade to a building, but of the execution of new details where old have perished. Where these are of the nature of purely conventional architectural detail, such as mouldings or a band of repeated ornament, we certainly cannot see that it is an act of vandalism or falsehood to fill up the gaps and render the architectural design complete again. It is that question of architecture as *design* which is in danger of being entirely forgotten in the present rather exaggerated worship of architecture as *history*. When we come to sculpture and painting the case is different; though in the matter of purely decorative sculpture it is sometimes rather difficult to decide. Mr. Aitchison instances the case of the north portal of Rouen Cathedral, where he saw new sculpture being executed in 1853 in place of that which had absolutely perished. The carver told him that he invented the subjects and carved them in the style of those that were left. Now if these were a series of figures in niches, such figures are really, in many Mediaeval buildings, only a rather higher form of architectural decoration; their effect as a whole is of more value than individually. If the sculptor had, as Mr. Aitchison contends he should, executed figures in the style of his own day, the architectural unity of the whole would certainly have been broken up. The effect would have been a patchwork. Better, perhaps, to leave the niches unfilled, and, perhaps, that is what Mr.

Aitchison would prefer. In the case of mosaic pictures we come more into the region of a special art distinct from, though connected with, architecture; and here we must say that the process of piecing up old mosaics, which we understand is being carried on at St. Mark's, so that "it is difficult to determine where the old ends and the new begins," is a proceeding absolutely senseless, unless it concerns only decorative design, of which the parts remaining give the design of the whole. When it concerns anything like pictorial work, properly so called, if the modern proprietors of the church think their place of worship wants renovation, let them put the fragmentary mosaics in a museum, and get as good work as modern genius will supply in its place; but piecing up an old picture (whether in mosaic work or other method) with work intended to give the idea that the whole is complete in its original style, is absurd: it is spoiling the old work and fettering and misusing the talents of the modern artist.

The question of St. Mark's has brought out a letter from Mr. Arthur Street on the old subject of the alleged symbolism of the "wavy" floor, concerning which the reader who is interested had better take notice of a letter signed "Delta," which we print in another column, and which is by a careful and competent observer, who has paid considerable attention to the subject. The Latin quotation at the close of Mr. Street's letter in the *Times* is curious, and seems to afford some kind of ground for the supposition; but he does not say from what source it comes; and other remarks in the letter seem to be rather a repetition of what the late Mr. G. E. Street has already said on the subject. We have always been exceedingly sceptical about the alleged symbolism of the incident; for the double reason that, although it is true, as Mr. Street says, that Medieval architecture was much charged with symbolism, yet to do a thing so practically inconvenient as to make an uneven floor for the sake of a symbol, seems a very improbable whim for any builders in possession of their senses; secondly, for the still stronger reason that the nature of the site on which St. Mark's is built seems to afford a much more probable explanation of the fact. Mr. Street should give the origin of his quotation about the floor of St. John the Evangelist at Ravenna in the fifth century; he only says, "we are told," which is not a satisfactory way of quoting; and the period referred to is too far antecedent to that of St. Mark's to have much weight as a probable precedent.

The third division of the subject is where we are concerned with actual additions to an ancient building, concerning which Lord Grimthorpe and Canon Venables have been keeping up a smart controversy. Putting the rudeness out of the question (and we suppose Lord Grimthorpe, in his public utterances at all events, cannot help being rude, and is to be pitied for his temper), it appears to us that Lord Grimthorpe is perfectly right in his theory of the subject, and in his estimate of his opponents' theories; he is very amusing (in a sense) and often very convincing when he is only writing about architecture: it is when he gets to building that he does the mischief. Canon Venables calls the west front of St. Alban's "Brummagem"; so do we, only for different reasons. Canon Venables calls it so because it is a modern Gothic front to an ancient Gothic church. We call it so because it is bad, clumsy, second-rate modern Gothic, done by men who do not understand the refinements of the style, and as such is a blot on the great building to which it is attached. Canon Venables, we gather, would have had the west front left as it was; others, we presume, would say, if a new front be added, make it in the style of the day. As far as mere theory goes, Lord Grimthorpe has the best of the argument. The west front of St. Alban's,—anything worth calling a west front,—had disappeared. It is mere fanaticism to say that the front as it was left was a worthy front to an old abbey which was to be resuscitated as a modern cathedral. In no former age has it been questioned that it was not only a pardonable but a spirited

and praiseworthy thing to glorify an ancient building with a new and more imposing facade. It is a kind of enterprise which at different times has called forth the energies and emulation of the best architectural artists of their day. The Milanese have inaugurated a great competition for a new facade to their cathedral: does Canon Venables wish to stop them? The Florentines have just completed a facade to their cathedral: are they also to be denounced? And then as to the question of style, let us once more remind the antiquarian section that architecture is, after all, art, and not mere history. When a new facade is to be added to a great building, which is in a special and marked style, it is a matter of artistic common sense, to our mind, that the addition should be such as to harmonise in style with the rest of the building. This is the principle on which the Florence facade has been designed; not, alas! as well as it might have been, but with the right intention. To add a facade "in the style of the day" merely for the sake of a Quixotic truthfulness, is a want of perception of artistic fitness. To our thinking, for instance, Inigo Jones did a stupid thing (were he three times Inigo Jones) when he tacked a Classic portico to the end of old St. Paul's. The designer of the western towers of Westminster Abbey (whether it were Wren or another) was much more in the right path: he endeavoured at least to make an addition in a style to harmonise with the existing building; not understanding Gothic detail, he did it very badly, but he meant artistically, and he would have been stopped by the S.P.A.B. had they existed then, though the same Society now admire the towers very much because they have been there a couple of centuries. Of course, an architect of genius would be able to design a Gothic front sufficiently in harmony with the ancient style, while giving some original feeling of his own to it. This was the attempt at Santa Maria del Fiore; and this, if fortune favours us with a new genius, is what may yet be accomplished at Milan. We have had too little attempt at this in England. Scott, at St. Alban's, would have built a good imitation of ancient Gothic; Lord Grimthorpe has made a bad one; but we do not hold that this is from any mistake of principle, but from defect of knowledge and taste. Canon Venables is most unfortunate in his reference to the screen masking the end of the aisles at St. Alban's; in condemning which, as his opponent points out, he condemns several of the finest Gothic facades in existence, and finds fault with the only means by which dignity can be given to the facade of a large three-aisled church, in the absence of western towers. In all this we hold that Lord Grimthorpe is perfectly right in theory; and very likely he thinks his facade very fine. Unfortunately, there it is to tell its own tale, and everybody who knows what good architectural design and detail are, knows that it is coarse, poor, and commonplace. The persons really to blame about it are the legal custodians of St. Alban's, who hold the building in trust for the nation, morally if not legally, and who, instead of going to an architect of known genius and knowledge of Gothic, or advertising a competition, as the Milanese have done, for the finest design that could be procured, have turned the building bodily over to be pulled to pieces and rebuilt by a lawyer, who, whatever his other abilities, is no artist in practice, assisted by an ex-clerk of works who has gained a smattering of Gothic detail. Great buildings are not meant to be playthings for amateur architects,* however logical may be their theories of restoration.

An Old Burial Ground. The old burial-ground adjacent to Kent-street, in the Borough, is being converted into an ornamental garden by Lord Erabazon's Association.

* We were amused to notice, in an *Edinburgh Review* article some little time since, on some recent ecclesiastical legislation,—an article obviously (rather too obviously) from the pen of Lord Grimthorpe,—various sarcastic comments on the "amateur lawyers" who were responsible for this legislation. Just so: but amateur architects,—that, of course, is another matter altogether!

THE BERLIN MUSEUM.

THE almost simultaneous appearance of three new official catalogues,* Vases, Casts, and Ancient Sculpture, marks an epoch in the history of the Imperial Museum at Berlin. In the department of Greek archaeology, where discovery advances just now with a rapidity that almost bewilders, there has recently come to every Museum worthy the name a feeling that not only must the whole mass of collected material be reconsidered, and in many cases re-arranged, but also that the basis and results of that reconsideration and arrangement must be presented in catalogue form, for the use of the educated public. In the matter of its vase-collection our own Museum is just passing through such a crisis, the outcome of which we hope shortly to chronicle; in the meanwhile it may not be unprofitable to see how, in its several departments, the Berlin Museum, which we may safely call the model museum of Europe, has gone through the ordeal.

The task will be the more instructive because the new Berlin catalogues are not merely catalogues, they are also, in a sense, confessions of archaeological faith; in one instance specially we have a bold and thorough-going attempt at classification,—nowhere do we see that timid dread of self-committal, that shrinking from theory, that restriction to the limits of absolutely demonstrable fact which some have held to be the sacred duty of the cataloguer, but which too often serves but to cloak inertia, ignorance, or professional vanity.

We begin with the catalogue of Greek Vases by Dr. Furtwängler. No one will say it appears before it was needed. The only existing catalogue of a collection of 4,221 vases was the long superannuated work of Lezevow and Gerhard, which went no further than the additions of 1854. Intent on perfecting their Cast Museum, for which an excellent short catalogue was published years ago, the Museum authorities have been tardy in attending to the needs of the less popular vase collection. However, we need not complain; if we have waited long, we at least are amply rewarded. Dr. Furtwängler represents the advance guard of his own special department; since 1852, when he was moved from the sculpture department to the Antiquarium, he has had that personal experience, that touch and handle knowledge, which is the first essential, and he adds to this experimental tact, a young vigour of opinion, a certain intellectual "push," if we may so call it, which saves him from absorption in the mere aggregation of detail, and which allows him to get through an accumulation of material which would overwhelm an energy less robust and vital. The short history of the gradual formation of the collection he gives in the preface in its itself a memoir of the archaeological progress of the present century. The collection began in 1805, with the purchase of Henin's vases in Paris. They numbered 331 pieces, and had all been found in Lower Italy and Campania. They belonged to what is known as the "Lower Italy" class. They are Italian, not pure Greek work,—large, heavy, elaborate, often vulgar in style,—one wonders they roused the enthusiasm even of the amateur collectors; but we owe them some sort of thanks, for, dethroned as they now are, they at one time formed the beginning, and certainly for long the chief glory of every collection, public or private. This "Lower Italy period," which applies to all collections in common with that of Berlin, lasted till 1830, and in 1830 the collection, numbering 2,000 pieces, was lodged in basement cellars, where, alas! it remained till 1879, when it emerged to its present upper-air condition. But meanwhile it had entered into its second and far more interesting

* 1. Beschreibung des Vasensammlung im Antiquarium von Adolf Furtwängler. Mit 7 tafeln. 2 Bände. Berlin: W. Spemann, 1886.

2. Die Gipsabgüsse Antiker Bildwerke in Historischen Folge erklärt. Bausteine zur Geschichte der Griechisch-Römischen Plastik von Carl Friedrich, neu bearbeitet von Paul Wolters. Berlin: W. Spemann, 1886.

3. Verzeichniss der Antiken Sculpturen mit Auschluss der Pergamentischen Fundstücke, herausgegeben von der General Verwaltung. Berlin: W. Spemann, 1886.

stage. In 1828 the first graves in Etruria were opened, Vulci yielded up its treasures of authentic Greek art hitherto undreamed of, and from 1830 until 1871 it was from Etruria that the principal treasures of the collection were diligently reaped. This "Etruscan" period, so fertile in signed vases, is marked by a great archaeological name, that of Gerhard, who became connected with the museum in 1833. One reads with amusement of the opposition he met with when he tried to induce the authorities of the Museum to purchase specimens of archaic pottery. They were not beautiful, he was told. A vase collection was still looked at, from the artist point of view, as a collection of pretty things, of graceful shapes, and elegant designs. Connoisseurs who published vases still touched upon the drawing of the designs, adapting them to modern taste. How bravely Gerhard fought the hard battle for science, the splendid collection of black figured vases which, in the teeth of constant opposition, he got together, is the best evidence. In 1871, Dr. Curtius succeeded to the directorship of the Antiquarium, where he still reigns. His period we might call the period of "Greece proper." From the first he set himself to secure not so much the splendid examples (and they are, undoubtedly, the finest) that come to us from Etruscan tombs, but rather such vases as were actually found in Greece proper, and which had on that ground special scientific interest. Alas! many such a vase has been offered to our own Museum, and, for want of funds, has passed to Berlin, where its price was not begrudged.

We have said that Dr. Furtwaengler's catalogue is marked by the frank expression of theory. These theories of classification are expressed in the divisions adopted, but for lack of space are not supported by the grounds on which they are based. He tells us in his preface that his original intention was to preface each section of the book with an introduction expounding the reason of the classification. This part of his work he was obliged reluctantly to forego, but he promises shortly to issue a handbook on Greek vases in which this material, advisedly omitted, will be embodied. He asks that judgment on his method of classification may be reserved till after this publication, and (provided his handbook does not tarry unduly long), the request is a reasonable one. We will, therefore, say only that his system of classification is the one which we believe must ultimately obtain, i.e., a cross classification chronological and local. He adopts four main chronological classes and then subdivides by local factories, not, be it observed, by where the vases are found, but by where they were presumably made. Thus in Class B, black figured, we have of the non-Attic group five local subdivisions, Rhodian, Boeotian, Corinthian, Chalcidian, and unknown (? Italian). When we state that, in all, the classes of vases, as arranged by Dr. Furtwaengler, number thirty-seven, with the characteristics and chief specimens of which every archaeologist is bound to be familiar, we can see that the history of vase-painting is not the elegant pastime which it has long been accounted.

Second in importance comes undoubtedly the new catalogue of the Cast Museum. The book is practically a new edition, with many alterations and modifications of Friedrich's well-known "Bausteine." The "Bausteine" was published in 1868. It consisted of a catalogue of the casts then in the Berlin Museum, arranged according to the accepted periods of Greek art, and under each number a critical description and commentary on the statue or group described and citation of the literature referred to. The catalogue had thus become incidentally a valuable handbook. Since 1868 there has, of course, been added to the Museum a vast store of new materials, and, with the new material, has come the shifting of many points of view. Dr. Paul Wolters, the new editor, has incorporated all the new material, and, while keeping the general scheme of the book intact, he has rewritten it up to date. One alteration he might well have made by which we think the arrangement would have gained in utility. Dr. Friedrich classed the archaic specimens of sculpture

immediately after the genuine "archaic": we think it is a mistake to continue this method. *Archaistic* sculpture taken in its actual chronological place, i.e. in the Græco-Roman period, is very instructive, but, taken in connexion with the genuine archaic, it can be to the eye of the student only confusing. Of course the order of the book is not a very serious matter, because the student can, if he pleases, reverse it, but a protest should be entered against any encouragement to a false method. With this exception there is nothing in the whole arrangement that calls for criticism, and the work will be not only invaluable as a guide to the actual museum, but will also be serviceable to the student in other countries and with other museums as a handbook for general reference. A student in the South Kensington Museum of Casts could not do better than supplement the somewhat meagre information of the official catalogue there by constant reference to the new edition of the Bausteine.

Last, we come to the new catalogue of the Greek and Roman originals of the Berlin Museum. This catalogue supersedes one published in 1861 and long since out of print. It is well known that until the discovery of the Pergamene marbles the Berlin museum was not rich in original work. It has been decided, — we think very wisely, — not to incorporate the Pergamene marbles in the present catalogue; to have done so would have involved a delay probably of some years, as new material is still constantly coming in; further, the Pergamene remains form a subject quite distinct in themselves, and may well form the subject of a separate treatise. The most interesting additions to the originals of the museum have been those purchased from the Sabouroff collection. The special value of this collection is that the "provenance" of every object contained in it is strictly known: they were all collected on the spot of discovery, and by M. Sabouroff himself, without the intervention of any dealer. The whole of the collection, the terra-cottas which have gone to St. Petersburg as well as the marbles, bronzes, and vases which remain at Berlin, are in process of publication in a splendid illustrated work by Dr. Furtwaengler, which, on its completion, we shall hope to discuss. But for those who are unable to possess a book so costly the small Berlin catalogue gives a valuable account of all the marbles, some of which are of unique interest. We have had occasion, when the collection was first bought by the museum, to call attention to the most notable sculptures, e.g., the Sparta stele, the Salamis bronze, the Demeter head, but we may notice now that the collection contains many others less remarkable in execution, but of equal interest as to subject,—such is the relief of Pan and the Nymphs (Furtwaengler, xxviii), which is satisfactory to find side by side with the famous Nani relief: the new addition represents a type prevalent in the fourth century B.C., three nymphs dancing hand in hand are led by Hermes within a cave, in which, to the left, sits Pan aloft on a rock, below him four worshippers approach. In the centre of the cave is a rocky altar, to the right a head of Achelous. Of similar date, style, and subject is a semicircular relief (Furtwaengler, xxvii.) representing a grotto in the midst of which, on a table, is the bearded and horned head of the river god, Achelous. Round him, seated and standing, in curious perspective, are seven deities; in the centre Zeus, to his left a youthful Pan, to the right Kore and Agathodaimon, the rest uncertain. For the study of this subject of the worship of Pan, the nymphs, and the river gods, Berlin offers now unequalled material. In conclusion, we may note that this small catalogue (sold for one mark) is a model of arrangement and of index reference. There is an index of subjects, of inscriptions, of "provenance," and a comparative table of the old and new catalogue numbers. We shall look forward with interest to the companion volume on the Pergamene sculptures; possibly the restoration of the Pergamene Acropolis at the Kunstanstaltung may hasten its appearance. Since the issue of these three new and ad-

mirable catalogues it is more than ever our conviction that Berlin is the place in which every beginner should lay the foundation of his archaeological studies.

NOTES.

THE statistics put before the representatives of the British iron trade by Dr. Percy, the President of the Iron and Steel Institute, are not very reassuring, inasmuch as they give us the real reason why this great staple trade continues in such a depressed condition. We have so long accustomed ourselves, not only in iron but in other manufactures, to regard our performances with self-complacency, that we have failed to realise the unpleasant fact that other countries are doing not only as well, but better than ourselves; and that, while we have been hugging ourselves with the notion of insular superiority, our rivals are equalling, if not excelling us, both in quantities and qualities. The figures given to the world by the American Iron and Steel Association speak volumes for the rapidity with which the trade has grown up in that country alone,—an increase during the three years between 1879 and 1882 of 80 per cent. At the present time the American aggregate capacity is estimated at 8,900,000 gross tons of 2,240 lb., showing a capacity of production more than double the actual make of 1885, or nearly 300 per cent. greater than the actual make of 1879. There are many ironmasters in England who can remember the time when nearly the whole of the American demand for iron was supplied by this country; but now the tables are turned, and the Americans are able, not only to supply themselves with every ton that they can use, but also to come into foreign markets and undersell us. In Bessemer steel, this is still more marked, and British steel makers need not flatter themselves that they will ever receive many more orders from the other side of the Atlantic. What America is doing on a large scale to compete with us, Continental States are doing on a smaller one, notably Germany, which, by dint of intense pertinacity and losing no opportunity of adopting every scientific improvement, is frequently able to cut us out, even in our own colonies. Disagreeable as these conclusions are, we need not, however, despair; but we should, masters as well as men, drop all the old-fangled ideas as to the superiority of English resources and English skill, and remember that in those matters all the world is against us.

WE are glad to notice that the Committee on Railway Rates and Railway Administration, as affecting the trade of Liverpool, express themselves satisfied with the way in which the railway companies have responded to their appeals for reduced rates. This body has succeeded in obtaining concessions varying from 10 to 25 per cent. in the charges upon traffic conveyed to and from Liverpool. This must represent a very considerable sum per annum, and the confidence of the Chancellor of the Exchequer in the readiness of the railway companies to meet their customers appears to be justified. At the same time, this may be one of those cases in which the companies have acted from a feeling of necessity, the possibility of the Manchester Ship Canal becoming an established fact having doubtless its influence upon their decisions. Sir W. B. Forwood is chairman of the Liverpool Committee, and he considers that the rates, compared with what they were, are now very moderate. A very different report comes from Manchester, a contemporary being informed that a considerable advance has been made in the rates for carriage of castings from Manchester to London, Birmingham, and other places. The particulars given show that the rates are in some instances to be doubled, and as all recent revisions in railway rates have been in the opposite direction, the rumour is probably either very much exaggerated or altogether unfounded.

THE excavations at Epidaurus are going on vigorously, and have lately reaped a rich reward; no less than fourteen statues have been

found lying close together. Three of them represent Asklepios, and are of finer work than any as yet extant. We shall now be in a position to judge definitely of the accepted type of the god's face and features, and it may be hoped that much light may be thrown on the vexed question of the "Asklepios" of the east frieze of the Parthenon. Another statue represents Athene, and is reported to be of exquisite work. A Pan, a Kybele, and a number of heads, complete the list. The worship of Pan and the Nymphs, it will be remembered, was closely connected with that of Asklepios, the healing powers of nature being always recognised to the full by the Greeks. We can only hope that a book as full and as lucid as the "Asklepios" of M. Girard, which treats of the Athenian temple, may be written on these no less fascinating discoveries at Epidaurus.

THE *Δελτίον της Έστιας* (No. 501) further reports the discovery, a little later, during the same excavations, of three new statues, all of considerable interest. The first is a life-size figure of the type known as the Venus Genetrix, or, if we prefer Greek nomenclature, the Aphrodite Genetrix. The best known replica is that in the Louvre. Aphrodite is represented, it will be remembered, in very closely-clinging drapery, and the conjecture has been hazarded that this type may be the representation of the draped Aphrodite made by Praxiteles for the people of Cos, the counterpart, as it were, of the far more famous nude Aphrodite made for Knidos. The new statue seems to be of Hellenistic date. The second statue is a Hygieia life-size, but, unhappily, without the head. From the drapery it is judged to be of the finest period. The third statue is an Athene, a little less than life-size, also headless. Nothing is reported of the style, so we may presume that it is far inferior to the Athene mentioned above.

THE efforts, which have been for so long before the world, to turn Paris into a great seaport, appear to have made more rapid progress of late, and to be assuming some degree of crystallisation. A formal demand has been placed in the hands of the Minister of Public Works for the concession to a Society of a canal between Rouen and Paris, the said canal to be formed in the bed of the Seine, and to be sufficiently deep to allow vessels drawing 6 metres of water to approach the metropolis. The anticipated works do not seem to be very difficult or extensive, the estimate of the time required for the completion of the whole being only three years. No State subvention or promotion is asked for, but only the enjoyment by the company of those parts of the river bed which would be drained or reclaimed, and also that the State ground on which the works may have to be carried out may be given free of cost. A charge of 3 francs per ton will be made on every vessel using the canal between Rouen and Paris, and smaller rates for intermediate distances. Although the scheme does not involve any enormous expense of construction or any interference with existing manufacturing districts, as in the case of the Manchester Ship Canal, it is probable that the risk is quite as much as the future results would warrant; for, under any circumstances, it is not likely that large sea-going vessels will ascend the river higher than Rouen, and the class of business, therefore, between that port and Paris would seldom exceed that of a coasting trade. Although this particular undertaking seems to be of a private nature and origin, we have no doubt that it received a considerable impetus from the proposals made by M. Fricquet several years ago, to vastly increase the waterways of France.

THE French School at Athens have brought to a close their excavations on the site of the Temple of Apollo Ptoos at Akraiphnon, the results of their work we have from time to time chronicled. Their concluding efforts laid bare a remarkable aqueduct structure. The walls of the reservoir are still intact; it is divided into seven compartments, in one of

which water still remains to the height of eight centimetres. Near the building the heads of three statues were found,—one of marble, two of tufa.

THE excavations in the Acropolis between the Erechtheion and the Propylea still continue to yield fresh treasures of archaic art. A late and very valuable find is the head of a bearded man in bronze, of distinctly archaic style. The head is somewhat over life size, and in type is reported to approach near to the *Agina* marbles. If it can boast of the same peculiar and so far unique purity it is indeed a treasure. Up to the present time no bronze head of equal size has been found in Greece proper; the famous Olympia athlete head must now retire to the second place. Further, the discovery of a large quantity of terra-cottas is reported, some bearing artists' signatures, but of these no further particulars are given.

THE Archaeological Society at Athens has just entered on its second year's work at Oropos, on the site of the oracle of Amphiaraus. The theatre was quickly laid bare. A portion of the seats have been uncovered, and one of them has inscribed on it the name of a priest of Amphiaraus, Nikon. A beautiful stele has also been found, and its interest is greatly enhanced by the fact that it bears the name of an Athenian sculptor, Strombychos, hitherto unknown to us.

WE regret to hear that the Liverpool Corporation have refused to allow the second panel by Mr. Stirling Lee, designed for St. George's Hall, to be fixed, and it is understood that litigation is likely to arise out of the case, Mr. Lee being advised that the Corporation have not acted according to the terms of his contract with them in the manner in which they have stopped the work. From a previous very absurd discussion in the Council, which we adverted to at the time, we gather that one objection to fixing the panel is that it contains a nude figure, but we imagine that the real objection amounts to a kind of general "don't-care" feeling on the part of a majority of the Council, who do not want sculpture, and object to pay for it. An objection has also been raised against inserting marble in the walls; and there is no doubt that Elmes contemplated the actual stone, left in rough-tooled raised panels, being carved in bas-relief; but the marble would make much better and more enduring work. Sir Jas. Picton, Mr. Samuelson, and Mr. Rathbone all supported the continuance of the work at the Council meeting last week, but they and their supporters were largely out-voted. It is much to be regretted that the present municipal authorities should be so indifferent to the completion of a world-famous building, which seems now to be regarded with more interest anywhere than in the town in which it was erected.

MR. A. B. MARSTON, the editor of the *Fishing Gazette*, writes to draw our attention to the fact that the Dean of Winchester has promised to find a niche for a statue of Isaac Walton in the cathedral, "if anglers will provide the statue,"—that is, we presume, the funds. The "gentle craft" has its followers in all professions, and no doubt many of our readers will feel an interest in the idea of a monument to the guide, philosopher, and friend of anglers. If so, they are invited to express their interest in a practical form in the way of subscriptions to the "Isaac Walton Statue Fund," which Mr. Marston will be happy to receive and acknowledge in the *Fishing Gazette*. Some of our architect and artist friends, we may hint, will probably like to know what sculptor is to execute the statue, before they make up their minds to subscribe to it.

Southampton.—The new Art Society of this town will hold its first exhibition at the Philharmonic Hall from the 20th to the 22nd of October, under the Presidency of Major-General Lacy. Mr. J. C. Churcher is the Honorary Secretary.

EXPERIMENTS ON COLONIAL WOODS.

SINCE the opening of the Colonial and Indian Exhibition there have been held at stated intervals a number of conferences on subjects connected with the objects the Exhibition has been established to further. These gatherings have not been invariably a success, so far at least as attracting an audience is concerned. Last week, however, quite a new element was introduced into the proceedings, and that of a most profitable and agreeable nature. The subject of the conference was the timbers of the Colonies, and the uses to which they could be put, and the scene of operations was shifted from the unattractive theatre at South Kensington to the trial room at Messrs. Allan Ransome & Co.'s works at King's-road, Chelsea. The great advantage of holding the meeting at these works was that a practical illustration could be given of the uses to which the various woods shown in the different courts at South Kensington might be put.

What is known as the trial-shop at Messrs. Ransome's works is a large building, fitted up with the various wood-working machine tools for the manufacture of which this firm is well known. These are kept in working order, in order to give this firm's customers an opportunity of practically judging of the uses of the machines. This afforded an excellent field for the pursuit of the work in hand. The various woods were planed, turned, or otherwise shaped, mouldings being cut, sleepers recessed and bored, and a vast number of other operations, familiar to the majority of our readers, were performed.

Canada contributed four specimens, the most important of which was undoubtedly the Douglas fir (*Pseudotsuga Douglasii*). It is only lately that the district in which this noble tree is found has been opened up. It grows all through the Rocky Mountains down to the Pacific coast, and reaches 5 degrees north. Professor Macoun has stated that he found it from latitude 49 to latitude 55. The trees produce a great quantity of timber, and one has been mentioned by Professor Macoun (who, it may be remarked, is the specialist in the botany of timber trees attached to the Canadian Geological and Natural History Commission) which, out of a length of 90 ft. of trunk only tapered 6 in. The opening of the Canadian and Pacific Railway should do much to facilitate the introduction of this wood, which may well take the place of the Canadian yellow pine, should the supply of that timber show signs of failing. A feature of special interest to engineers, which has been brought forward by the experiments Messrs. Ransome have been engaged upon with these colonial woods, is that the Douglas fir swells very little when soaked in water, and is, therefore, especially suitable for pattern-makers' uses. This wood was made up before the visitors into a great variety of forms, and, to all appearance, left nothing to be desired in the way of working under the tool.

The Black or Swamp Ash (*Fraxinus sambucifolia*) was another wood that attracted a good deal of attention. The wood is suitable for building purposes, joiners' work, cask-making, &c. The swamps all through Quebec and Northern Ontario are filled with this tree, and the wood is so plentiful that it is used for burning, splitting into rails, and other common purposes. The Douglas fir and black ash could, we are told, be delivered into the English market at 5*l.* per ton.

The remaining Canadian woods experimented upon were the White Fir (*Picea Engelmanni*) and the Bitternut or Swamp Hickory (*Carya amara*). The former was worked up into a variety of forms, and is said to be of superior quality to Archangel pine,—a fact which may be true, but requires further verification. The hickory extends from Halifax to the western port of Victoria on the Pacific coast, and is abundantly plentiful. Axe-handles and other forms were being made from it. Its other uses will, perhaps, be too obvious to our readers to require enumerating.

The Australasian colonies contributed a large number of specimens, the various "gums" or Eucalypti taking a prominent place. It is difficult to know what to say about these woods. There is a plentiful supply of Eucalyptus trees in Australia is undoubted, and if we may believe the reports of our Australian friends (which, of course, we do), there appear to be few hard woods in the place of which the

Eucalypti cannot be used. Some are equal to teak for submarine work, and withstand the *teredo navalis*; others are tough and elastic; whilst another kind, though short and brittle, is admirably suited for resisting crushing strains. The beauty of many species can be placed beyond doubt by a visit to South Kensington, and, indeed, it would be difficult to name any quality, except perhaps that of lightness, which is not present in Eucalyptus wood in some or one of its many forms. On the other hand, it may be asked, how so many virtues have come to be hidden under the bushel of local consumption? And no doubt the answer would be found in the problem of transit.

New South Wales had sent several samples, but, unfortunately, the specimens were so small that they were fit for little more than small turnings. The wood Messrs. Ransome had selected as being the most economically important was the Ironbark. This wood is said to be used for carriage building, spokes of wheels, piles, and railway sleepers. The wood appeared to be very hard, and is accounted durable. The Mountain Ash (*Eucalyptus Sieberiana*) is also used for carriage building, and for wheelwrights' and coopers' work.

The Victorian woods were chiefly represented by the Blackwood (*Acacia melanoxylon*), which is used in the colonies for all kinds of cabinet-work, carriage-building, &c., and also for making casks. The Blue Gum (*Eucalyptus globulus*) and Red Gum (*Eucalyptus rostrata*) are very important timber trees in Victoria, and there appear to be few ordinary purposes to which their wood cannot be put, as we find the former mentioned as being used for beams, joists, railway sleepers, piers, and bridges; whilst the red gum is made into veneers, furniture, railway sleepers, &c. At the conference these woods were formed into sleepers, one of Messrs. Ransome's automatic chair seating and boring machines being used for the purpose. So far as working was concerned, there seemed nothing to be desired.

The leading wood contributed by Western Australia was the Jarrah (*Eucalyptus marginata*), a log of which forms so conspicuous a feature in the court of this colony at the Exhibition. It is used for joiners' work, railway sleepers, furniture, cabinet work, and piles. The wood is dense and very heavy. It takes a fine polish. At the trials it was worked up into a great number of forms, and appeared to pass through all the machines satisfactorily, although naturally not at a very high speed. The Kurri wood (*Eucalyptus diversicolor*) is another heavy close wood. It is said to be suitable for joiners' work, railway sleepers, furniture, &c. Messrs. Ransome state that it is liable to centre shakes, but if the heart be taken out when first cut, the parts between the heart and sap afford excellent material.

Amongst the samples of New Zealand wood submitted for experiment, the Kauri Pine (*Dammara Australis*) was pronounced the finest. It is very sound, and can be obtained in large pieces, and works, Messrs. Ransome say, with the greatest facility. It warps very little, and cracks hardly at all. The only thing against it here appears to be that it is grown on the other side of the world, where it is used for a very large variety of purposes: such as building, furniture-making, slack-barrels, pattern-making, and, in fact, almost all ordinary work. Three other samples of pines were shown, but the Kauri is undoubtedly the most valuable of all.

From the Cape, wood that attracted most attention was the upright yellow wood (*Kynsna*). This was made up into a large variety of forms, chiefly in planing and moulding machines, and appeared to work excellently. It is said to be very plentiful, and is suitable for joiners' work and general purposes. Sneeze wood (*Pterozylon utile*) is used for sleepers, telegraph-poles, wagon work, &c. It is also well adapted for submarine construction, not being attacked by the teredo. Stink wood (*Oreodaphne Bullata*) is well adapted for furniture-making and cabinet work. This wood quite deserves its uncompromising name; but the disgusting odour that it emits when first cut disappears after a time.

The woods of North Borneo received a good deal of attention. The Billian possesses this curious property. When first cut it is almost white, but becomes as black as ebony upon exposure. It is close grained and sinks in salt water. There is any amount of this wood along the coast of Borneo. Some other woods were

also experimented with, but those we have mentioned appeared to be the leading examples. A feature that was remarked throughout the proceedings was the facility with which the specimens worked under the tools. Of course, there are two factors necessary to gain this end, viz., good wood and good tools. It may be that the excellence of Messrs. Ransome's machines gave these colonial woods an advantage they would not always possess.

CHANGES AT SCOTLAND YARD.

It has been officially announced that the head-quarters of the Metropolitan Police are about to be removed from Scotland-yard into more commodious offices to be erected for them over the site of the prematurely deceased National Opera House, Victoria Embankment.

The name of Scotland-yard is not only familiar enough to our generation as associated with the police force, but should recall certain incidents of an important, though almost forgotten, chapter in the making of Great Britain. Further, as we shall show, it was intimately connected with the former office of Surveyor of His Majesty's Works, whose modern representative is still quartered in Whitehall-place, hard by. The site itself, once enclosed within a great wall, was formerly known as "Scotland." According to tradition, Kenneth III., king of Scots, was one of the eight vassal sovereigns who rowed Eadgar's state barge along the river Dee. The ground in question is commonly said to have been bestowed upon Kenneth by Eadgar whereon to build a residence for himself and successors upon their visits to London for the paying of homage to the English Crown. It is worth while to consider in respect of what territory this fealty was expected. For it cannot be too clearly understood that in those days much of what we now know as Scotland was in no manner Scottish: some of England had not become English. The Picts of the present north-eastern Highlands were supplanted by King Fergus I. and his bands from Ireland,—the original Scotia,—who in A.D. 330 invaded the north-western coasts of Britain.

By the tenth century we find the King of Scots, himself a Kelt, reigning freely north of the Firths of Forth and Clyde over a Keltic, that is, an Irish people, who speak in the older Gaelic tongue. But the south-western part of modern Scotland, together with portion of what is now north-western England, constituted the kingdom of the Strathclyde Welsh; their territory represented by Cumberland and Galloway. Here were ruling sovereigns of the Scots royal house, it is true; nevertheless this distinct State was as independent of the King of Scotland as of the King of Wessex. The Lothian of our day formed parcel of Northumberland, stretching from the Humber to the Forth; a Teutonic country inhabited by an Anglian race using, as they still do use, the Northumbrian dialect of English Northumberland, its people being the Sassenach or Saxons, who had owned Eogberht's supremacy and renewed their submission to Ælfred. An English claim to dominion in Scotland arose from the submission which the Scots and Strathclyde Welsh yielded in the year 934 to Eadward the Elder, son to Ælfred, whose own kingdom reached northwards as far as the Humber. With their subjects' consent the princes north of that river "chose Eadward to father and to lord." With the English kingdom Æthelstan, son of Eadward, incorporated Northumberland, including Lothian. Eadmund, Eadward's son, having conquered Strathclyde upon its revolt, granted it to Malcolm I. (944-953), father to Kenneth III. (970-994), to hold in tenure of military service by land and sea. Under either Eadgar, son of Eadmund, or Cnut the Dane, all Lothian was ceded to the Scots king, who, in Eadred's time, had acquired the great Northumbrian Bretwalda's border fortress of Eadwinesburgh (Edinburgh). Thus, it happened that Scotland proper, Lothian, and Strathclyde became associated under one sovereign, the Emperor, *ad hoc*, of Britain. A tie of purely personal commendation, to use the befitting term, connected Scotland proper with the English crown. Strathclyde formed a territorial fief: Lothian was an integral piece of England in respect whereof the King of Scotland was an English earl. Professor Freeman points out that no Scotch writer repudiates the

once vassalage of part of Strathclyde,—namely, Cumberland;—nay, it is the rather insisted upon as though thereby to weaken any pretensions to lordship over Scotland itself. In course of years the English Lothian becomes the actual kingdom of Scotland. Former distinctions melt away; and whilst the Scots kings held both royalties and private estates across the border of later England, for which homage was as legitimately due as from any English noble, it depended in effect upon the character of the Emperor of Britain whether homage for Scotland proper should be rigorously demanded or willingly rendered. This complex question came for settlement before that greatest of our sovereigns, who on his tombstone in St. Eadward's chapel, West Minster, is styled "Scottorum Mallens." "When a crowd of competitors for the Scottish Crown were eager to lay their contending claims at his feet." Appealed to as Sovereign Lord and Emperor of Britain by Robert Bruce, anterior to the conference at Norham (1291), King Edward I. received the collected claims, by first securing that his own claim to superiority should be fully admitted. "Edward put forth his claim, a good and honest claim, urged in good faith." So exercising his sceptre's pristine right he nominated John of Balliol to reign as his vassal, setting aside a tempting proposal by Bruce and Hastings for a division of the realm. But with the varying victories of Dunbar (1296), Falkirk (1298), and Stirling (1297 and 1304),—contests in which either side had right to engage,—the old relations finished, and at Bannockburn, ten years later, Scotland won her independence for ever.*

That the Kings of Scotland were for some period considered to be members of our Parliament appears from certain records, once kept in the Tower, of the issue of writs summoning them to Westminster. Pinkerton's "Iconographia Scotica" contains an engraving,—said to be copied from a limning in the College of Arms,—which delineates Edward I. seated in Parliament with King Alexander, his brother-in-law, at his right hand, and at his left Llewellyn ap Griffith, Prince of Wales. Yet no King of Scotland after William the Lion is believed to have occupied the royal palace in Scotland-yard; and in the reign of Henry II. it reverted into that sovereign's hands. The last of the Scottish royal line to occupy it was Margaret Tudor, widow to King James IV., who after her first husband's death on Flodden Field came to London. Here she was splendidly entertained by her brother, Henry VIII., upon his reconciliation to her union with the Earl of Angus. James VI., as was only natural under the circumstances, did not press his privilege to inhabit the palace, which, with his succession to the English crown, was finally deserted as a royal residence. The liberties, however, extending from Downing-street to Northumberland-street, Strand, retained their ancient immunities, as appertaining to a royal palace, of freedom from arrest and other legal processes for debt. In so much so that in later years nearly three-fourths of its inhabitants were insolvent debtors, taking refuge within the Verge of Court, as the jurisdiction of Board of Green Cloth was styled. Scotland-yard would not seem to have fallen within purview of the Statute 8 and 9 William III., c. 27, for the suppression of pretended privileged places. It continued, indeed, to afford sanctuary to debtors, under the Board's protection, until shortly before the No Popery riots of 1780.

And Scotland-yard could boast of other famous inhabitants. Milton lived here when Latin secretary to Cromwell; and here he lost his infant son, child by his first wife, Mary Powell. A book of orders of the State Council during the usurpation, contains numerous entries affecting Milton's secretaryship. One runs, under date, November 19th, 1649,—"Ordered that Mr. Milton shall have the lodgings that were in the hands of Sir John Hipsley, in Whitehall, for his accommodation, as being secretary to Council for Forreigne Languages." He removed hence to Petty France in June, 1651. Lord Herbert of Chisbury, Inigo Jones (who, with his master mason,—there were no "sculptors" in those days,—Nicholas Stone, buried his money here during the Commonwealth), Denham, Beau

* We follow Professor Freeman in the main. His arguments may be more closely pursued in his History of the Norman Conquest, vol. I., and Appendix; and in his essay upon the Relation between the Crowns of England and Scotland.—*Fortnightly Review*, June, 1867.



Sketches from the Wakefield Ecclesiastical Exhibition.—Fig. 1.

Fielding, Vanbrugh, and Wren all lived within the boundary. It was in front of Scotland-yard that Lord Herbert, as he relates in his Autobiography, defended himself from the attack of Sir John Ayres and his hired ruffians. The *causa teterrima belli* was the circumstance that Lady Ayres would wear a miniature likeness of Lord Herbert. In Scotland-yard, close to the after site of Little Fife House, Sir John Vanbrugh built for himself, from materials of Whitehall Palace, the diminutive and fantastic Gothico-Græco house, likened by Swift to a goose-pie amidst the rubbish. The subject of Dr. Evans's epitaph, which will endure as long as the buildings it ridicules, was author, architect, and—Whig. Hence the animosity with which the other party assailed him. When he was appointed Clarencieux King-at-Arms, Swift said that he might now build houses. Sir Joshua Reynolds pays warm tribute to Vanbrugh's originality of invention. After defending him from the wits, he concludes,

"His fate was that of the great Perrault. Both were objects of the petulant sarcasms of factious men of letters, and both have left some of the fairest monuments which to this day decorate their several countries, the façade of the Louvre, Blenheim, and Castle Howard." Vanbrugh, though, unlike to Perrault, was never assailed as a writer, the merits of his plays being universally acknowledged. For the best account of Beau Fielding we should turn to Steele's more gentle satire. Despite its tone of ludicrous banter he gives us, in his History of Orlando the Fair (*The Tatler*, Nos. 50, 51), a fair picture of a man whom, whilst not deficient in parts, inordinate vanity drives to the confines of insanity. Endowed with a person of singular grace and beauty, he could, as Steele says, refute ridicule by merely moving. Swift, on the other hand, holds him up to contempt in his "Great and Mean Figures." An advertisement inserted in *Salisbury's Flying Post* for October 27th, 1696, is illustrative of the times. Announcing the robbery of two gentlemen by six highwaymen at Kentish Town on the 14th *idem*, it requests that "at any rate the cane, valuable as having been the gift of a friend," may be sent to Wells's Coffee-house in Scotland-yard. The dwelling here in turn of Inigo Jones, of Sir John Denham, who, Wood tells us, got 7,000*l.* by his appointment, and of Wren, is due to the fact that the Crown Surveyor had an official residence in Scotland-yard. Pristine associations with Scotland were curiously revived about a century since. Under date, Fife House, February 4th, 1803, Lord Fife, writes to the Society of Arts, "Fife House, Whitehall, is a Crown lease. I have made two different embankments, which, with the buildings, have cost me many thousand pounds. The first embankment was made about five years after my entry on the lease, and the other twelve years after; they were made at a great expense. All the trees and shrubs planted in these embankments, as also the stones, were brought from my estates in Scotland. . . . Some of the elms planted in the first embankment measure 6 ft. 4 in. girth and above 50 ft. in height." Lord Fife was a celebrated arboriculturist, and had received the Society's gold medal for his plantations, &c., in North Britain.

The last vestiges of his house, garden, and embankments by Middle Scotland-yard have given way to the new Whitehall Court and National Liberal Club.*

Though the little that remained of the Scottish palace had long disappeared, the site maintained its connexion with the Crown in the shape of the palace court, which was established by letters patent of 1604. The judges and officers of the Marshalsea Court of the Queen's House were the same as in this. According to a "Treatise on the Police of the Metropolis," by a Magistrate [P. Colquhoun], London, 1796, the latter was a Court of Record, or Court of the Royal Palace, with jurisdiction twelve miles around Whitehall, excluding the City, for actions of debts, damages, trespasses, &c., and subject to be removed to a higher court when exceeding 5*l.* It was taken to Scotland-yard in the year 1801, and was finally abolished on the 31st of December, 1849. By the courtesy of the Receiver of the Metropolitan Police District, the writer is enabled to state that the head-quarters of that police were established in Scotland-yard at the formation of the force (under Sir Robert Peel's Act) in 1829; but that no remains of the old buildings have been found beneath any of the offices at present used for police purposes.†

Bradford Historical and Antiquarian Society.—The annual meeting of the above society was held on Friday, the 8th inst., at the Alexandra Hotel, Horton-road, Bradford. The chair was taken by the President, Mr. Councillor Empsall, who called upon the Corresponding Secretary, Mr. J. A. Clapham, to read the annual report, which referred to the flourishing condition of the society. During the session seven papers had been given upon a variety of archaeological subjects, and seven interesting excursions had been made. In the coming session papers had been promised by Mr. J. P. Pritchett, on "The Great Medieval House of Neville"; by Mr. T. T. Empsall, on "Bradford in the Seventeenth Century"; by Mr. Wm. Cudworth, on "Old Bradford Lawyers—The Bentley Family"; by Mr. Wm. Scruton, on "Early Days of the Drama in Bradford"; by Mr. John Lister, M.A., on "Gleanings from Old Halifax Life"; by Mr. Wm. Glossop, on "The Electoral History of Bradford"; and by Mons. Federer, on "Rev. Dr. Scorsby." Excursions were proposed to the two Riddleaden Halls, near Kighley, Temple Newsum, Selby Abbey and Wressle Castle, Heysham Church, Castle, and Old Hall; Settle for Folly Hall, Giggleswick Church, and the Flowing and Ebbing Well; and on Bank Holiday (August) to Corwold, Newborough Hall, and Byland Abbey. The treasurer, Mr. Wm. Glossop, gave the financial statement, showing a balance in hand of 27*l.* 13*s.* 10*d.*, besides hundreds of copies of the "Bradford Antiquary," the journal published by the society. The officers and council were elected.

* *Vide the Builder*, May 9th, 1885; December 6th, 1885; January 2nd, 1886; & ante.

† In his "Sketches by Box," Charles Dickens records, more *sic*, the changes he had known to come over Scotland-yard, and Crank drew for it the group of local coal-bearers crouching.

THE ECCLESIASTICAL ART EXHIBITION AT WAKEFIELD.

THE LOAN COLLECTION.

AMONG the interesting productions of ancient and Medieval art in this collection, some of those from the cabinets of Mr. and Mrs. Riley were the most interesting and most beautiful. The Russian silver icon, said to have been in the possession of the Stuarts, which we illustrate (fig. 1), especially, is a fine example of early Christian art. The Latin texts upon the nimbus do not appear to be original, and are scratched on the silver comparatively roughly. In the same case with this, and also lent by Mr. Riley, were two beautiful ivory diptychs, about 9 in. and 4 in. high respectively, one, certainly, and probably both, of French seventeenth-century workmanship. Each panel of the larger of these is divided into two heights, containing a crucifixion in the middle, with a conventional St. Jerome and the lion beneath, and at the sides female saints, and half-figures of male saints beneath. The drapery and air are tinted, and the whole is enclosed in a mongrel architectural framework of foliated arches, supported on quasi Corinthian columns. The smaller ivory contains in a plain framework a representation of the death of a saint, who lies upon a bed, at the head of which stands a monk, while St. Michael descends from the clouds, and with his sword drives away the devils that are whispering in the ear of the dying man, and playing round the room. In the side panels are angels, and a pilgrim with his cockle and staff.

Close to these were shown a small enamelled copper triptych, not much more than 1½ in. high, with representations of our Lord enthroned, and saints; and an ivory reliquary casket, covered with architectural ornament of a Romanesque type; and a series of heads, with much character in the faces.

In the adjoining case were exhibited a small collection of the "Baptismal Shells" brought by pilgrims from Palestine; pieces of mother-o'-pearl, carved with more or less skill to represent subjects from sacred history; and others saints and their acts. Also some powder-horns, a German one with a hunting scene; and one from Assisi, which justified its appearance in an exhibition of ecclesiastical art by bearing a rough representation of the temptation of Eve. A case on the other side of the room contained a miscellaneous collection of antiquities, among which were coins, bronze utensils, a little red Roman pottery, cones, bronze armlets and keys, fibula, statuettes, a Grecian terra-cotta lamp, and a marble slab engraved in Greek, with the words "Helpful one, farewell!"—"Farewell to thee too,"—said to be from the catacombs of Rome. Among these objects, a bronze bibcock and spanner arrested attention, in form not unlike those in use at this day, but slighter, and with a vent to allow the air to enter.

In the large wall-case in this room were exhibited the heavy silver-gilt flagons and communion plate, belonging to the parish church of Wakefield, the great weight and consequent value of which are duly appreciated by the inhabitants generally. They are entirely without ornament, and do not pretend to any grace of form.

On a shelf above these were a few interesting old silver chalices and patens; we illustrate three of the chalices which appeared exceptionally good. One of them, a very elegant cup on a slender stem, bears the inscription, "A maiden's gift, Margarine" (fig. 3), and appears to be of seventeenth-century workmanship. Another is a remarkable, nearly

fine modern ones, and a copy in electro of a very ancient specimen, which reminded one of the Chinaman's dinner service in which all the plates were cracked because his copy had been so. In this cup the dents in the original were made to re-appear. Other objects in the case were a few patens and alms-dishes, not very remarkable, and a couple of pretty little Italian

Roman lecythos, with a handle bearing a female head, were the other objects which we chiefly noted in this case.

In the adjoining room there was a large wall case of miscellaneous antiquities, among which two broken wooden figures from crucifixes and a couple of alabaster tablets representing the adoration of the magi and the presentation in the temple, seemed to have the most connexion with ecclesiastical art. In the table case in this room was to be seen a small marble head, said to be from the temple of Diana at Ephesus, and to represent that goddess herself, and standing on the table were some heavy old pewter flagons and a paten, once used as sacramental plate.

Though the exhibition was rich in embroidery, there was remarkably little that was old, a French Renaissance white chasuble of no very great artistic merit, and an Italian white frontal of very late workmanship, which had been remounted and restored, representing the greater portion of this class of work, if we except the chasuble exhibited by the East Grinstead School of Embroidery, which we mentioned last week, and a small piece of the appliqué on which we illustrate here (fig. 5).

Besides the exhibits we have particularly noticed there were large numbers of drawings, photographs, and engravings of ecclesiastical architecture, and church fittings and furniture, and some architectural designs chiefly for the decoration and fitting up of churches. There were also some painted panels for a reredos for St. Mary Magdalen's, Bradford, which, though well drawn, seemed rather too strong in colour, unless the church is a very dark one. On the walls also were a number of rubbings of brasses, some of them apparently of great interest, and we were told that there were many others for which space could not be found; unfortunately the rooms were so dark that we could not properly see many which were not very closely rubbed.

The books and missals exhibited were chiefly interesting for other than their artistic merits, and so were some doors of wood and gilt iron-work "from the bookcase of Archbishop Laud." So also, we must suppose, were a fragment of a Purbeck marble column and some other of the numerous exhibits which we have not space to mention.

THE LION IN HERALDRY.

The lion has always been regarded as the embodiment of courage and generosity, the type of power and dominion, and from the earliest records of history men have assumed to themselves leonine virtues by adopting the monarch of the brute creation as their standard. The Lion of the tribe of Judah will occur to many of our readers in illustration of this, and in the dawn of heraldry no other animal was thought worthy of being represented on the warrior's shield, and prior to the thirteenth century hardly any device but this one existed as an armorial bearing.

The ingenuity of the heralds was greatly exercised to keep pace with the demand for so many different coats of this nature, and hence we have the lion depicted in a variety of attitudes, as rampant, salient, combattant, passant, sejant, couchant, dormant, and so forth, and even as coward, representing him as running away with tail between his legs, and showing every sign of terror.

But in time all these different postures were exhausted, and then people began to adopt parts of lions as bearings, such as paws, legs (or jambs), heads, and even tails; and then strange combinations were sought for, and the effects were half-fish and half-lion monstrosities, and sometimes the king of the forest appears with two tails, three bodies, or even as a demilion. Proud as we may be of our own "Lions of England" in the Royal coat and of the wide dominion under their banner, we must not forget that each one reminds us of a territory now lost to us,—the first, Normandy; the second, Maine; and the third, Aquitaine.

Shields of arms have been assumed for all our monarchs since the Conquest, but not until the reign of Richard I. have we any evidence to show, and then we get the best of all evidence in this monarch's great seal, and thus for seven centuries have England's quarterings remained unaltered, with the three lions passant guardant, as thereon represented,



Fig. 2.

Fig. 3.

Fig. 4.



Fig. 5.

straight-sided cup with a cover (fig. 4), of rude workmanship, and bearing hall marks showing it to have been made at York. The third is also peculiar in shape, being very thick and stunted (fig. 2); all are small compared with most modern cups of the kind, and looked quite diminutive beside the gigantic Wakefield flagons. Beside these were other old chalices almost as interesting, several

silver lamps. On a lower shelf were a small wooden reliquary cross, inlaid with mother-of-pearl, engraved with a figure to form a crucifix, the drawing very stiff and conventional. Also a small bronze enamelled crucifix, of Russian workmanship, and a small china censor with bronze mountings, also Russian. A bronze sanctus bell engraved with rural scenes, and with a good deal of raised ornament, and a

To most things there is a comic side, and nothing funnier in heraldry was ever perpetrated than the spectacle of a golden lion sitting on a chair, and holding a battle-axe of silver; and such were the arms attributed to Alexander the Great by the quaint imagination of Gerard Leigh.

When James I. ascended the throne of England, a battle royal was fought between the heralds north and south of the Tweed on behalf of their respective lions, which ended in what is commonly called as a draw by the Scotch coat maintaining the first place in the shield on its own ground and the English one a like position when the border was crossed for English territory, thus reversing the quarterings for each country. Sir William Segar produced a learned treatise on spurious heraldry on this occasion.

Our Welsh neighbours show in their national shield four lions passant guardant counter-charged (the shield itself being quarterly gules and or) for South Wales, and for North Wales "three lions passant guardant in pale gules, their tails passed between their hind legs and reflexed over their backs" on a white shield. It is to be regretted that these Welsh lions have never been incorporated in our Royal arms, and taken their proper position amongst their English and Scotch brethren.

Planoët is of opinion that William, Earl of Gloucester, was the earliest bearer of the lion as an armorial device. He died in 1182, and his seal comes down to us with a fine representation of the imperial beast.

We may just add that however grotesque and far-fetched was the early representation of the lion in heraldry, its chief attribute of strength and lionness was most faithfully presented, and whether it was shortened or lengthened to fit the shield, this characteristic was ever conspicuous and unmistakable.

John Lion was a Chancellor of Scotland in the thirteenth century and in high favour with King Robert, whose daughter Elizabeth he was allowed to marry, and his descendants in token of this royal alliance assumed the Scotch shield, but the field black for a difference, a most historic and interesting coat.

It is presumed that the Scottish lion was derived from the arms of the old Earls of Northumberland and Huntingdon, from whom some of the Scotch kings were descended, and that the double tressure with the fleur-de-lis by which it is surrounded records a trace formed with Charlemagne, and means that France undertook to protect Scotland from her enemies.

The winged lion of Venice forms a most picturesque heraldic bearing, with crown on head, surrounded by a nimbus of gold and holding in his dexter paw a sword with the sinister one placed upon an open book.

Our Welsh neighbours are well known for their love of ancient arms and lineages, and Matthew Carter records that a lion "passant guardant gules" was the coat armour of Roderick the Great, Prince of Wales in the year 843. "By which account," says this quaint chronicler, "coat-armour hath gained a great antiquity."

The lion dismembered has the tail, head, and paws cut off, but placed so near to their natural positions that the outline of the animal remains indicated. The Matildas bear the Scotch shield with this difference, probably as a grant of services rendered to the Throne.

When more than three lions are borne upon a shield they are technically known as lioncels, and invariably represented rampant.

William Longspée (or long sword), Earl of Salisbury, who died early in the thirteenth century, bore six lioncels on a field azure. Another ancient example and a very fine one is the shield of De Bohun, Earl of Hereford:—"Azure, a bend argent, cotised between six lioncels or."

The lion first appears as a royal crest upon the great seal of Edward III., but standing on a helmet instead of a crown, as it now appears.

As a royal badge the white lion of March was a favourite one with Edward IV.

Supporters are said to have been introduced by Edward III., to whom are assigned a lion and falcon for that purpose; but the evidence is weak, and we have no authority worth naming till the reign of Henry VI., who assumed two antelopes argent, and sometimes substituted a lion for the dexter one; the earliest record of the royal beast so placed.

THE FOUNDER OF THE IRON TRADE.

THE opening address of the President of the Manchester Association of Engineers (Alderman Bailey), delivered on the 9th, gives an interesting sketch of the life and labours of John Wilkinson, who called himself, and not without justice, "the father of the iron trade," and who was the maker (about 1750) of the first iron boat, which was constructed to carry peat along a canal cut for it. The following extract from Alderman Bailey's historical sketch will be of interest to a good many of our readers:—

"Will that swim?" said an indignant local blacksmith, as he threw a horse-shoe with some violence into his water-trough, on being told that John Wilkinson was engaged in making an iron boat. The first boat was made at Wilson House, in Cartmell parish.

John Wilkinson was in partnership with his brother and father, their chief business being in the manufacture of flat-irons for smoothing linen. It is related that John's father bought his iron in the molten state, by the ladleful; it was then carried across the high road to the small foundry, and there run into these smoothing-irons.

The Wilkinsons prospered, business increased, for John invented the box iron with its inside heating-piece. They erected more extensive works in the neighbourhood, engaged themselves in smelting the rich hematite ores, or what was then called Furness iron. The furnaces were at Nelson House, near Linsal, in the parish of Cartmell. They used the peat and turf of the district for fuel, and to get a proper supply of this to the furnaces John Wilkinson designed a short canal, which was cut through the turbarry, and the iron boat was constructed, which not only excited the emotions of the astonished village blacksmith, but also created great astonishment along the whole country side.

This first small iron boat at Cartmell was succeeded by others made by Wilkinson. The pioneers of inland navigation were at work, pamphlets were written, folios were printed to show how the wealth of the country might be increased by a proper system of inland navigation. The Duke of Bridgewater, Bradley, Telford, and other enterprising men had created these waterways, the Manchester and Worsley Canal was being initiated, the Birmingham Canal had been finished, and the great Staffordshire Canal ran not far off Wilkinson's furnaces.

Wilkinson had heavy contracts and the boat builders were very busy supplying these new canals with boats, but the Arts of Peace and the Arts of War created a great demand for John Wilkinson's manufacture. He obtained the contract for the Paris Water Works, which included all the pipes, tubes, cylinders, and iron work for that enormous undertaking, and which was considered the greatest of its kind of that day. His friend, James Watt, having designed the steam-engine, and Wilkinson not being able to get boats of wood to convey the materials for the above contract, determined to design boats of iron to go down the Severn and the canals. He was also busy smuggling cast-iron guns 4 ft. long into France. These were consigned under the name of water piping, sometimes merely as metal water-pipes, to be re-cast into guns when they got to France. They were taken from Willey by means of a cast-iron tramway to the banks of the Severn.

The next iron barge that was made was called the *Trial*, and, according to the record of the day, Wilkinson set to work building this at Willey with John Jones as chief smith, John O'Lincoln he was called. During the spring of 1787, John O'Lincoln's hammer and bands were busily engaged fastening plate after plate, and many jokes were cracked by the passers-by in terms considered very expressive by that class of men in those days, and sometimes even indulged in by men who have a famine-stricken vocabulary.

The *Trial* was finished in 1787, and a great crowd came down to witness the launch of the iron barge. As a chronicler of the time says, "The woods wore their summer foliage, the sun sent down approving smiles, and the Apley rookery, disturbed by the incursive visitors, furnished a hovering cloud of sable spectators, the plodding ploughman left his task, the artisan his shop, the pedlar his pack, and swarms of sturdy yeomen from vale and upland, dell and dingle, came pouring down to witness the novelty of the launch. 'Will she swim?' 'Will she work and prove manageable on the water, and who will he get to work her?' were

questions that served to occupy the time. Never did son of Vulcan look more proud than John O'Lincoln: if his descent direct from the patron god had been made out and patented, he could not have felt more so. A discharge of thirty-two pounders told that all was ready, and before the white curling smoke had well died away, the newly christened *Trial* descended the way-pieces into the river with splash."

The following is Wilkinson's account of the event in a letter to Mr. Stockdale:—
"Broseley, July 17th, 1787.

Yesterday week my iron boat was launched. It answers all my expectations, and has convinced the unbelievers, who were 999 in 1,000. It will be a nine days' wonder, and then be like Columbus's egg."

Wilkinson went on building other barges. In a letter dated Bradley Iron Works, 20th October, 1787, he says:—

"There have been two iron vessels launched in my service since September 1st, one is a canal boat for this navigation, the other a barge of 40 tons for the River Severn. The last was floated on Monday, and is, I expect now at Stourport with a loading of bar-iron. My clerk at Broseley advises me that she swims remarkably light, and exceeds even my own expectations."

The *Universal Magazine* for that year says:—"November 8th, an iron vessel built by John Wilkinson was lately launched at Willey Wharf. She is perfectly tight, moves very easily on the water, and draws about 8 in. with every accompaniment on board."

The *Gentleman's Magazine* of the same year had a similar notice. Others caught up the idea, and iron barges have been common to the Severn ever since. In 1810 John Onions & Son, of Broseley, built a lighter at Brierley, which was sent in parts to a Mr. Bishop, of London, which I believe was the first iron vessel on the Thames.

Wilkinson made many experiments in coking coal in closed ovens for the purpose of extracting oil, and also for producing coke. It seems that Lord Dundonald afterwards carried on this process at Callicutta, not far from Wilkinson's works, and it is not known whether Wilkinson or Lord Dundonald was the originator. Dundonald as a boy studied chemistry under his uncle at the Tuckies, near the Severn. As Admiral Dundonald he was known afterwards as the last of our old sea-dogs, and it is supposed that from these studies he gleaned information which enabled him to propound to the Government of the day a plan for the destruction of the Russian stronghold.

Wilkinson's experiments with what were called "stew-coal-ovens" enabled him to drive off the gas from the coal, and to distil therefrom the tar. He obtained about 4 lb. of tar from every hundredweight of coal, and from this product oils were again extracted, and various of some value for the purpose of jannapening. Every gallon of tar that he made was found to produce half the quantity of volatile oil, whilst the residuum was pronounced to be equal to the best asphaltum. The process consisted in conveying the liberated gases from the ovens by means of flues into funnels built of bricks supported by arches, and formed into gutters for the conveyance of water. The water was required to condense the tar, which, falling to the bottom, was conveyed by pipes into a reservoir. From this it was pumped into a large boiler, and then brought by heating to a proper consistency, according to requirements.

It is said that he sold great quantities of this product for the use of the British Navy.

He had almost invented illuminating gas before Murdoch, who was busily engaged at that time in his small experiments in Cornwall. The gas that Wilkinson made served all the purposes except that of illumination, for by reason of his not making provision for it to escape in sufficient quantity, it would take fire and explode, and blow out all the heavy masonry round about and destroy the apparatus.

Wilkinson also made many experiments in connexion with the hot-blast for furnaces, especially with a method for re-melting old slag. We are told that it was customary at that time, as even it has been down to a recent period,

"The maker's matter-of-fact way of recording the success which so astonished the multitude is very characteristic; but it is curious that, even in those days, so many people should have been sceptical about an iron boat floating, when many of them must have seen for themselves that a metal pot or saucepan would float on water.—Ed.

—to use pipes made of leather for conveying the hot-blast into the tybers, but their use had to be discontinued because of being scorched. Long before the hot-blast was re-introduced as a discovery, pipes of metal, sliding one into another, telescope fashion, were used. He invented the double-acting blowing engine, copied no doubt from the cylinders which he made and bored for the firm of Boulton & Watt.

Coal-getting machines were designed by Wilkinson; these he gave the name of "iron men." It is said they answered the purpose for which they were designed, viz., that of cutting the coal on both sides from top to bottom after they had been holed. They were used at Bradley and Brosely, but at both places the colliers refused to set up the props and to gather the coal after the "iron men" had worked it, arguing that if Wilkinson's "iron men" did the one they must do the other.

The First Iron Bridge if not actually designed by Wilkinson, was to a very great extent the production of his constructive genius. This bridge was cast at Coalbrookdale and erected in the year 1779. It has a span of 100 ft. 6 in., and weighs 370½ tons. It was proposed to put a bridge across the Severn to connect the Madeley and Brosely banks of the river, and Wilkinson at once proposed that cast-iron should be employed for the purpose. Wilkinson was declared to be iron mad. He was a large shareholder and a wealthy man of the neighbourhood, and it was decided at last to carry out his suggestion. Wilkinson received the co-operation of Abraham Darby and others. This iron bridge was the first of its kind. It was deemed when erected as a great triumph of enterprise, skill, and unique engineering.

Those who are familiar with the troubles and difficulties of James Watt in bringing out his steam engines will probably recollect that many of the difficulties of the firm of Boulton & Watt ceased when John Wilkinson adapted the machinery, which he had used for boring cannon to the boring of engine cylinders. He not only designed proper boring tackle for James Watt, but the first engine made at the new works, Soho, was one ordered by John Wilkinson to blow the bellows of his iron works at Brosely. We are told that this new engine created a great sensation. It was erected about the beginning of 1776. Wilkinson found that Watt had given him what he wanted to blow his furnaces, and that he had placed at his disposal a power capable of the nicest, and, at the same time, the most stupendous operations.

This engine was not coupled up in a direct manner to the bellows: it was simply used for pumping up the water to the pool dams to propel the great water-wheels. Most of the first engines in that neighbourhood were used ignobly to assist the water-wheels, the water supply being pumped back from the tail race.

The new steam engine, in the same way, played second fiddle at Coalbrookdale, Willey, Brosely works, and at those of Bentrall, belonging to Squire Harris, and others of that district.

James Watt had a very high notion of Wilkinson's abilities. In looking over the correspondence with his cashier and his managers, I have been very much impressed with the firm grasp Wilkinson seems to have had of his business, and of his careful attention to the most minute details. There are instructions for book-keeping, instructions for the mixture of metal, and in one letter he gives the most minute details of the proper amount of malt, hops, and sugar for the brewing of ale for his workmen employed in his lead and iron works.

Wilkinson joined with Watt, Boulton, and Wedgwood as large shareholders in the Cornish mines.

James Watt sent his son to Mr. Wilkinson's ironworks at Bersham, "where he has also to study practical book-keeping, geometry, and algebra; and he has also," according to the letter of James Watt, "to work three hours a day in the carpenter's shop. I intend that he should stay there a year; I am glad I am able to send him to Mr. Wilkinson's ironworks, as it will fit him for some employment not so precarious as my own." It will be evident from this, that although Watt was busy booking orders for his steam engine, and had been at work, and remarkably successful with them, for over ten or twelve years, yet he seems afraid to let his own son learn the business.

He is evidently doubtful of his own success: and this was in the year 1784.

Boulton in speaking of Wilkinson in one of his letters, says:—"They are all frozen up, and were it not for Wilkinson's steam mill, the poor nailers must have perished; but his mill goes on rolling and slitting ten tons of iron a day, which is carried away as fast as it can be bundled up, and thus the employment and the assistance of these poor people are secured."

Wilkinson was wont to say, more is done by scheming than by working, and when a scheming fit came over him it seems he would go to bed, and, to prevent his falling asleep, he would hold an iron ball in his hand over a copper basin, so that if he caught an idea, and he fell asleep before he had worked it out, the ball would fall into the basin and make a noise and awaken him.

Under Pitt's administration of 1784, the finances of the country were in a bad state, and it was proposed by certain legislators to make times good by making commodities dear. It was about this time or a little before, that the law was passed which gave a premium for every sack of corn that was sent out of the country when corn was below a certain price, a clumsy method of increasing the value of the quarter loaf for the benefit of corn-growers. This new scheme was to lay a tax on coal, iron, and copper. Wilkinson, Watt, and Wedgwood took alarm. The serious gravity of this measure is probably more apparent to us, as engineers, than it would be to many in those days. Wilkinson went with a deputation to London, and urged Pitt to withdraw the Bill. He pointed out that the cheaper English iron, copper, and coal are, the less likely are foreign people to engage in the trade; "keep down the price of iron and coal and the Frenchman will never engage in it."

He took an active part in resisting the attempts to pass a law to make book debts liable for interest, and showed how it would check enterprise and place the commercial classes at the mercy of the landlords, who always would be paid in full; and in talking about his interviews with Pitt, he would laughingly say, that although he himself, besides knowing as much of the iron trade as any one, and besides that being cram full of statistics, he found Pitt knew quite as much about the iron trade as any of the deputation.

The annals of Cartmel, by James Stockdale, gives an interesting account of John Wilkinson, who made an engine for Mr. Stockdale's grandfather from the designs of Watt. Details are given of this engine with an account of the method of payment by royalty, in a letter written by James Watt, to raise eight cubic feet of water per second, 20 ft. high, required from 184 lb. to 200 lb. of good coal per hour when going at twelve strokes per minute, the premium to be reckoned at 184 lb. of coal per hour, equivalent to about 33 cwt. per day, as a common engine will burn three times as much, —I suppose by common engine was meant the single-acting Newcomen type,—the total saving would be 22 cwt. per day, which at 12s. a ton comes to 13s. 2½d. per day, or, for 14,400 strokes, that being at the rate of 9s. 2d. for each 10,000 strokes, and this was the royalty charge payable half-yearly by the index counter fixed on the beam; the cost of the engine was about 1,000l.

When this engine was fixed at Carke, the noise it made was so great that it could be heard at Newton, five miles away. It is said of one in Cornwall, which created such a din as to be intolerable to the men in charge, who, on trying to make it work quieter, the proprietor would not permit, as he observed the noise it created was in proportion to the power it exerted.

About the year 1765, John Wilkinson built a house on the north side of Castle Head Rock, which is a mountain of limestone on the river Winstar, in Cartmel, a most interesting account of which as a stronghold of the ancient Britons, Romans, Saxons, Danes, and Norwegians, will be found in the "Annals of Cartmel," by Mr. James Stockdale. The mansion built by Mr. Wilkinson is now in the occupation of Mr. Edward Mucklow, to whom I beg to take this public opportunity of thanking for the assistance he has rendered me in the old iron master. When the Wilkinsons built this house it was covered with a novel roof made of copper, which did not answer well, as a lead one had to replace it. The bare

rock was covered in almost inaccessible places with rich soil which had to be carried up on horseback, and the barren waste was converted into beautiful grass, shrubberies, ferneries, and luxuriant floral life. In making these alterations many old coins, rings, and flint instruments of antiquarian interest were discovered, about which his brother-in-law, Dr. Priestley, wrote a very interesting description.

The men who met at Castle Head when John Wilkinson was in his prime were those whose names will be forever identified with intellectual achievements of that period. Members of the Lunar Society met round his board, sometimes they met at Dr. Priestley's house at Soho, and sometimes at Boulton's, and then at James Watt's. It was called the Lunar Society because their meetings were held when the moon was at full. Wedgwood, the potter; Franklin, famous for his experiments with lightning and electricity; Murdoch, of gas-lighting celebrity; Dr. Parr, Sir Joseph Banks, Sir William Herschell, Baron Reden, and other earnest labourers in the field of science and art, lovers of the true and the beautiful, were members of this brilliant coterie.

At Carke, in the neighbourhood, the inn had over the door a perfect facsimile of the first engine made by John Wilkinson from Watt's design. Steam engines in those days were called fire-engines, and that was the name of the inn; it was there until a very recent period; indeed, only within the last twelve or fifteen years, when the tenant, having to make alterations, caused the sign-board to be removed. As it was a fine-grained mahogany it was made into a table, now in the possession of a family in the neighbourhood.

John Wilkinson's father was a labourer, and John had very little education. By the power of original genius and hard work Wilkinson became a very wealthy man, and was justly entitled to the position he always assumed as the "Father of the Iron trade."

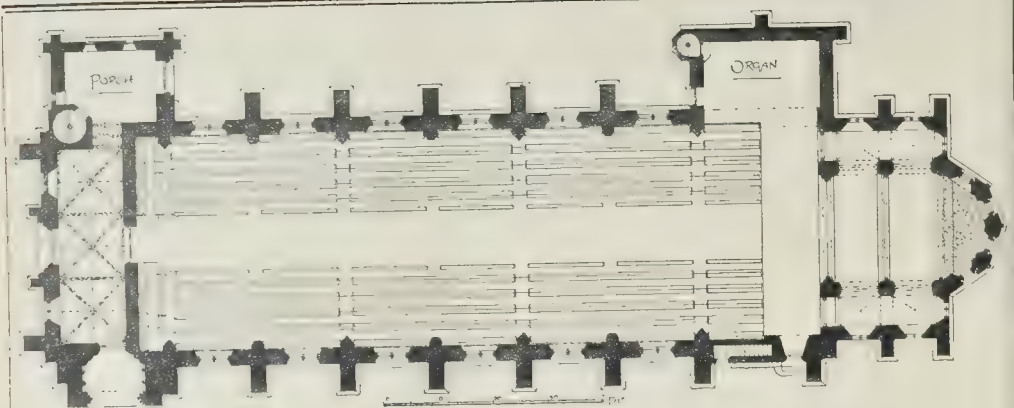
A grand banquet was given to him when he finished his contract of the Paris Waterworks, in which his achievements as an engineer were eloquently described by the delighted Frenchmen. He said that if the Frenchmen gave over the fiddling and dancing, and took to engineering, Englishmen would have to look to their laurels.

In the latter years of his life he lived at Castle Head. He prepared his coffin and the large cast-iron pyramidal tomb, which I have mentioned, and gave instructions as to the manner of his funeral. He died in the eightieth year of his age, on July 14th, 1808, and was buried in his garden at Castle Head; but the estates having been sold, the body was afterwards removed and buried in a grave in consecrated ground, within the very beautiful snow-white chapel of Lindal, in Cartmel.

THE ARCHITECTURAL ASSOCIATION CONVERSAZIONE.

THE opening *conversazione* of this vigorous society, which has done such good work in the past in educating our young architects, was held this year in the rooms in Conduit-street, where architecture is so much at home. Of late there has been a tendency on the part of the Association to go elsewhere for a change when keeping holiday, and for several years the *conversazione* has been held at Prince's Hall in Piccadilly. But since the great crush on a certain *conversazione* night the numbers attending the meeting have sensibly diminished, and, except in the great gallery where the concert was held, the rooms last week were not inconveniently crowded at any time. The President's opening speech, which used to be a chief feature of the entertainment, has now been abandoned, for, notwithstanding the interest which these often clever addresses had for the members themselves, they had come to be considered a bore by the ladies, and an almost intolerable nuisance by the unfortunate presidents themselves.

The actual entertainment this year consisted chiefly of a capital concert held in what is known as the large gallery, which was filled with seats and densely packed with listeners from quite early in the evening, so that for a long time it was very difficult to get in to see the exhibits on the walls. In the concert, following a selection of popular airs played by the band of the 2nd Life Guards, the chief performers were Miss Mary Morgan, Miss Edith Touzeau, Mr. W. H. Brereton, Mr. Harold



New Chapel, Marlborough College.—Plan.

Savery, and, at the piano, Mr. F. R. Kinke. Mrs. Dyke accompanied the songs.

In the interval between the parts of the concert Mr. Cole A. Adams, the popular president of two years ago, gave a series of dramatic sketches which were exceedingly amusing, that which called forth the greatest applause being the last, a sketch of a French play as it probably appears to the majority of an English audience, who can understand but solitary words and phrases at not very frequent intervals.

The evening was an exciting one for the numerous competitors for the prizes given by and through the Association, for the names of the prize winners were made public for the first time by a list posted at the entrance, of which the following is a copy:—

The A. A. Travelling Studentship (20l. to travel for five weeks and medal).—1st, R. W. Paul, 2nd, St. J. E. Lee.

Admirable Travelling Studentship. Not awarded.
The A. A. Medal and Ten Guineas.—W. A. Webb. Honourable Mentions: H. P. B. Downing, W. H. Raffles, W. F. Kelsey, R. H. Gordon.

Essay Prize (Ten Guineas).—H. F. Mallet. The judges suggest that an extra medal should be given to T. L. Worthington. Honourable mentions: A. B. Mitchell, T. E. Key, H. Wilson.

The Architectural Union Company's Prize (6l.).—H. J. White; 2nd, 2l. 10s., J. M. Brooks.

Elementary Class of Design. Section I.—1st, 2l. 2s., H. S. Wood; 2nd, 1l. 1s., H. G. Lidstone. Honourable mention, L. Jacob.

Elementary Class of Design. Section II.—1st, 2l. 2s., A. D. Yeates; 2nd, 1l. 1s., H. S. Wood. Honourable mention, B. M. Southall.

Elementary Class of Construction.—1st, 3l. 3s., B. M. Southall; 2nd, 2l. 2s., F. C. Agutter.

Class of Design.—1st, 3l. 3s., B. A. Rix; 2nd, 2l. 2s., E. F. L. Seaman.

Class of Colour Decoration (3l. 3s. and Mr. Vacher's Prize).—H. Wilson.

Class of Construction.—1st, 3l. 3s., C. O. Winmill; 2nd, 2l. 2s., B. A. Rix.

Advanced Class of Construction (3l. 3s.).—J. Hudson.

Class for the Study of Quantities and Specifications.—1st, 3l. 3s., E. J. Cooper; 2nd, 2l. 2s., J. Hudson and B. Potter sq.

Sketch-Book Prizes.—Title page, 5l. 5s., G. G. Woodward. Two transfers, 4l. 4s., S. Vacher. Three plates, 3l. 3s., G. J. Oakeshort.

Lectures in connection with the Classes of Design.—1st, 3l. 3s., B. M. Southall.

Lectures in connection with the Classes of Construction.—1st, 3l. 3s., T. C. Agutter; 2nd, 2l. 2s., W. D. Gravel; 3rd, 1l. 1s., B. F. Fletcher.

At the next meeting the several prizes will be presented to these gentlemen, who, judging from the fine collections of drawings on the walls, have well earned them. We noticed especially some of the designs for a village church, several of which we should very much like to see executed in place of some that are being built in different parts of the country. The collection of drawings exhibited by the Colour Decoration class was also particularly good; and, above all, Mr. R. W. Paul's clean, neat, and telling sketches were worth close study.

Besides the students' drawings, the rooms were well filled with objects of interest. In the Institute Library was a collection of Mr. Robinson's photographs and a quantity of German Medieval wood-carving, among which a diptych representing the "Adoration of the Magi" was especially noticeable. There were also some beautiful water-colour sketches by Mr. R. P. Spiers, and a terra-cotta panel by Mr. Tinworth. In the Institute meeting-room, all the Institute rooms were very kindly lent

for the occasion,—was some furniture and metal-work by Mr. Longden; and in the Council-room a magnificent collection of Dr. Salviati's delicate Venetian glass, some metal-work by Messrs. Hart, Son, & Peard, and some very fine tiles and pottery by Mr. Wm. de Morgan.

Downstairs in the large gallery were materials for curtains and hangings and wall-papers by Mr. Wm. Morris, and some of Messrs. Jeffrey & Co.'s papers designed by Messrs. Walter Crane, Lewis F. Day, Sydney Vacher, and others of our best decorative artists. Also an exhibit of metal-work by Messrs. Vorty, and a further collection by Messrs. Hart, Son, & Peard. On the walls of the smaller gallery were some of Messrs. Woollams & Co.'s wall-papers, a fine piece of plaster frieze by Messrs. Jackson, some beautiful wrought ironwork by Mr. Alfred Newman, and some other good decorative materials.

The members, if we may judge by the general good humour of all, spent a very pleasant evening, though it was somewhat marred by the absence of the President, Mr. J. A. Gotch, who telegraphed to say that he had met with an accident and could not be present.

Illustrations.

NEW CHAPEL, MARLBOROUGH COLLEGE.

WE give this week an interior view and a plan of the new chapel at Marlborough College, designed by Messrs. Bodley & Garner, which has replaced that built nearly forty years ago from the designs of Blore. As will be seen, the plan is what may now be called the accepted college chapel plan,—a one-aisled chapel, with an ante-chapel, narthex shape on plan, stretching across the west end. The general character of the work is, as will be seen from the view (reproduced from a pencil drawing lent by the architect), pure Gothic reproduction, a form of modern architecture (or ancient architecture) in which the architects of this chapel perhaps have hardly their equal among their contemporaries at the present moment. The windows are by Messrs. Clayton & Bell and Messrs. Morris & Co. The stone-carving has been done by Mr. McCulloch, the figures by Messrs. Farmer & Brindley, the wood-carving by Mr. Wilmut (of Bristol), the decorations by Mr. Powell (of Lincoln). The builders were Messrs. Stephens & Bastow. The cost of the whole has been about 30,000l.; and the Master is inviting contributions from Old Marlburians and others who are interested for some further work,—a lectern, some additional stained-glass windows, &c.

The paintings in the panelling over the seats are, we understand, a series of pictures by Mr. Spencer Stanhope, which were painted before, and now transferred to the new chapel. We should have preferred that English boys should see before them in chapel something more manly than Mr. Spencer Stanhope's weak and superstitious sentimentalities; but we suppose that is not our business.

[SALTSKÖG, NEAR STOCKHOLM.]

This illustration shows a country-house for Herr C. F. Liljevalch, of Stockholm.

The site,—the edge of a plateau above which the hill rises again,—commands extensive views to the south (the elevation shown in our illustration). The principal rooms are of course placed with this aspect.

The house is built entirely of timber, on a basement of granite, after the manner of the country, except, of course, the chimneys, which are of brick, stoves being used throughout instead of open fireplaces; there is a large brick oven attached to the kitchen.

The exterior face is covered with inch weather boarding, coloured bright red; the barge-boards, architrave, strings, &c., are stained a grey black, the casements being white. The roof is covered with grey green slates.

The hall and dining-room, shown in the small sketch, are divided by a movable dwarf screen, and can be converted into a saloon 26 ft. by 38 ft., the landing of the staircase across the northern end projecting to form a minstrel's gallery; the woodwork here is painted and flatted with a frieze of Japanese paper.

The work is being carried out by local workmen, from the designs and details of Mr. Howard Ince, from whose drawing in the recent Royal Academy Exhibition our illustration is taken.

HOUSE AT OTFORD, NEAR SEVENOAKS

The illustrations show the ground-plan, the south or garden front, and the west or entrance front of this building, which is being erected on a fine site near Otford, and overlooking an extensive tract of country. The nature of the site,—a very sloping one, rendered it necessary to extend the building lengthways without giving it extreme depth and the plan has been arranged to suit this condition.

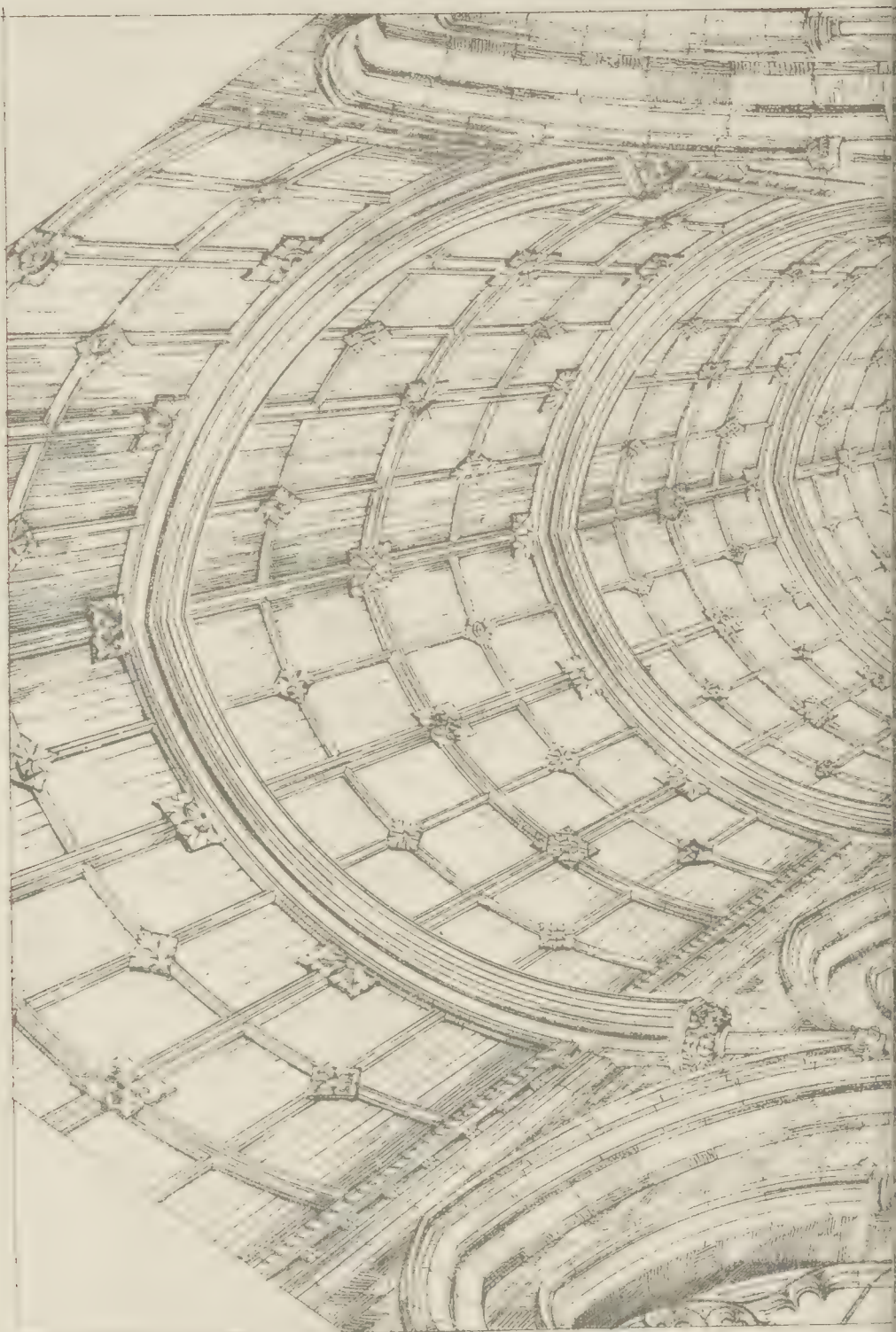
The materials being used are red bricks with terra-cotta dressings, and a certain amount of half-timbered work in the upper parts of the building. The roofs are tiled, and the general treatment is rich without extreme elaboration.

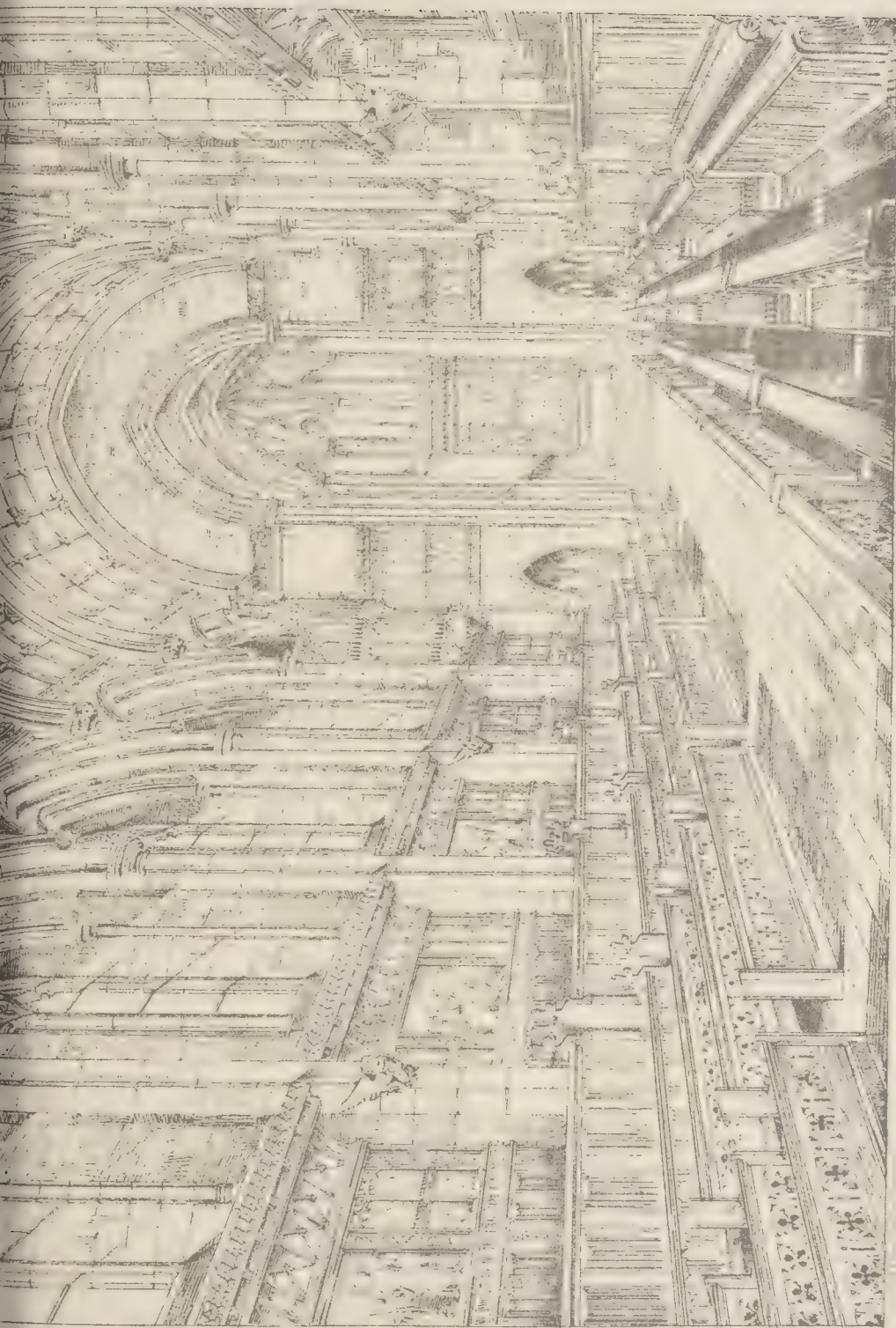
The general contractor is Mr. A. Bush, of Gower-street, who is also building the stabling. The clerk of works is Mr. James Redden. The architects are Messrs. Roger Smith and Gale. The house, stables, and out-buildings are to be lighted with electric light by the Edison and Swan Company.

Otford is a place of some note, having been for many years,—at least as far back as the fourteenth century,—a residence of the archbishop of Canterbury. Their palace here was rebuilt at great expense by Archbishop Warham, and was occupied by Cranmer to Henry VIII. The manor remained in the hands of the Crown till the death of Charles I. A few fragments of the building serve to mark the site, which is a mile away from that of the new building and down in the valley, while the new site is on the breezy slopes of the chalk hills.

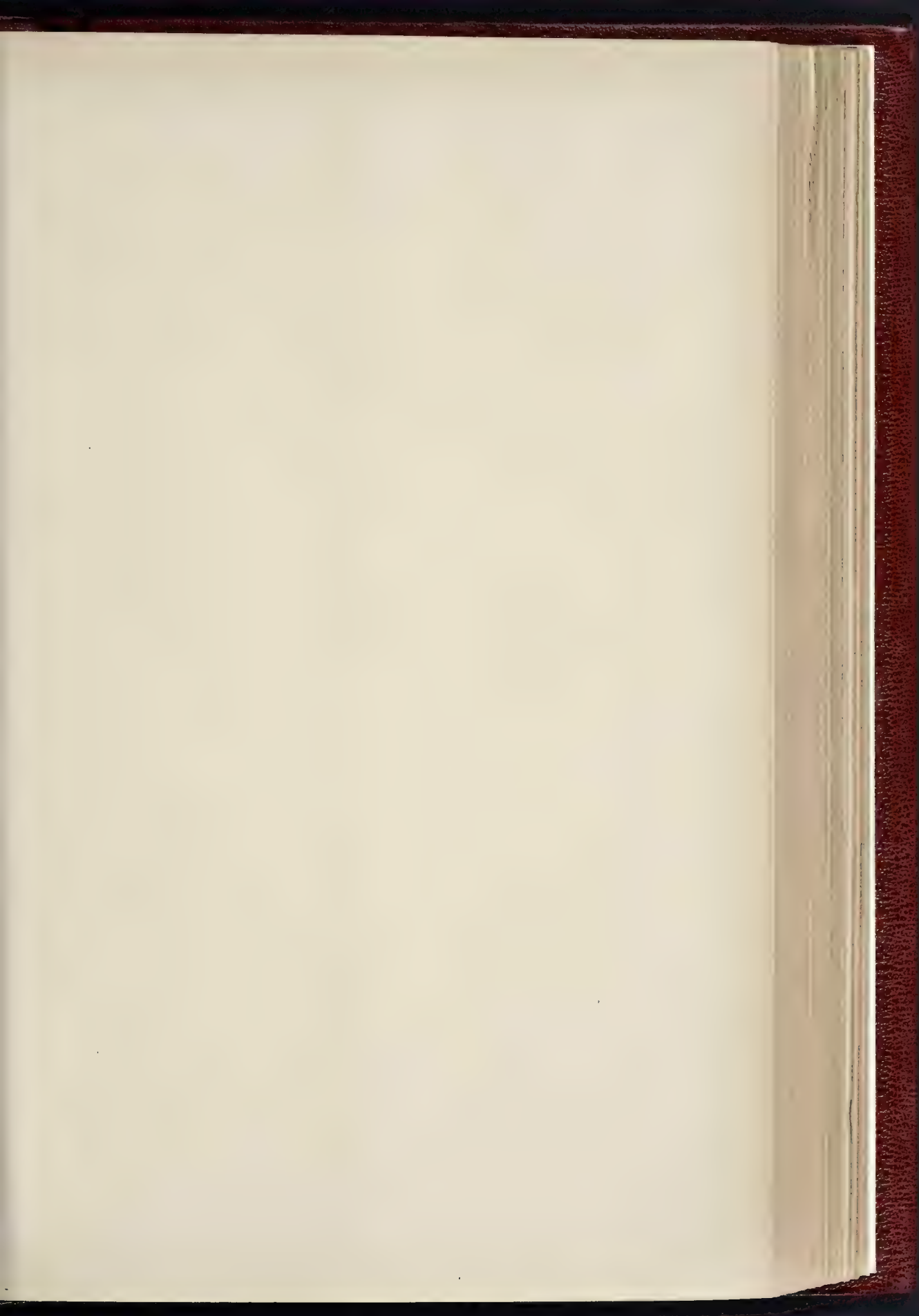


THE RINDER (1700-18, 1800)

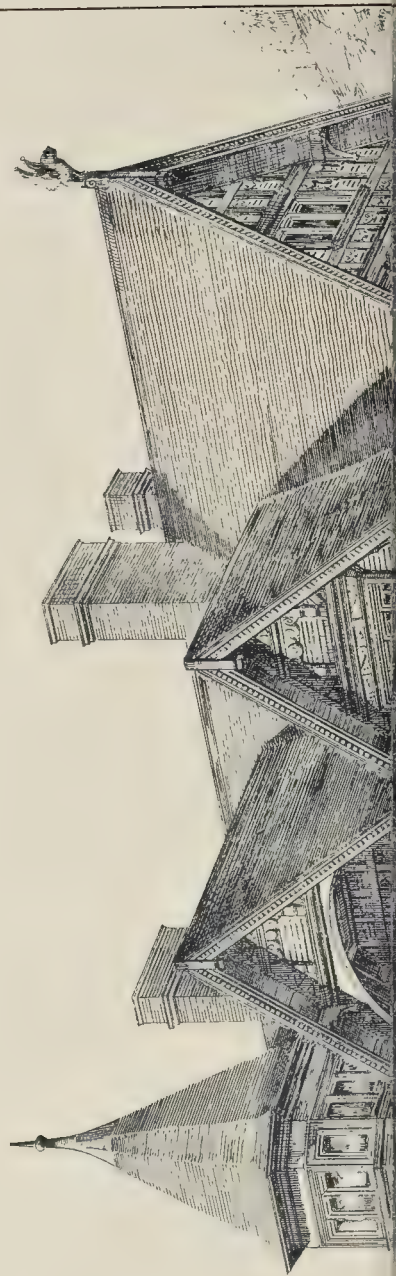




MARLBOROUGH COLLEGE CHAPEL.—Messrs G. F. Bodley, A.R.A., and T. Garner, Architects.

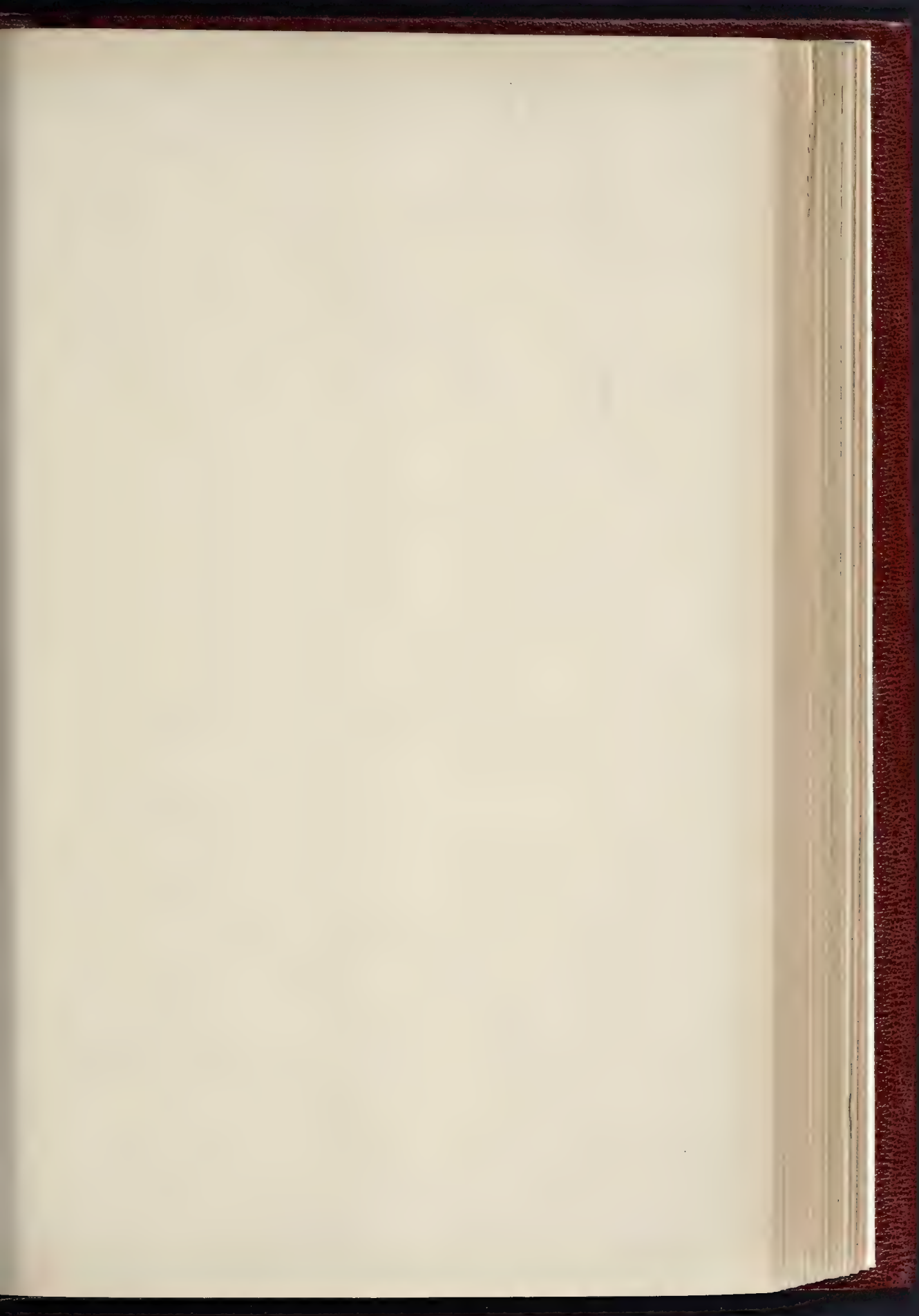


THE BUILDER, OCTOBER 16 1886.





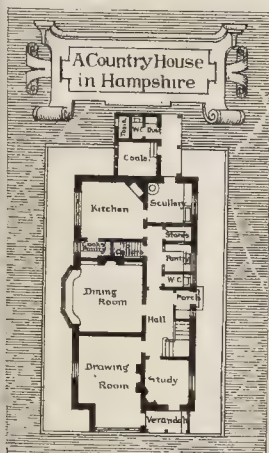
HOUSE NEAR STOCKHOLM, SWEDEN. MR. J. HOWARD INCE, ARCHITECT.



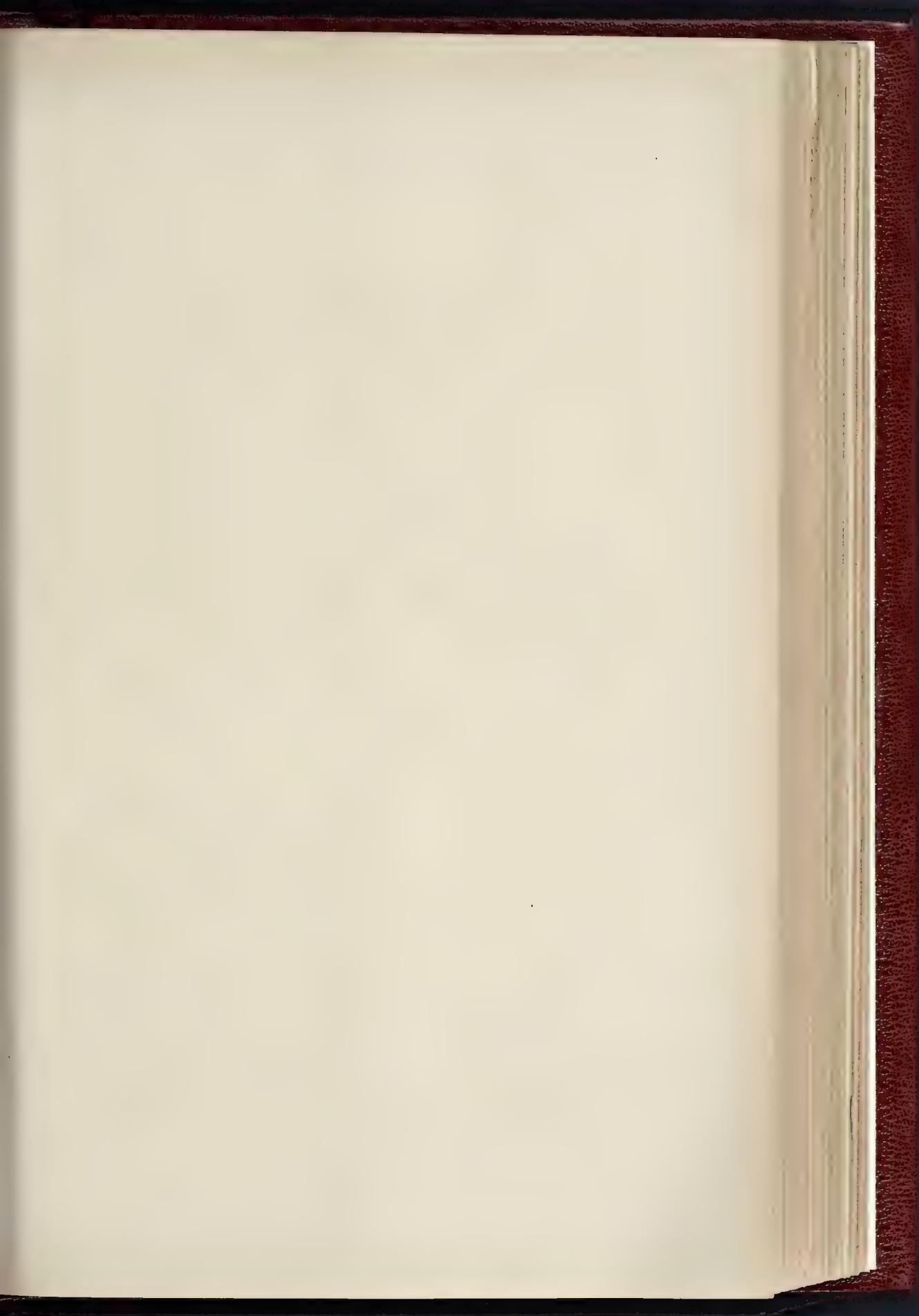
THE BUILDER, OCTOBER 16, 1886.

White Lodge, Fulham
London.
W. Lacey, architect





A HOUSE IN HAMPSHIRE.—MESSRS. WYATT AND SPIERS, ARCHITECTS.









New Town Hall, Motherwell.—Mr. J. B. Wilson, Architect.

PARK LODGE AND ENTRANCE GATES.

THE above was designed for Mr. J. P. Sheppard, of Kingston-on-Thames, to cost 600*l*. The ground-story is of Lawrence's hard pressed red bricks, with all angles rubbed and gauged, the piers to the gates being of red rubbers set in putty, with red concrete caps. The upper story is half-timbered in oak, filled in with half-brick, with stucco exterior, and the roof is covered with Collier's sanded faced tiles.

The drawing from which this plate is taken was exhibited in the Royal Academy Exhibition of this year, and Mr. F. W. Lacey, of Brentford, is the architect.

"HOUSE IN HAMPSHIRE."

THIS is a small country house, which has been erected near to Basingstoke. The lower portion is built of 14-in. hollow brickwork, the 44-in. thickness being on the outside in stretcher bond; the upper portion is in 9-inch brickwork, built solid and covered with rough cast.

The plan of the ground-floor is appended. On the first floor there are four bedrooms, dressing-room, bath-room, linen-room, housemaid's closet, and W.C., and in the roof there are two attics and a box-room. There are also cellars under the drawing-room and dining-room. The work has been carried out by Mr. J. J. B. Cooper, builder, of Odham, from the designs of Messrs. Wyatt & Spiers, of London.

NEW TOWN HALL, MOTHERWELL.

OPERATIONS have just been commenced for the erection of a new Town Hall and Municipal Offices at Motherwell, N.B., a view of which is given above. The building is situated on a prominent site in Clyde-street, triangular in form, and will be open on three sides. The Municipal Offices occupy the first floor of the front building, having entrance in the base of the tower, and comprise a council-room, 30 ft. by 20 ft., with retiring-rooms, &c., and offices for Borough Engineer and Town Clerk. On the ground-floor are two offices intended for letting. The halls are placed behind the front block, the main entrance being in the centre of the front, but with egress doors to each of the side streets. The Town Hall is arranged with side and end galleries, and will be seated for 1,200 persons, and the lesser hall in connexion, which would serve as supper-room for assemblies, will seat over 300 persons. As the lesser hall is also to be used as a court-room, witnesses' and retiring rooms have been provided in connexion, as well as ample cloak-rooms, lavatories, &c., for both halls, and the corridor space is unusually large. The arrangement is such that either of the halls can be used apart, with separate entrances, &c., or the whole occupied *en suite* when desired. Accommodation for Burgh fire engine, caretaker's house, &c., has also been provided.

The whole external walling will be of white freestone, from the Bellside quarries, and the roofs are proposed to be covered with green

Aberfoyle slates. The total estimated cost of the buildings is 5,500*l*. The contractors are almost entirely local, and the architect is Mr. J. B. Wilson, A.R.I.B.A., Glasgow, the design being selected in competition.

THE SUPERINTENDING ARCHITECT: METROPOLITAN BOARD OF WORKS.

THERE seems to be some difficulty as to the reappointment of Mr. Vulliamy. We quote the following report of the proceedings at the last Board meeting from the *Metropolitan of Saturday last* :—

"The Chairman (Sir J. Hogg) said that he understood several members of the Board intended putting questions on the subject of the proposed reappointment of Mr. Vulliamy. He (the Chairman) had given the matter the most careful and anxious consideration in his power, and had likewise consulted more than once the Board's Solicitor on the subject. The matter was a difficult one, and if the Board would allow him the liberty of suggesting a course which he thought would be the best to take in the circumstances it would be to allow the Deputy-Chairman to simply, *pro forma*, move the recommendation on the paper of business, and send the matter back to the Works and General Purposes Committee for reconsideration. (Hear, hear.)

Mr. Shepherd observed that he quite assented to the proposition.

Mr. G. Edwards (Deputy-Chairman) hoped

Mr. Jones would not oppose the suggestion of the Chairman. He (Mr. Edwards) therefore, *pro forma*, moved the recommendation of the Works Committee that Mr. George Vulliamy be appointed, in a temporary capacity, as Superintending Architect of the Board, for one year, from December 25th, 1886.

Mr. Selway moved that it be referred back to the committee.

Mr. J. Jones here rose.

Mr. Edwards said Mr. Jones would have an opportunity of speaking to the question on Monday, at the Works Committee meeting.

Mr. J. Jones observed that the Board-room was not a secret chamber. They were in the presence of four millions of persons who were interested in the question. The whole architectural profession of the kingdom was interested in it. They had their rights, and he was there to object particularly to the application. There was no use in sending the thing back to the committee,—into secrecy and—should he say, corruption? (Loud cries of 'Order!') No, he would not say so. (Laughter.)

Mr. Richardson, asked whether the hon. member could imply corruption.

The Chairman said it was impossible to say what was on the hon. member's (Mr. Jones's) mind. He (the Chairman) had asked him to be kind enough to allow the matter to go back to the committee, and now made a second appeal.

Mr. Jones, continuing, observed that he did not wish to impute anything in the way of corruption to anybody. He, however, objected to the application. It had come to him as a matter of surprise that pressure was put upon the Architect to get him to offer his resignation. When the resignation came before the Board he (Mr. Jones) believed it was a tribute of honour on his (the Architect's) part, that, feeling himself to be insufficient, he resigned; but he (Mr. Jones) had learned since that a pressure was put upon the Architect to do what he would not have spontaneously done. ('No, no.')

Mr. Harbon rose to order.

The Chairman again asked Mr. Jones to allow the matter to go back to the committee.

Mr. Jones still insisted upon speaking, and said the proposition should be extinguished at once. The hon. member continued at some length, although repeatedly called to order.

The Chairman then asked the opinion of the Board on the question to refer back to the committee, when thirty-six members voted for the adoption of that course, and Mr. Jones against. The matter was then referred back to the committee.

To this we may add that we understand that the Committee have resolved not to take any further steps with regard to the re-appointment of Mr. Vulliamy, but have decided to invite the candidates who have applied for the post of Architect to attend before them on the 22nd instant, with a view to selecting the names of six of their number to submit to the Board.

NOTES FROM SWEDEN.

A SYNDICATE has been formed in Stockholm for the building of an aquarium and winter garden, the drawings for the same, which have been accepted, being those of Herr F. F. Lundin. The design provides for three five-storied buildings, with a common frontage, in Renaissance, the central part of which is destined for the aquarium and winter garden, and the two wings for future enlargements, which, in the meanwhile, are to be let as shops and flats. Several other new buildings are also in contemplation in the Swedish capital, one being a circus, to be built by the German circus proprietor, Herr Schumann, who has for many years been obliged to content himself with the little *menagerie* at the celebrated pleasure resort, Djurgården. It is also stated in building circles that the same London syndicate which has recently purchased several first-class hotels in some Continental cities has sent a delegate to Scandinavia in order to negotiate for the purchase of a first-class hotel in Copenhagen, Malmö, Gothenburg, Stockholm, and Christiania. The negotiations having failed as regards the Grand Hôtel in Stockholm, this delegate, a Swedish engineer, has proposed to the Government to erect a fine modern theatre in place of the old one now disfiguring the square of Gustavus Adolphus, on the condition that the English syndicate should be permitted to build a first-class

modern hotel on the surplus ground. Any decision on this scheme has not yet been arrived at, and it is doubtful whether it will be sanctioned, as the site in question will most probably be wanted for the new Houses of Parliament, which are so urgently required.

A meeting of influential persons has just taken place in Stockholm, with the object of founding an institute for promoting Swedish industries of all kinds, chiefly by means of a permanent exhibition of manufactures. A similar step has also been taken in Christiania.

It is reported from the province of Upsala that during the last few years churches and buildings have been found to have sunk considerably, where no sinking has been observed previously for decades. This phenomenon has been attributed by geologists to the severe droughts which prevailed in 1880 and 1881, in consequence of which the water in the earth was dried up to a very great depth.

An official of the Stockholm Railway, Mr. G. Forsberg, has, after many years' experimenting, succeeded in inventing an apparatus for drying damp rooms, which has been found very effective and easy of management. In the course of thirty-two hours it dried completely the walls of a room which were thoroughly damp, at a cost of only 1d. per hour. The drying is effected by means of hot air, but the invention is naturally a secret, and has been patented.

A paquetry works, the first of its kind, has been started in Malmö, which seems to promise well. Hitherto all such goods have been imported into Sweden from Denmark and Germany; but the present manufacturer asserts that he will be able to compete in both these markets, as well as supplying the building trade of Sweden, on account of the greater cheapness of the raw materials in the latter country.

The great danger of fire arising from the use of shavings for making roofs on sheds and outhouses, so commonly in use in Sweden, and the great fires which have arisen and been spread by this material being carried from one building to another, has decided the various insurance companies in Stockholm to issue special regulations as to the proximity, &c., of buildings thus protected to others.

East Coast Watering Places and Railway Extensions.—The rapid progress of building which is at present going forward at the several watering-places on the East Coast which are now rising up in quick succession, has led to the Great Eastern Railway Company providing increased means of access and communication by the construction of new branch lines and the widening of existing routes. Some of these are already in course of construction, whilst others are about to be commenced. On the estate at Southwold, facing the sea, which was sold last year in several lots, building is now actively progressing, but the want of adequate railway communication is a great drawback to the development of the place, the only means of arrival at it being by a light narrow gauge line commencing at the company's main line at Halesworth, where passengers have to change carriages and proceed on their journey in vehicles resembling tram-cars. Lowestoft is likewise at present only reached by a branch line running eastward from the main line at Beccles, the route being angular and circuitous. In order to render the communication between the two towns more direct a new extension on the main line between Saxmundham and Darsham, running in a southerly direction to Southwold and Lowestoft, both places forming, when the line is completed, integral parts of the company's London, Colchester, and Ipswich section. Clacton is also expanding at a remarkably rapid rate, some hundreds of houses having been erected within the last twelve months, and we learn that it is the intention of the railway company to double the single line between Colchester and that town, as well as the present single line between Saxmundham and Aldeburgh. It may be added that the company's extension to Southwold, which commences between the Breatwood and Ingatstone stations, is expected to be ready for opening at the commencement of the new year. The station buildings at the junction, which consist of two spacious structures on each side of the line, have already been completed.

OBITUARY.

Mr. J. Tom Burgess, F.S.A.—We record with regret the death of Mr. J. Tom Burgess, F.S.A., which occurred at Leamington on the 4th inst., after a long and painful illness. Mr. Burgess was born at Cheshunt, in Hertfordshire, in 1823, and became reporter on the *Leicester Journal*, when he was sixteen. Subsequently he went to London to study art. From there he went to Bonmahon, in Ireland, to help to establish some printing schools. Afterwards he was for six years editor of the *Clare Journal*, seven years editor of the *Bury Guardian*, thirteen years editor of the *Leamington Courier*, and four years editor of *Berrow's Worcester Journal*. His great love was antiquarian lore. He was author of "English Wild Flowers," which has passed through seven editions; "The Last Battle of the Roses," "Historic Warwickshire," "Fortifications of Warwick," and of a "Handbook to Worcester Cathedral." He was an occasional contributor to many other journals, periodicals, and magazines (to our own columns included), and was a most genial and helpful companion on an archaeological excursion.

Mr. E. W. Godwin, F.S.A.—The *Times* of the 14th inst. announces the death, on the 6th inst., at Great College-street, Westminster, of Mr. E. W. Godwin, F.S.A.

THE FLOOR OF ST. MARK'S, VENICE.

SIR,—As the persistent fiction ascribing to symbolism the surface-undulations in the floor of St. Mark's, Venice, has lately reappeared, with variations by the Society for the Protection of Ancient Buildings, it may be alike instructive and conclusive to note the genesis of the legend, and on such ground to test its validity. In the year 1854 the late Mr. G. E. Street made his first journey to Venice. In the year following he published his "Brick and Marble Architecture in Italy," in which were recorded the impressions he received in the visit.

In this account his enthusiasm knew no bounds. Ruskin was followed and out-Ruskined. The author of "The Stones" and "The Seven Lamps" had seen nothing in the unevenness of the pavement to call forth special remark. This feature, however, before which Ruskin had kept his head cool, provoked Street to helpless rhapsody, which found vent as follows:—

"Of all the features of this very noble interior, that which, next to the gorgeous colour of the mosaics on the walls, most attracted me was the wild beauty of the pavement, for I know no other word that quite describes the effect it produces. It is throughout the whole church arranged in beautiful geometrical patterns just like those of the noble Italian pavement in the choir of Westminster Abbey, but these, instead of being level and even, swell up and down as though they were petrified waves of the sea, on which those who embark in the ship of the church may kneel with safety, their undulating surface serving only to remind them of the stormy seas of life, and of the sea washing the walls of the streets and the houses throughout the city."

There was at the time a good deal of amusement at this apparent satire on the emotional interpretation of symbolism, then epidemic; but the tone of the whole book showed that the effusion was seriously meant.

A second edition of the work, published some twenty years after, removed all doubt on the point, for in this we find its author deliberately endorsing his youthful imaginings, saying, "the corresponding example of St. Sophia, Constantinople, where we have it on record that there was just such a floor, is conclusive as to the intention of its imitators here." Still later, 1880, when writing in support of his idea to the *Pall Mall Gazette*, he said:—

"I remember how we are told that when the pavement of St. Sophia was laid it was made in the form of a central sea, from which the four rivers of Paradise flowed forth on all sides; and I ask myself why if this symbolism might be avowed in the mother church at Constantinople it might not be still indulged in in the daughter church at Venice?"

The question, therefore, thus put, in reference to St. Mark's, stands or falls by reference to St. Sophia.

We have seen the statements, "we have it on record," and "I remember how we are told," and may note the absence of a word of corroborative reference as to where is the record or by whom it is told. It is, moreover, not in evidence that Street ever was at Constantinople, there to form his own opinion on the spot. On the other hand, there is circumstantial reason to conclude that the fiction which possessed him in reference to the waviness of the floor of St. Mark's

was based on a strained reading of an unwarrantable description of the pavement of Sta. Sophia, current in a traveller's Handbook for Turkey, published at the date of Street's visit to Venice. In this handbook reference was made to the pavement of Sta. Sophia, in the following description:—

"The floor was originally to have been laid with plates of gold, but Justinian abandoned this idea fearing that such a step might lead his successors to destroy the work altogether. The ground was, therefore, paved with variegated marble whose wavy lines imitated the advance of the sea, so that from the four corners of the Temple the apparently waving marble floor rolled onward, into the four vestibules like the four rivers of Paradise."

It will be remarked that the hand-book description by no means justified a conclusion that there were surface undulations at all in the floor of Sta. Sophia. The publishers of the Guide, however, discovered, meanwhile, that the writer of the description had drawn wholly on his imagination for his facts, and had betrayed their confidence; as a consequence this description was at once and in toto expunged from the following and all subsequent editions.

According to recent communications in the *Times* from Venice, The Society for the Protection of Ancient Buildings has adopted the doctrine of symbolism by surface undulations in floors. In this spirit they are said to have discovered that the undulations in St. Mark's mean not "the stormy seas of life" nor the "ship of the church," but that "Venice rides the waves."

May not these conflicting interpretations,—the outcome of a guide-book fiction,—be left to destroy each other?

Outside of St. Mark's, in the Piazza, as in both the Piazzetta and the Piazza dei Leoni, there are pronounced undulations, and many of them in the common flag stone paving of modern times. Will no poet of symbolism, or member of the society referred to, propound a deep symbolism here? If not, I would ask why not?

DELTA.

October 13, 1886.

"FEDERATION OF ARCHITECTS."

SIR,—Having received a circular headed as above, which circular has, I believe, been sent to architects generally, I found it in the following paragraph:—

"The committee thus formed represent all existing Societies, as well as those who hitherto have practised independently."

I thereupon wrote to the honorary secretary of the "Central Committee" asking him to inform me of "the way in which the Royal Institute of British Architects and the Architectural Association of London are represented on the Committee," feeling pretty sure that no such representation existed, as I have since ascertained to be the case.

Mr. Farman replies admitting that this is so, but referring me to the previous paragraph as showing that "on the Federation Committee are to be found members of the various Architectural Societies of the Kingdom, and that they are official representatives of such."

If your readers will refer to the circular, they will find that this paragraph in no way fulfils that description. What it does say is that at a conference, to which the circular alludes, consisting of a large number of architects and engineers from all parts of the kingdom, "representative of nearly all the societies, both metropolitan and provincial," certain resolutions were passed. There is not a phrase in this circular to indicate the fact that the persons so attending represented only themselves; but, on the contrary, the circular is so composed as to convey the impression that the "central" committee issuing it is the creation of all the existing architectural societies, as well as of architects who do not belong to any society.

It appears highly important that statements so misleading should be promptly contradicted.

THOS. BLASHILL.

SIR,—Referring to a circular signed by Mr. Boumieu Gough and Mr. Edgar Farman on behalf of "The Central Architectural Federation Committee,"—which I have received, and which has, I believe, been issued generally to members of the architectural and civil engineering professions, I think, in the interests of all concerned, that the members of those professions should be officially and publicly informed as to who are the gentlemen who have actually served on this committee.

The circular ostensibly emanates from "The Federation Committee elected at the Conference on this great question held in London in April last," but if rumour doth not lie, many of the well-known men who were then nominated and appointed (some without their knowledge or consent) declined to serve on the committee.

If rumour be incorrect, it would be well to have it officially contradicted, for doubtless there are many like myself who hesitate to place this important object in the hands of a committee who are not so "representative" as they seem. I enclose my card.

QUERY.

October 12th, 1886.

THE ARCHITECTURAL ASSOCIATION CONVERSAZIONE.

SIR,—The principal objects of the opening conversations of the Architectural Association used to be:—(1) The delivery of a short address followed by some remarks from the leading members of the profession; (2) The distribution of prizes to successful students; (3) Friendly communication and introductions between members of the Association, their friends, relations, and guests; and (4) The inspection of the prize drawings and others, as well as various objects of manufacture collected together for the purpose of being seen.

I am not sure yet that the total omission of the two first objects is an advantage. I am quite certain that the arrangements made by the committee for last Friday were fatal to the two latter objects. There was no time to look at anything before or after the concert and dramatic sketch, unless one came very early or went very late. At 8.30 the guests began to take their seats, and most of them left after the performance at 10.30, or thereabouts. Those who attempted to look through the prize-drawings and others upstairs in the Institute Room found themselves outside the gallery where the performance was going on, and unable therefore to hear any of it, or to exchange greetings with their friends.

Of course I may be old-fashioned in my views, but I should like to know what is the feeling of the members on this point.

AN OLD MEMBER OF THE ARCHITECTURAL ASSOCIATION.

SCULPTURED STONES AT ST. NICHOLAS, IPSWICH.

SIR,—With reference to the notice published in your issue of October 2nd [p. 473], of some old sculptured stones in the Church of St. Nicholas, Ipswich, will you allow me to suggest that "Ostolus" may, perhaps, be part of the word "Apostolus" (Apostle). The A and P might have been on the short arms of the cross. I notice in the same figure what seems to be a hand grasping some object; if the nature of this object is ascertainable, this might supply a clue to the name of the Apostle represented.

It would be interesting to know what exactly is the inscription with reference to St. Michael.

Is it quite certain that the figure in the tympanum is a boar? In East Anglia the wolf is an important animal as figuring in the legend of St. Edmund.

F. HERVEY.

3, Spring Gardens, Oct. 7th.

ST. IGNATIUS, R.C. CHURCH, PRESTON.

SIR,—May I ask you to correct a mistake which occurs in the description of the Church of St. Ignatius, Preston, as enlarged by my friend, Mr. C. Hadfield? This church, which is a very interesting specimen of the early "Revival," was designed in 1835 by my old master, the late Joseph John Soles. His son, Ignatius, who for some years studied architecture, is, I am happy to say, not to be described as "the late," as he is now a missionary priest in British Guiana, where his artistic and constructional knowledge has served him to good purpose.

S. J. NICHOLL.

RAILWAY RATES.

SIR,—Any legislation with regard to the above will be useless unless it includes compelling the companies to carry all goods, except such as are dangerous. It is this power of refusing to carry goods which paralyses all efforts at reform. The existing law is quite sufficient to deal with the question of unfair advantage to the foreign importer. The courts will not take into consideration the question of competition in determining rates. The obstacle in the way of putting a stop to unfair advantage is the great cost of legal proceedings, as in the case of the manure from Aberdeen, the costs of the decision in which were 2,500l. Added to this is the power the companies have of retaliating upon and annoying a trader. Refusing to carry a particular kind of goods may be a small matter to a railway company, while to a trader the effect is ruin.

C.

* We regarded the conclusion as too self-evident to need comment.—E.

AUTOMATIC COUPLINGS.

SIR,—In your issue of July 17th [p. 85], in an article on the Machinery at the Colonial and Indian Exhibition, you have been kind enough to notice the patent rails and trucks fitted with automatic couplings, both being patents of Messrs. Cowdery & Thomas, of Sydney, New South Wales, for which notice we beg to thank you.

From your remarks on these patents you appear to think they are new patents that have not borne sufficient tests, and therefore write of them as doubtful in their working. In explanation, allow me to state that the patent couplings have been working on the New South Wales railways since February, 1881, and have acted perfectly in all respects. They have been tested in the severest manner. Both of the inventors are railway engineers of over thirty years' experience, and would scarcely have overlooked such an important point in a coupling as the difference of load in trucks freighted and empty. The tests they have been subjected to, in difference of load, have been more severe than any traffic officer would allow, and yet have not proved any uncertainty of coupling. The adjustable links are arranged for the extreme of difference in load between all trucks used, either loaded or empty.

To have worked upon our railways for the time specified, without accident through their use, is a guarantee of their value. Our mountain lines have been traversed by trucks fitted with these couplings, and with all conditions of loading.

Our lines are much more severe as regards curves and gradients than those in England of the same gauge, our gauge being 4 ft. 8½ in. We have reverse curves of 7, 8, and 10 chains radius, and gradients of 1 in 30, often for three miles in length.

The rails have been laid here on a portion of the line that has the heaviest traffic, and have answered all the conditions claimed for them, with the exception of the length of "life." This will take as far as we can see, many years to decide the percentage of saving. We have proved that they can be laid in half the time and labour of any rails at present in use. The joints keep free from jumping or any permanent set, while the "gauge" remains perfect, reducing the tendency to oscillation to the minimum.

For Messrs. Cowdery & Thomas,
Department of Public Works,
Railway Branch, Sydney, N.S.W.,
September 1st, 1886.

NEW WAREHOUSES, ST. PAUL'S CHURCHYARD.

SIR,—As the equivocal wording of the second paragraph of your description [p. 518, ante] of Mr. Hemings' buildings is likely to give the impression that that gentleman was also concerned for the adjoining warehouses, I should feel obliged if you would allow me to state that I was the architect of the six warehouses north of the three which Mr. Hemings designed, and which, in your perspective, are ingeniously hidden by the Cathedral.

DELISSA JOSEPH.
* * There is no "ingenuity" in the matter; Mr. Hemings brought us a drawing showing the whole block of warehouses, which could only be done by falsifying the facts and representing the street as widened; and as that is exactly what ought to have been done and never was done, and as the matter has been the subject of much public discussion, we declined to publish a falsified view. If our correspondent wants his end of the new buildings illustrated, he had better send us an equally good drawing from the other side of the site.

A CEMENT QUERY.

SIR,—Can you, or any of your correspondents, inform me by what means the running of liquid cement can be removed from slates?

A CONSTANT READER.

Hot-Water Spring at Buda-Pesth.

Some interesting experiments are being made at Buda-Pesth in obtaining a hot-water supply for the town from a natural hot-water spring. An artesian well has been bored by two Hungarian engineers to a depth of about 3,500 ft., being most probably the deepest in the world. From this a supply of hot water amounting to some 150,000 gallons per diem is obtained, having a temperature 35 ft. above the ground of 70° C. It is the intention to continue the boring, the city authorities having granted a sum of 200,000l. towards the undertaking until the temperature reaches 80°, a temperature which it is expected will soon be reached, as it increases with the depth. It is anticipated that the supply of hot water will be sufficient for the whole town, and may contribute to the cultivation of tropical plants in the neighbourhood.



Proposed New Boat-house, Christ's College, Cambridge.—Mr. R. S. Topham, Architect.

NEW BOAT-HOUSE, CHRIST'S COLLEGE, CAMBRIDGE.

The site, together with the adjoining boat-shed, has been purchased from Mr. Logan; it occupies the corner of his boat-yard next the road. At present there is on the site an old boat-shed, which it is intended to pull down, and make use of some of the materials in the new building. The ground-floor is to be occupied by a boat-shed and workshop.

The building is to be constructed of red bricks up to the first-floor joists, half-timbered work above, and the roof covered with red tiles. Tenders have been received from local builders varying from 700*l.* to about 800*l.*, and the work is to be commenced next term. The architect is Mr. R. S. Topham, who is now in residence at the college.

The Student's Column.

STONE QUARRIES.—XVI.

KIRKCUDBRIGHTSHIRE GRANITES.

THERE is plenty of granite in this county. The three principal districts where it is found are, that in the north-west, extending from Loch Dee to Loch Doon; the second, stretching from Loch Ken to Palnure Water; and the third, from Criffel to Craignair. It is a noteworthy fact that, although its existence was known a long time ago, the principal houses and gentlemen's residences were, in the early part of the present century, almost exclusively built of old red sandstone from Dumfriesshire. And Mr. David Bremner, in his "Industries of Scotland," informs us that, when the bridge over the Dee at Tongland was built, in the years 1804-5-6, after a plan by Mr. Telford, the celebrated engineer, at a cost of nearly 7,000*l.*, it appears never to have entered the mind of any one concerned in the matter, to utilise the granite boulders close by, so that the stones used in the structure were transported, at great expense, from the island of Arran, and they were subject to heavy duty, which greatly added to the cost.

Granite was, however, used at Dalbeattie for some years previously, but it was not until 1823 that anything like extensive operations in the working of granite were commenced in the district. In that year, the Liverpool Dock Trustees leased a portion of Craignair Hill, near Dalbeattie, for the purpose of obtaining material for the construction of the docks. This was attended with great success; so much so, that other enterprising spirits took the

matter up after the Dock authorities had finished their work. Several quarries were opened in addition, and a brick trade was carried on for a long time, not only with the United Kingdom, but with Russia, several Mediterranean ports, and South America.

We may mention that in some of the quarries in the parish of Kirkcubrecht the stone was worked without blasting.

Several of the quarries opened have, for various reasons, been closed, but the excellent material which is found near Dalbeattie is still worked and polished on an extensive scale in that town. All the granite, as far as we are aware, is of a grey colour.

Dalbeattie Quarries.—The light grey stone obtained from these quarries is fine-grained, some kinds approaching medium. The quartz is white, clear, and transparent. The felspar is mostly white also, but here and there assumes a light-brown tint. None of the crystals are well defined, and they are much interlocked with the quartz. There is a fair proportion of black mica present, and another black mineral, which occurs in long needle-like crystals, denotes the presence, perhaps, of schorl. This last mineral is not too abundant.

The stone appears to be very hard, compact, and takes a beautiful polish, being highly suitable for ornamental decorations and the like. Besides being used in Liverpool, it may be found in the Newport, Birkenhead, and Swansea Docks, and several public buildings in Manchester and other large towns in the north-west of England.

Creetown Quarries.—These are near Newton Stewart, and are sometimes known as the "Globe" quarries. The stone is very similar to that lastly described, and it bears a great resemblance to certain kinds of Newry granite. It does not, however, contain much of the light brown felspar.

It was extensively used in the Liverpool docks.

The stone obtained from the *Rockcliffe Quarry* is much darker than either of the other Kirkcubright granites described. This is principally owing to the greater abundance of the black mica. It is fine-grained, and the white felspar and quartz are with difficulty separated from each other.

ARGYLSHIRE GRANITES.

The granite industry in this county is largely, almost exclusively, confined to quarrying only, the stone being sent elsewhere to be polished or elaborately worked into monuments, &c. Quarries are scattered about in various places, such as at Inverary, Oban, Strontian, Loch Awe, and the Ross of Mull. We will first deal with the

Ross of Mull Quarries.—The Isle of Mull contains a considerable quantity of granite. Much of it is found in the centre of the island, where it is cut up by great masses of an equally crystalline rock—gabbro, which has formed subsequently to the granite. It would appear from the researches, principally of Professor Judd, that these highly crystalline rocks are the stump of an ancient volcano, and the greater part of the island is described as the basal wreck of a volcano. The lavas, which surround these central masses, bear a close relationship to the granites and gabbros alluded to, and, like them, they can be shown to have formed at least two different periods. This volcano was in eruption in very early tertiary times, as has recently been shown by Mr. Starkie Gardner, from a critical study of the fossil plants found imbedded in rocks between the sheets of basalt,—the most recent lava erupted.

It appears that the granites, &c., in the interior of the island are not used to any extent for commercial purposes, but that quarrying operations are chiefly confined to the extremity of the south-western part of it, known as the Ross of Mull.

The granite at this place has no connexion with the central masses; neither has it anything to do with the volcano. It is simply a part of the groundwork upon which the volcano was built, and is thus of much more ancient formation.

The rock has been extensively quarried from time to time, by some of our greatest granite merchants; but it does not seem to have been worked in a steady systematic manner for any long consecutive periods, such as have the majority of the other rocks described. People seem to have procured the stone only when large contracts required it. Why this should be the case is difficult to understand, for the rock, when polished, is exceedingly handsome, much more so than many of those that find their way in large quantities into the market. The opinion we thus express regarding the Ross of Mull granite is shared by all architects who know the stone, by whom it is much sought after. One would imagine that the supply had fallen short of the demand, if it could not be easily shown that this is not the case. Very large blocks are obtainable, and the supply is almost inexhaustible. We are informed by one of the quarriers that the principal cause of the trade being so disproportionate to the beauty of the stone is a lack of the "sinews of war," and quite recently he has had to decline some large orders solely on this account. The fact that Mull is a rather out-of-the-way place has, however, no doubt a great deal to do with it.

On the contrary, a good trade is done by the chief of the Shap quarries, Westmoreland, in

bringing the Mull granite by sea and rail to that place to be worked and polished, and, as we have previously pointed out, the tremendous columns at Blackfriars Bridge were so treated. But we should like to see the Mull quarries more fully developed, and more machinery would then be erected for treating the material economically on the spot than is now the case.

Speaking of the stone itself, it is of a warm red colour, brought about principally by the presence of a large proportion of red orthoclase felspar, which, although occurring as masses of crystals congregated together, have no definite outline, their edges presenting a ragged appearance and dovetailing into the other minerals in such a manner as to cause the stone to have no marked grain, other than that always more or less exhibited in this class of rock, and found out only by the manipulators. White felspar is also exhibited. The quartz is clear and transparent, and occurs in tolerably regular crystals, whilst the black biotite mica is not very abundant. Two or three accessory minerals are present, but do not affect the general structure of the stone, which is coarse-grained.

Examples of the Ross of Mull granite may be seen at Westminster and Blackfriars bridges, Holborn Viaduct, &c., in London; St. George's Hall, and in the Docks, at Liverpool; several public buildings in Manchester, where the polished work is now being used; and in some docks and lighthouses in the north-west of England and south of Scotland.

Loch Awe Quarries.—These quarries are situated at the head of Loch Awe, in the base of Ben Crachan, and about three miles from Loch Awe station, being connected with the Callander and Oban Railway by a branch line belonging to the quarry-owners. At present there are two workings opened, one being 300 ft. above the other. The branch line comes into the lower quarry, being about a mile and three-quarters in length, with a gradient of one in fifteen to two in thirty. The upper quarry is connected with this by a drum tramway.

There are two different kinds of stone, one being grey and the other a dark grey, speckled black. The former is found in the lower quarry, and when it is properly opened up a great quantity of large stones for monumental and other purposes will be raised. The dark stone is obtained from the upper quarry, where there is a very large face of granite, capable of being opened up to the extent of about three hundred yards. It is suitable for either monumental or dock work; at the present time some large blocks are being cut up for the former purposes, and the polished stone is becoming a marked feature in the yards of the Aberdeen granite-workers, where it is finished.

Mineralogically, the stone is principally composed of quartz, felspar, mica, and schorl. All the minerals are thoroughly interlocked with one another, and none of them have had space enough to crystallise regularly. This shows that they crystallised out almost simultaneously, and it gives a very characteristic appearance to the stone. The quartz is white and crystalline, being much broken up; the felspars are of three tints, milky white, light green, and light pink. The other minerals are black. It is fine-grained.

Arran granite does not appear to be worked on a very extensive scale. There are many large boulders, from half a ton to a ton in weight, in the vicinity of Sannox which are split and used in mills. Goat Fell, with an elevation of 2,875 ft., is composed principally of granite of two varieties, the coarse-grained and the fine-grained, formed probably at successive periods. In composition, however, they are similar, being formed of white orthoclase, a triclinic felspar probably oligoclase, quartz, and a little black mica; the quartz is very abundant.*

Bronntian granite is medium-grained, of a grey tint, consisting of quartz, oligoclase white felspar, and black mica in abundance.†

The Constitutional Club.—We may add to our description of the Constitutional Club in last week's issue, mention of the fact that about 1,000 ft. super. of Hayward's patent "semi-prismatic pavement lights," supplied by Messrs. Hayward Brothers & Eckstein, of Union-street, B.rough, have been fixed, some 3 ft. wide, all along the front.

Books.

Electric Transmission of Energy and its Transformation, Subdivision, and Distribution. A Practical Handbook. By GIBBERT KAPP, C.E. London: Whittaker & Co. and George Bell & Sons. 1886.

IT has been stated that an eminent scientist, upon being asked what was the greatest invention of recent years, replied "the discovery that the Gramme machine is reversible." This means that whereas the dynamo machine was originally invented for the purpose of converting mechanical energy into an electric current by causing coils of wire to revolve between the poles of a magnet, the same electric current if obtained from any extraneous source,—whether a primary battery or another dynamo machine,—can be reconverted into mechanical energy and itself cause the revolution of the original coils and consequently do useful work. It is probable that this discovery, like so many others, was made quite accidentally at the Vienna Exhibition by a workman who inadvertently connected two wires through which an electric current was passing with a dynamo which was at rest, when it was instantly set in motion. Whether the discovery was accidental or not there can be no doubt that it opened up an entirely new field to inventors, and it is somewhat surprising that greater progress has not been made in developing the practical transmission of power by electricity. The probability is that the transformation of the electric current into light appealed more directly to the public mind, and hence inventors bent their whole energies in this direction. As the author very justly says, the dynamo as motor, has been comparatively neglected for the dynamo as generator. Its capabilities in the former capacity are now, however, becoming gradually recognised, more particularly for the purpose of supplying power in small quantities, and for obtaining high speeds. In conjunction with this, there is the great advantage of economy of space and weight in the motor itself.

The work under notice treats the whole subject most thoroughly. The theory of the transmission of power is worked out clearly and fully, and formulas are given from which the mechanical energy which the receiver will give out can be calculated from that supplied to the generator under various conditions of speed, resistance, &c., and the graphical solution of the problems involved, which Prof. Sylvanus Thompson was the first to suggest is explained. Moreover, the author, who has great practical experience as well as theoretic knowledge, never shirks hard facts, and he not only points out various instances in which practical results differ from those deduced theoretically, but explains the reason of the variations which occur. Perhaps the most important practical questions discussed are (1) the relation between the maximum mechanical energy of a motor and its weight, and (2) the most economical size of conductors. We have no space to follow the author into his discussion of the comparative merits of the various kinds of dynamo machines as motors, nor into the very interesting comparison of the relative cost of power transmitted in different ways, but the general conclusions arrived at, based on the estimates of Herr Beringer in his work on this subject* are sufficiently interesting to be quoted. "1. It pays to transmit cheap water power: by wire rope if the distance is less than a mile, and electrically if the distance is a mile or more. This applies to all powers. 2. It pays to transmit cheap steam power if the amount of energy required at the receiving station does not exceed 10-horse power. If the distance is less than a mile use wire rope; for distances of from one to three miles use electric transmission. Beyond this limit a small local steam or gas engine is preferable." The work concludes with a short description of the various practical installations of electric transmission which have been inaugurated. We cannot resist the conclusion that very great difficulties still remain to be overcome before the electric current can be used on any large scale to transmit energy, and Mr. Kapp wisely does not attempt to shirk their difficulties, but the publication of such a work as this will prove of immense help in overcoming

them, as it appears to us to be thoroughly well and carefully prepared, and we are sure it will be of the greatest possible value to engineers. We do not know whether we shall have to submit to what must now be called the "authorised" form of spelling *centimeter*, *kilogram*, &c., but we can only say that we dislike it intensely.

Arc and Glow Lamps: a Practical Treatise on Electric Lighting. By JULIUS MAIER, Ph.D. London: Whittaker & Co. and Geo. Bell & Sons. 1886.

It is now seven years since the Count Du Moncel published what was probably the first work devoted exclusively to electric lighting. This was a very clear and complete *résumé* of the subject, and the author described the various inventions which had been made public up to that date. But, with the exception of a somewhat sarcastic reference to the high-flown rumours which had recently reached Europe of Mr. Edison's success in forming lamps in which the light was obtained by heating a platinum wire to whiteness by means of the electric current, we find no reference whatever to lighting by incandescence, the invention of which has rendered electric lighting generally practicable, as it solves the problem of the indefinite subdivision of the light. Arc lamps, however, have still an important function to fulfil, as, for certain purposes, they are more suitable and much more economical than incandescence or glow lamps, and in the work under notice will be found much useful information upon the two systems of lighting. The book is divided into four separate sections. Part I. treats of the general principles of electric lighting, the electrical units, and the efficiency of dynamos, &c. Much of the information here given partakes of the character of a twice-told tale, and we cannot help thinking that the author's statements might have been made much clearer if rather more care had been taken. For instance, in discussing the efficiency of dynamos, we are told that "*ceteris paribus*, the efficiency of the machine is higher the better its ventilation." Now, this is very loose writing: the "efficiency" of a dynamo is a perfectly well recognised term, meaning the ratio between the electrical output at the terminals and the total mechanical work put into the belt, and this depends upon the construction of the machine, varying from 0.65 in bad machines to 0.94 in very good ones. Undoubtedly the ventilation of the machine, or rather of the armature, affects the heating of the latter, and, therefore, allows it to run a longer or shorter time under a certain load; but this is not, strictly speaking, the efficiency of the machine. Further on we find the same confusion, as Dr. Maier says in speaking of a test of a certain machine that its high efficiency arose "from the arrangement of carbons in the lamp." We utterly fail to see how the "efficiency" of a dynamo can be affected by the lamp which is driven by it, and, in fact, we believe the modern practice invariably is to test most carefully the dynamo, the lamp, and the carbons separately before coming to any conclusion as to the efficiency of the first-named. In the description of instruments we notice several omissions. Messrs. Ayrton & Perry's spring ammeter and voltmeter are mentioned, but the old forms, which are no longer made are described fully and illustrated, and no mention is made of either Crompton & Kapp's instruments or Capt. Cardew's, which are the most largely used now. Edison's current meter is described, but Ferranti's is omitted.

Part II. consists of a description of the best known types of arc lamps, but we do not think the author lays sufficient stress upon the degree to which all arc lamps are dependent upon good carbons. The unsteadiness which is so frequent an accompaniment of arc lamps is far more often due to differences of density in the carbons and other defects of manufacture than to defects in the lamp itself, and we think it would only have been fair to point this out. We notice descriptions of several lamps which, whatever may have been their merit, have not been found to be of practical use, and even in the description of some of those which are largely used, such as Crompton's, we find no mention of the latest form of this lamp, and we believe the only pattern which has been in use for the last three years. We are thus driven to the conclusion that Parts I. and II. of this book were written some time ago, and that the author's engagements have not permitted him to revise

* Hall's "Building and Ornamental Stones," p. 34.

† British Association Report, 1883, p. 62.

* Kritische Vergleichung der Elektrischen Kraftübertragung. Berlin, 1883.

them, and bring the information given up to date. We regret this all the more, because Part III. of the book, which is concerned with glow lamps, is excellent, giving a large amount of useful and in some cases novel information. There is, however, in the table, in page 283, a curious misprint, where, at the head of one of the columns, we have "Resistance in Ohms (Holt)," this last word should be "hot," the resistance of the filament always being taken when it is heated by the current. Some interesting tests are recorded of lamps whose carbon filaments have been flashed,—that is, treated with some hydro carbon,—so that there ensues a deposition of carbon on the filament, and the results tend to show that this flashing of the filament has the effect of maintaining its efficiency for a longer period than would otherwise be the case. The work concludes with a short chapter on the various applications of the electric light. We notice that this book is one of what is called "the specialists' series," and although we take leave to doubt whether specialists will find in it all the information and assistance which they may expect from its title, we have no hesitation in recommending it to architects and others who ought to have some knowledge of the practical part of electric-light engineering.

The Gas Engineer's Chemical Manual. By J. ALFRED WANKLYN. London: Scientific Publishing Company, Limited, 22, Buckingham-street, Strand, W.C. 1886.

This work is a small one of 74 pages on a subject of considerable magnitude and importance. The author's name is sufficient guarantee of the practical nature and value of much of the information given. The book is likely to be useful to managers of small and medium-sized works, with whom, as a rule, the more elaborate and ponderous text-books on gas analysis find but little favour.

Bearing in mind the intention and scope of the work, exception must be taken to the rather perfunctory manner in which the reader is referred on page 32 to a certain work of the author's on water analysis for further information as to the mode of Nesslerisation in the estimation of ammonia in coal gas. The obviously unnecessary remark in the same connexion that the process of Nesslerisation is quite familiar to chemists, is entirely out of place in a manual for gas engineers, and rather apt to suggest the undesirable inference that the object of the author is to stimulate by a side wind the sale of a totally unconnected work.

The frequent references to Cooper's coal-liming process, whereby it is claimed that sulphur compounds can be completely, or at any rate to a much larger extent than is at present the case, eliminated from the gas, indicate that this promising but not as yet very widely adopted patent finds in the author an ardent advocate; indeed, the work seems to have been written largely with the idea of furthering its interests.

Among the advantages which are incidentally referred to we may notice the statement that the resulting coke is more readily combustible than the ordinary article, and that, as the sulphur is fixed by the lime, the production of the unpleasant and injurious sulphurous fumes is avoided. On the other hand, it is quite certain that the addition of lime must seriously increase the percentage of ash and the larger works would lose considerably by the diminished demand, which would surely result, for such lime-laden coke, as well as by the extinction of income which is at present derived from the sale of the sulphur contained in spent oxide, whilst it would seem to be an open question as to whether the increased amount of ammonia obtained would cover these losses.

Shareholders and proprietors of gasworks might also object to the cost of the necessary manipulation of the coal previous to carbonisation (breaking up, mixing with lime, &c.), especially as the yield of gas seems to be somewhat diminished, owing to the lowering of the temperature of the retorts, in consequence of the presence of moisture. No information is given in this work as to the effect of the moisture of the slaked lime upon the quantity of the extremely poisonous carbonic oxide in the gas made by the Cooper process. It is well known that the action of steam upon incandescent carbon is to produce a large proportion of carbonic oxide, so that the point is an important one.

If it be possible by liming the coal to

economically remove the sulphur compounds, to a much greater extent than is possible by the usual processes, without at the same time increasing the amount of carbonic oxide, the experiment deserves to be more widely tried, and subsidiary objections may be overlooked in view of the important advantages to be derived from the use of sulphur-free (or nearly free) illuminating gas. Certain gas engineers have ventured at various times to assert that the sulphur compounds which result from burning ordinary coal gas are harmless, or nearly so,—an assertion ludicrously at variance with the practical experience of less directly interested observers, which has proved beyond a doubt that these sulphur products are a sadly too frequent cause of the rapid deterioration of the materials, pigments, &c., used by decorative artists.

We sincerely hope, then, in the interests of all lovers of beautiful interiors, where the use of gas is at present unavoidable, that the following paragraph, which is the concluding one of the book, gives expression to a practical possibility and not merely to the enthusiastic opinion of a presumably interested advocate:—"If coal-liming were perfectly carried out, the gas passing up the ascension-pipe out of the retort would be quite free from sulphur in every shape; and when coal-liming is practised even imperfectly, the work to be done by the purifying boxes is reduced to a minimum."

The work is clearly printed, well arranged, and written in the author's usual forcible and direct style. Typographical errors are few and unimportant. On p. 43, and in the index, cresylic acid is incorrectly spelt cresylic acid.

The Techno-Chemical Receipt Book. Edited chiefly from the German of Drs. Winckler, Elsner, Heintze, Mierzinski, Jacobson, Koller, and Heinslerling, with additions by Wm. T. Brannet and Wm. H. Wahl. London: Sampson Low, Marston, & Co., 188, Fleet-street. Philadelphia: Henry Carey, Baird, & Co., 810, Walnut-street. 1886.

This is a compendious and handy volume of 460 pages closely printed in double columns, and worthy of a place alongside "Cooley's Cyclopaedia of Practical Receipts."

So far as we have been able to test it, the information given, embracing a bewildering variety of subjects, is clear, concise, and as a rule accurate, though, as might be expected from such a work, there are not a few errors of diction, spelling, and nomenclature. As an illustration of the latter we may quote a receipt on p. 178 for a substitute for opaque glass, which recommends among the other ingredients hydrochlorate of baryta, an obsolete term describing the well-known salt chloride of barium; a more serious slip has been made in the second part of the same receipt, where sulphate of baryta is referred to instead of the obviously intended soda salt; such a mistake as this will lead any one without chemical knowledge hopelessly astray.

Under the head of "Building Materials, Artificial Stone, &c.," much practical and serviceable information is given, and we especially commend the following remarks to the attention of all "whom it may concern," to use an old-fashioned formula:—"To obtain good mortar, as much depends on the character of the ingredients and the manner of mixing them, as on the quality of the lime. It does not necessarily follow that because a lime is good the quality of the mortar will be good also. The best lime ever burned would be spoiled by the custom common among some builders of mixing it with earth and rubbish taken from the foundations of intended buildings." The italics are our own. Receipts for rendering wood incombustible and for its preservation are scattered through the work. It would certainly have been better to have grouped them together under the heading of "Wood," where several receipts will be found, though the inconvenience of the present arrangement is greatly lessened by the very excellent index appended to the work.

Under the heading above referred to, much valuable information is given concerning the guiding, polishing, staining, preservation, and seasoning of wood, although as regards the last item we must express our scepticism respecting the allegation that green wood can be freed from moisture and rendered fit to work, in from ten to fourteen days, by merely being imbedded for that length of time in animal charcoal,

bone black, or peat dust. Our countryman, Mr. S. B. Boulton, also, will be interested to learn that a process for creosoting timber, which, if we are not very much mistaken, is in all essential details similar to the one patented by him some years ago, is described here by the compilers as an American invention.

To render brickwork impervious to water, Sylvester's process, used with much success in America, is recommended. This consists in the successive application to the walls of two washes, the first being composed of Castile soap and water, and the second of alum and water. The action is, of course, to close the pores of the brickwork with the insoluble oleate of alumina which results from the action of the alum upon the soap solution, and when applied in the way directed it is stated that four coatings will render a reservoir free from leakage under 40 ft. head.

Under the heading of Cements, Pastes, and Patties some excellent recipes are given. Lacquers and varnishes have twelve pages devoted to them, many of the recipes being of a valuable character, though we must again take exception to a piece of antiquated phraseology, in this instance adopted in the case of ordinary ammonia solution, which is described on page 208 as "spirit of sal-ammoniac."

In conclusion, we can commend the volume as a really useful one, though a re-arrangement of some of the matter, careful revision of the whole, and the modernising of a good deal of the nomenclature, will greatly enhance the value of any subsequent edition.

Kelly's Directory of the Building Trades. Fifth Edition. London: Kelly & Co., Great Queen-street. 1886.

This useful directory has again made its appearance. While commending it to our readers as very fairly professing to comprise "every trade and profession connected with architecture and building throughout England, Scotland, and Wales," we yet feel constrained to point out that in some respects it is not so complete as it might be. To particularise a few points, the list of county surveyors exhibits some omissions; the list of officers and Council of the Royal Institute of British Architects is not up to date; the list of architectural lithographers is incomplete; and in some cases prominent names which ought to be included under provincial towns are not there. We venture to suggest to the publishers that the usefulness of this work would be greatly added to if they would include in future issues some particulars as to the various charities connected with the building trades; a list of the Master Builders' Associations and their secretaries; a list of the London and provincial architectural societies; and some information as to the trade-union organisations connected with building operations, such as those of the stonemasons, bricklayers, carpenters and joiners, plumbers, painters, ironfounders, &c. For convenience of reference, all these items of information should be tabulated in collective form at the commencement of the Directory, along with the lists of borough and county surveyors; but they should also appear again, dispersed under the headings of the various towns to which they appertain, in the body of the work,—so that under each town might be given a complete conspectus of all that concerned the building trade of that town. We trust to see some or all of these suggestions adopted in future issues of this now indispensable work of reference.

VARIORUM.

"The Timber Trades' Directory" (London: W. Rider & Son, Bartholomew Close) has been issued. It professes to contain "the addresses of the leading timber merchants and saw-mill owners throughout the world." The title-page (there is no preface or introduction) states that the work has been compiled by l'Administration des Annaires d'Adresses, Paris, and the British section revised by the publishers of the *Timber Trades' Journal*, who, no doubt, have special facilities for ensuring accuracy. So far as we have been enabled to test it, the work is reliable and is sure to be useful. The foreign sections, such as French, German, and Italian, are compiled in the native languages.—"Benrose's Railway Rate Book" (London: Benrose & Sons), gives an alphabetical list of stations, sidings, and collieries on English railways, with ruled columns for entering rates,—a

useful memorandum-book for those largely engaged in transporting goods by rail.—“Iron-plate Weight-Tables,” compiled by H. Burlinson and W. H. Simpson (Crosby Lockwood & Co.), contains over 200 pages of schedules of weights of varying lengths and thicknesses of iron plate; useful to architect, engineer, and contractor, giving the weight of any size of iron plate from 1 ft. to 10 ft. in length, from ½ in. to 1 in. in thickness (by sixteenths of an inch), and from 6 in. to 5 ft. in width (by half inches).—Messrs. T. & W. Farmilos, of Rochester-row, Westminster, have lately issued a very complete and well-got-up illustrated catalogue, which may be described as a veritable *vide macum* of information about sanitary appliances and fittings, plumbing and glazing, work, gasfittings, paints, varnishes, &c. It contains upwards of 850 pages, and is strongly bound for reference. It will be found useful in every builder's office.—“Walks in Epping Forest,” by Percy Lindley (London: Published at 125, Fleet-street), is a cheap and very excellently-illustrated handbook to the forest-paths, with cycling and driving routes. Without vouching for its accuracy with regard to all historical and archaeological points touched upon, we can unreservedly say that the visitor to the Forest will find it only second in value to Mr. E. N. Buxton's capital guide to the Forest.—We have received from the author, Mr. W. L. Kellaway, a “Description of Scheme for the Development of the Site of Coldbath Fields Prison, Clerkenwell” (published by Goode Bros, Clerkenwell-green). Mr. Kellaway proposes the formation of two new streets, running diagonally from the existing corners of the site, with a great deal of open space in the form of gardens in the centre of the site and around the points of the intersection of the streets. The blocks of artisans' dwellings which he proposes for erection are situated on the borders of the site, and provision is made in separate blocks for costermongers' dwellings and stables for their ponies and donkeys. Mr. Kellaway's suggestions are worth consideration.—The *Commercial World* (published at No. 10, Adam-street, Strand) in a recent number published a very useful table, specially compiled from Parliamentary Returns, giving a comparative view of the premium incomes of ninety-one British life insurance offices.—Messrs. F. W. Reynolds & Co., of 73, Southwark-street, have recently issued a very useful illustrated catalogue of hardware goods and general ironmongery. It contains some specialities in locks and door and window fastenings generally.—From the Index Society (6, Hanway-street, Oxford-street) we have received Part I. (A to G) of the “Index to the Obituary and Biographical Notices in the Gentlemen's Magazine,” 1731–1780,” by Mr. R. Henry Farrar, F.R.H.S., which will be indispensable to explorers in that curious and interesting miscellany.—“The Tape Indicator Map of London, and Visitor's Guide” (C. Smith & Son, 63, Charing Cross) embodies an idea of great value and usefulness to the visitor or resident who is unacquainted with all parts of that vast province of houses which is called London. A tape bearing a series of numbers is strongly pivoted to one end of the map, and on the other three margins of the map is another series of numbers. The tape radiates from the pivot so as to enable it to be placed on any one of these marginal numbers. Strongly bound within the cover of the map is an alphabetical list of 7,000 streets,—this number including, of course, most of the principal streets, roads, and places in the metropolis. Opposite the name of each street is a map-number and a tape-number. By bringing the tape in a straight line across the map to the map-number, and by looking just above the tape at that part of it which bears the specified tape-number, the street of which one is in quest is at once found. But the map is scarcely large enough, and does not show sufficient of London south of the Thames. This is a defect that should be remedied in future issues.

Builders' Benevolent Institution.—The thirty-ninth annual dinner of this Institution will be held in the Hall of the Worshipful Company of Carpenters, London-wall, on Thursday, November 4th, the President of the Institution, Mr. Basil E. Peto, in the chair. We trust that the Institution will be liberally supported on this occasion.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,110, Pavements. J. Fabbri & Co., Praga (Cairo).

This invention relates to a pavement consisting essentially of a species of macadam wherein the sand or gravel which ordinarily binds the broken stones together in macadam is replaced by asphalt. Slabs are made also in the same manner and laid down for pavements.

11,128, Closets. C. Heywood.

The closet is insulated entirely, and a circulation of air is arranged over and under by means of the cavity which is around it. The entrance is over a grid on the floor line equal in width to the cavity on the side or end which is nearest to the entrance to the closet where it adjoins the house or passage leading to the same. The cavity at that side opens upwards between two doors. If the inner door is open the air will be carried into and ventilate the closet as well as the other cavities surrounding it; whilst, if both doors are closed, the ventilation will be confined to the cavities, and any annoyance from too much draught of air when the closet is in use will be thus avoided.

12,477, Improved Cowl or Ventilator. G. Smith.

The rotor is fixed at such an angle that the wind causes it to rotate and to actuate a fan or archimedean screw which exhausts the smoke or foul air. Above this is fixed a cowl-head kept in position against the wind by a vane or arrow, down-draught being thereby prevented.

12,700, Ventilation. J. Westmoreland.

A hollow beam is employed which has ventilating openings and a hollow flat-piece with junctions leading into chimneys or flues. The beam may be used as a trimmer, with means of securing it at each end to the flooring joists with bearings to receive the end of the joists supported by it. It may also serve as a carrier for the hearth-stone or its equivalent.

13,143, Shop Fronts. F. J. Chambers.

This patent relates to cast-iron shop-fronts, so constructed that they can be fixed up and glazed complete in a very short time. The improvements are also available on shallow sites of land without the sacrifice for constructive purposes hitherto necessary in erecting shops of this nature. The stanchions are cast hollow and without a back, but with a projecting lip on the inner surface of the sides. Wooden blocks are fixed and driven home by means of slate centre or key pieces, to be built in the party-wall where necessary. The wooden blocks being fixed, india-rubber filleting or tubing is glued or otherwise fixed to the iron or stanchion; the sheets of plate-glass are pressed home, a second india-rubber filleting is fixed against the glass, and the whole is secured by the match-boarding secured to the wooden blocks. Advertising panels, frames for stained glass, &c., are provided, and provision is also made for fire-proof partition walls between different shops in a row where brick division walls are unnecessary.

12,725, “Tie” or Interlocking Bricks. H. Blythe.

The object of this invention is to produce bricks of such a shape as to avoid side and end “straight joints,” which are common when ordinary bricks are used for walls, pit-shafts, &c., and to tie the work. The bricks have a lug or projection near the centre of one side, the other side of the brick being suitably recessed to receive the lug of another brick. The bricks are of variable shapes and patterns, all tending to the same end.

NEW APPLICATIONS FOR PATENTS.

Oct. 1.—12,643, F. Froulay, Saws.—12,464, W. Kinipple, Construction of Breakwaters, Harbours, Docks, Quay Walls, &c.—12,470, E. Long, Concrete Blocks.

Oct. 2.—12,492, W. Wood and A. Simmons, Installation of Stones on Wood Furniture.—12,494, J. Hunt and H. Nasse, Covering for Walls, Roofs, &c.—12,512, A. Waddell, Ventilating.—12,520, R. Baird, Slip Ladders.—12,537, A. Waddell and F. Redman, Sanitary Appliances for Water-closets, &c.—12,542, E. Blundatons, Plaster of Paris.

Oct. 4.—12,555, R. Atkinson, Gully for Excluding Sewer Gas.—12,552, C. Maxwell and S. Walker, Baths and Sinks.—12,558, W. Day, Chimney-pot and Ventilator.—12,597, H. Penmore, Look-up Ventilator for Buildings.—12,683, G. Goto and F. Beasley, Supplying Water to Water-closets, &c.

Oct. 5.—12,633, K. Pez, Mortise Lock.—12,638, J. Kelly, Telescope Ladder.—12,655, W. Thompson, Cooking Stoves.

Oct. 6.—12,702, E. Booth, Hanging and Opening Casement Windows.—12,711, J. Sanders and H. Thomas, Water Meter, &c.—12,745, E. Blackman, Lift.—12,749, J. Morris, Chimney Pots or Cones.

Oct. 7.—12,764, W. Harris, Trap for Waste-water Outlets.—12,771, W. Munns, Nail Holder.—12,774, T. Hind and R. Lund, Grinding Paints, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

9,438, J. Parker, Composition for Paving Floors, &c.—9,725, W. Lawson, Hoist.—9,748, H. Whiteley, Regulating the Opening and Closing of Fanlights,

&c.—9,824, A. Muir, Mitreing Machines.—10,384, G. Nobes, Door Lock.—10,405, J. Wilson, Ventilation of Rooms.—10,464, C. Thornett, Fastening Window-sashes, either shut or partially open.—10,701, H. Sutcliffe, Ventilators for Preventing Down-draught.—10,860, E. Nunn, Bricks for the Reception of Nails, Screws, &c.—11,454, R. Hunter and J. Turnbull, Kitchen Ranges.—11,494, A. McLean and R. Smith, Manufacture of Pigments.—11,596, J. Dooley, Lavatories, Baths, Sinks, &c.—11,792, Viscount Grimston, Water-waste Preventers.—11,827, J. Ashworth, Stench Traps.—11,621, A. and E. Paget, Counters.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

14,949, T. Ransome, Fabrics or Materials for Preventing the Spread of Fire in Public and Private Buildings.—15,108, J. Gibson, Cooking Ranges and Stoves.—12,508, A. Kerr, Water-closet Cistern.—15,069, G. Bonehill, Metal Stair Nosings, Floors, &c.—15,004, D. Gill, Room Doors and Doorways.—229, J. Hendra and W. Gooding, Stair-treads, Doorsteps, &c.—10,653, W. Withington, Outlet for Sinks, &c.—10,915, H. Haddon, Quarrying.—11,310, A. Fowler, Privies and Water-closets.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 5.

By DEBENHAM, TEWSON, & CO.
West Dulwich—Allyn House, and la. 1r. 13p., 56 years, ground-rent 37l. 10s. 22,310
Holborn—11, Greville-street, freehold 840

By Messrs. FLOOD.
Cavendish-square—3, Henrietta-street, 8 years, ground-rent 80l. 1,100
Notting hill 5, Notting Hill-terrace, 38 years, ground-rent 9l. 9s. 610

By H. A. HARRISON.
Lisson-grove—8, Great James-street, 6 years, ground-rent 7l. 7s. 50
Plaistow—32 and 34, Stratford-road, freehold 550
East-road—A plot of freehold land 100

By J. McLAUGHLIN & SONS.
Clapham, The Chase—A plot of freehold land 1,325
Small cottage, 27 years, no ground-rent 165

By FLEURBAET & SON.
Whitechapel—1, Cambridge-road, freehold 1,600
Barnes—3, Northumberland-avenue, 88 years, ground-rent 24l. 2,050

By BELTON & SONS.
Barking-road—The Liverpool Arms Public-house, freehold 1,780
Burnham-street—Gilbert's cottage, freehold 490

Wandswoth-road—The Bolingbroke Hotel, freehold 2,110
Fetter-lane—An improved rental of 60l. a year, 45 years 710

OCTOBER 6.

By T. E. WATSON.
Baling—65 and 67, Oxford-road, 75 years, ground-rent 14l. 430
Kentish Town—25, Prince of Wales-crescent, freehold 590

Upper Holloway—39, Salisbury-road, 81 years, ground-rent 6l. 495
Kentish Town—16, Victoria-road, 61 years, ground-rent 1l. 10s. 200

Holloway—Ground-rents of 100l. a year, reversion in 62 years 415
142, Eilthorpe-road, freehold 205
15, Milton-grove, freehold 250

34, Hampden-road, freehold 249
By DALM & SON.
Poplar—1 to 5, Stephen's-acre, 14 years, ground-rent 20l. 60

Ratcliff—34, 36, and 38, Love-lane, 10 years, ground-rent 35l. 70
Mile End—60, Clark-street, 12 years, ground-rent 3l. 100

St. George's-in-East—2, Ann-street, 14 years, no ground-rent 65
Mile End—64, Exmouth-street, 15 years, ground-rent 4l. 130

Bethnal-green—1 to 5, The Terrace, freehold 2,400
17 and 19, Old Ford-road, freehold 1,860
Land tax of 18l. 4s. a year 490

By BELTON & SONS.
Upper Holloway-road—No. 68, term 71 years, ground-rent 122l. 10s. 500
Holloway-road—Ground-rent of 25l. a year, reversion in 18 years 530

Ratcliff 15, Leather-lane, freehold 1,300
Upper Mitcham—Two cottages, a house and shop, and four plots of land, freehold 1,429
Stoke Newington—177, High-street, copyhold 1,630

By C. R. CROSS.
Wandswoth—65, High-street, freehold 1,500
Battersea—33 and 33, Duddington-grove, 67 years, ground-rent 24l. 685

OCTOBER 7.

By HARRIS & JENKINSON.
Balham—The residence called Kingthorpe House, 49 years, no ground-rent 2,140
Jamaica—The Flamstead, Mount Elizabeth, Mossman, Mount Trafalgar, and part of Mount Henry Sugar Estates, 912 acres 1,120

By J. A. & W. TRAPP.
Sutton—27 to 213 odd, High-street, 62 years, ground-rent 2l. 10s. 625
Leatherhead, Kingston-road A plot of copyhold land 50

North-street—Six copyhold cottages 430
Fair Field—Four copyhold cottages 260
By C. D. FIELD & SONS.
Holloway-road—Ground-rent of 8l. reversion in 15 years 1,680

6, George's-road, and a plot of land, freehold 1,260
The freehold beer-house, the White Hart 800
10 to 28 even, George's-road, and 11 to 18, Milton-place, freehold 2,810

OCTOBER 8.	
By BAKER & SONS.	
Islington—40 and 41, North-street, 37 years, ground-rent 107. 10s.	£730
By W. A. BLAKEMORE.	
Regent's Park—The lease of 1 and 1a, Upper Park-place, term 11½ years	170

MEETINGS.

SATURDAY, OCTOBER 10.	
Liverpool Architectural Society.—Visit to Rainhill Asylum. Train leaves Lime-street Station at 2:15 p.m.	
MONDAY, OCTOBER 12.	
Royal Academy.—Professor John Marshall on "Anatomy." IV. 8 p.m.	
TUESDAY, OCTOBER 13.	
Institute of British Carriage Manufacturers.—Professor John Marwood on "Canadian Timbers suitable for Carriage-Building" (Town Hall, Westminster). 7 p.m.	
Manchester Architectural Association.—Conversations in Lecture Hall of the Athenæum. 7:30 p.m.	
Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. I. By Professor David Masson (Masonic Hall, Edinburgh). 8 p.m.	
WEDNESDAY, OCTOBER 20.	
Royal Academy.—Professor John Marshall, on "Anatomy." V. 9 p.m.	
FRIDAY, OCTOBER 22.	
Architectural Association.—Opening Address by the President, Mr. J. A. Gutch. 7:30 p.m.	
Royal Academy.—Professor John Marshall on "Anatomy." VI. 8 p.m.	
Bradford Historical and Antiquarian Society.—Mr. J. P. Fitchett, F.R.I.B.A., on "The Great Medieval House of Neville." 7:30 p.m.	
Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. II. By Professor David Masson. 8 p.m.	

Miscellaneous.

The Sold Portions of the Buelencluch Estate.—Sir J. Whitaker Ellis, M.P., has purchased as a residence the Buelencluch mansion on the estate which is about to be acquired by the Richmond Vestry as pleasure-grounds for the people. The price is 6,000*l.* There is very little ground attached to the house beyond the lawn, which, according to the conditions of the purchase, is to remain intact. The proposal to continue through the lawn the towing-path has been abandoned, as not affording advantages equal to the great expense and depreciation of property involved in the construction in the path. Sir J. Whitaker Ellis intends, it is believed, to make the mansion his own residence. General satisfaction is expressed in the town that this part of the estate has fallen into the hands of no public-spirited native of Richmond as the gentleman mentioned, who has also promised a donation of 500*l.* towards the expense of substituting an open railing for the wall which now encloses the upper grounds. The Three Pigeons, which formed part of the estate, has been purchased by Mr. Messum, the well-known boat-builder, for 5,000*l.*, while it is believed that the Vestry have an offer of 4,000*l.* for the stables. The Richmond Vestry will thus realise 15,000*l.* from the sold portion of the estate. The Vestry are, as previously announced, empowered to raise a loan for the balance of the purchase-money.

Drainage Inquiry at Acton.—Major Talloch, R.E., Local Government Board Inspector, held an inquiry on the 7th inst. at the offices of the Acton Local Board in respect to an application for sanction of a loan to borrow 25,000*l.* for works of sewage and sewage disposal. Mr. MacSwiney, who appeared for the Local Board, stated that the loan for which the Board now asked power to raise was part of the sum originally applied for (75,000*l.*) to carry out the whole of the new drainage works, but the Local Government Board had given its sanction from time to time to only portions of the loan, so that it might have some control over the expenditure and works. The scheme was originally prepared by Sir Joseph Bazalgette, but since then the Board had, by the advice of its surveyor and Mr. William N. Lailey, and the approval of Sir Joseph, diminished the proposed size of the effluent sewer through Chiswick to the Thames, so as to obviate probable objections on the part of Chiswick authorities and private owners. The pipe was diminished from 5 ft. to 2 ft. diameter, and an additional tank for the storage of the effluent water at the pumping station during flow tides has been erected to meet the circumstances arising from the reduced capacity of this sewer. By this alteration a saving of not less a sum than 7,000*l.* was effected. With regard to the proposed treatment of the sewage the Board were still in negotiation with the Native Guano Company to treat it on the ABC system, but it was possible that this might fall through, and, if so, the Board would

probably treat it. The tanks for which a contract with Messrs. Mowlem & Co. existed would be available for any system that might be adopted. Mr. Hardy, a ratepayer, persisted in criticising the action of the Board, notwithstanding that the Inspector told him the case of the Local Board should be heard first. Major Talloch stated that, if interrupted in the proceedings, he would pack up his books, and the Local Government Board, which was not bound to hold an inquiry, could get what information it wanted otherwise. Mr. Lailey, the Acton surveyor, Mr. Jones, the Ealing surveyor, gave evidence in regard to the desirableness of the alterations, and the inquiry closed, Major Talloch remarking that the Local Government Board were satisfied with the effectiveness of the scheme.

The Recent Case of Suffocation in a Well.—A painful story of death from misadventure, which in this as in so many other cases means death from ignorance or carelessness, was investigated the other day by Dr. Danford Thomas. A prisoner in Pentonville Gaol volunteered, with a colleague, to descend a dianaed well for the purpose of removing pumps. The danger of such a proceeding is manifest, and it is reported that the authorities were warned of the danger, and the jury certainly appended a censure to their verdict. One of the men died, and the other was so much affected that he had to go to a hospital. It is scarcely necessary to remind our readers that the utmost caution should be used before entering any well or confined space. Carbonic acid generates under a variety of conditions, and its action, even in small quantity, is not only poisonous, but paralyzing. The candle test is, when properly used, sufficient. If the candle burns clear and bright to the very bottom, there is no danger, but if it does not go to the bottom, there is always a possibility that carbonic acid, which is half as heavy again as air, may lie there, as in the celebrated Grotto del Cane, in which a man can stand, while a dog is asphyxiated. It is commonly supposed that carbonic acid accumulates only in old or disused wells. This is a dangerous delusion. We were present a few years ago at an inspection of a new well on the estate of our lamented editor, the late Dr. Wakley. The well had only been sunk a few weeks before in a country place remote from houses. It was loosely covered, and one of the men was about to descend for the purpose of inspection, when Dr. Wakley, with characteristic caution, insisted that a candle should be lowered first. It went out before it had gone 6 ft.; and it is certain that if the man had gone down, as he proposed, he would have fallen lifeless to the bottom. The generation of carbonic acid below the surface of the earth is apparently capricious. The curious pits or caves, some of them more than a 100 ft. in depth, which abound in the neighbourhood of Bexley, in Kent, contain no carbonic acid, as we can testify from personal experience, although they are said to have been excavated in prehistoric times; whereas, as in the instance already quoted, the gas may accumulate in a perfectly new chamber. The mere extinction of a flame is not a sufficient indication of danger. If the candle burns dimly there is risk, for the gas acts on living beings as on candles, and insensibility, or exhaustion tantamount to it, may be produced by a quantity of carbonic acid which would not immediately kill.—*Lenest.*

Birmingham Architectural Association.

On Saturday afternoon last the members of this Association made a visit to the new premises for the Staffordshire Joint Stock Banking Company, and the new Rectory now nearly completed for Canon Bowlby, rector of St. Philip's Church, Birmingham. The two buildings adjoin each other, and form very prominent features at one angle of the churchyard abutting in Temple-row. Mr. W. Doubleday is the architect of the new bank, which is built of Bath stone in a somewhat free Classic style. The total cost of the building, exclusive of shopping and offices, which are to be added, is about 11,000*l.* Messrs. Bennett & Son, of Sheffield, are the contractors. Messrs. Osborn & Reading are the architects to the Rectory, which is faced with Hollington stone, and built in the Renaissance style of architecture. Messrs. Barker & Son, of Birmingham, are the contractors. After a close inspection of the many interesting details of both buildings, the members dispersed about five p.m.

Sale of Two Building Estates at Harold Wood.—On Monday last Messrs. Baker & Sons, who have held two sales of the property within the last few weeks, sold the remaining portion of the Oakleigh Park Estate. The number of lots submitted was 132, most of which have frontages varying from 15 ft. to 18 ft., and depths of 100 ft. to 130 ft., the prices realised ranging from 10*l.* to 18*l.* each. A corner tavern plot, at the extreme north boundary of the estate, facing Squirrel's Heath-road, the main high road from Romford to Upminster, having a frontage of 29 ft. to Squirrel's Heath-road, but narrowing to about 16 ft. in the rear, and a return frontage of 126 ft. to Archibald-road, caused a very close and warm competition between two bidders. The biddings commenced at 20*l.*, and the property was ultimately sold for 106*l.*, being at the rate of about 1,400*l.* an acre. The conditions stipulated that not less than 400*l.* is to be expended in the erection of the hotel. A plot at the north-west portion of the estate, bounded by Ingrebourne Brook, having a frontage of 16 ft. and a depth of 280 ft., with a large area in the rear, enclosed east and west by the brook, was sold for 57*l.* The estate, upon which upwards of 400 houses and shops are to be erected, has realised an average of from 350*l.* to 400*l.* an acre. Having disposed of the above-named property, the auctioneer next submitted the Avenue-road Estate, situated on the south side of the railway, and also close to the Harold Wood Station. The estate is about six acres in extent, and has been divided into eighty-two plots, all of which were offered. Nearly the whole of the plots have frontages of 17 ft., and depths of 70 ft., the prices realised for the private house plots being from 8*l.* to 12*l.* each, and for the shop plots 15*l.* and 16*l.* each. An hotel plot, having a frontage of 25 ft., and a return frontage of 65 ft., realised 64*l.*

The Queen's Park Estate at Loughton.—On Monday evening Messrs. Croucher & Co. offered for sale, as the Crown Hotel, Loughton, the second and remaining portion of the Queen's Park Estate, situated on the borders of Epping Forest, and within a short distance of Loughton Station on the Woodford, Loughton, and Ongar branch of the Great Eastern Railway. The estate occupies an area of about 15 acres, and has been laid out for the erection of about 130 private residences. That portion of the estate facing the high road from London to Epping was sold a few weeks since, and the lots offered on Monday last, sixty-four in number, consisted of the central part of the estate, on each side of Queen's-road, a new road 50 ft. in width, which has just been formed. There was a very large attendance, the sale-room being much crowded. The several plots have frontages of 25 ft. each, varying in depth from 130 ft. to 212 ft. With few exceptions all the lots were sold, the smaller lots realising from 25*l.* to 28*l.* each, whilst those having a depth of 200 ft. and upwards were sold at from 33*l.* to 36*l.* each. A corner plot, having a frontage of 54 ft. to Queen's-road, and 195 ft. to Pump Hill, realised 76*l.*; and another corner plot, having a frontage of 110 ft. to Queen's-road, and a depth of 150 ft. to York Hill, was sold for 136*l.*

Evening University Lectures at King's College, London.—Special courses of lectures, commencing on October 25, will be given at King's College during the ensuing Winter Session of the Evening Classes. The subjects will chiefly be treated with a view to assisting independent study. Among the courses will be the following, viz., "Iron and Steel," by Mr. Walter G. McMillan, F.C.S. In this course it is proposed to treat of the general methods by which the different qualities of malleable iron, cast iron, and steel may be produced and prepared for use in the Arts; of the effect of the various foreign substances contained in these metals upon their strength and fitness for the purposes to which they are to be applied; of the extent to which these substances are injurious, and the means by which they are commonly eliminated.—"The Geometry of Newton," by Professor W. H. Hudson, M.A. This course will consist of detailed explanations and illustrations of Newton's reasoning, and also of applications of Newton's method to the geometry of certain particular curves of practical importance.—"The Roman, Etruscan, and Græco-Roman Monuments in the British Museum," by Professor G. C. Warr, M.A. The object of these lectures is to explain the historical monuments and art collections in the above departments of the British Museum.

The New Street through "The Mint," Southwark.—The long-delayed new street through that notorious locality known as "The Mint," in the Borough, is at last in course of formation. The haunts of Jack Sheppard and Jonathan Wild are now no more. The *Southwark Standard* says with regard to the improvement that in 1840 the late Mr. A. J. Hiscocks, F.R.I.B.A., District Surveyor of Wandsworth and Tooting, succeeded in obtaining the necessary Parliamentary powers for the formation of a street from Blackman-street to Rowland Hill's Chapel, Great Charlotte-street, Blackfriars-road. The construction of Southwark-street was the reason for abandoning this scheme. The author of the present scheme for the formation of a new street, 60 ft. wide, from Blackman-street to Southwark Bridge-road, is Mr. A. Hiscocks, C.E., the present Surveyor to the parish of St. George-the-Martyr, who in 1875 took an active part in urging the Vestry to take the necessary steps to obtain Parliamentary powers for its construction, which were obtained in 1877. The Industrial Dwellings erected by Sir Sydney Waterlow's Company in the Mint will afford ample accommodation for the persons whose houses have been demolished, the new buildings being replete with every convenience, both as to sanitary and domestic requirements. The South-Eastern Railway Company are responsible for much of the delay that has occurred in carrying out this improvement, in consequence of their requiring some of the property already taken for the street for their proposed new lines and widenings, crossing the line of the new street. This scheme has for the present been abandoned. The Vestry of the Parish of St. George-the-Martyr, Southwark, and their surveyor, are certainly entitled to the thanks of the community at large for the good work they have done in disposing of the nest of fever-dens and haunts of infamy that existed in the midst of one of the most densely populated and busiest localities in the metropolis. There is no doubt that the construction of this street will have the effect of relieving the congested state of the traffic of London Bridge by the diversion of the traffic through the new street over Southwark Bridge. The new street will debouch in the Borough High-street opposite to Great Dover-street (the approach to the Old Kent-road), thus forming a link in a continuous main thoroughfare between Wandsworth and Vauxhall (via Albert Embankment) and Greenwich.

Brickmaking under new Conditions.—Under this heading the *Rochester and Chatham News* gives some account of the measures which are now being employed in that neighbourhood to convey brick clay in a diluted fluid state from the ground where it is found, to the brickfields in pipes. The brick manufacturer is enabled, by means of Messrs. Taylor & Neate's slurry pumps, to prepare his earth upon the site from whence he draws his supply, and convey it thence in a liquid state through iron mains to the brickfield where it is presently to be converted into bricks. Messrs. Smeed, Dean, & Co., of Sittingbourne, who are very large brickmakers, have lately obtained an enormous supply of fresh brick-earth from a property about a quarter of a mile east of Tongue Church, and, nearly two miles distant from their present brickfields, Messrs. Taylor & Neate are carrying out engineering works which will enable the company to utilise their purchase at their existing brickfields. The most important feature of the undertaking is the set of pumps for pumping the washed brick-earth through a cast-iron pipe main to the brickfields. The pumps are designed to deliver sufficient brick-earth to make 1½ million of bricks per week.

New Government Offices at Christiania. The Norwegian Government have decided upon building a modern block of Government offices at Christiania, those now in use being old dwelling-houses spread over the town, and wholly unsuitable to present requirements. As yet, however, no invitations of tenders for design have been issued, the committee appointed for considering this question not having been able to decide whether the various departments should be located in one vast hall, presided over by the departmental chief, or in several minor offices. There is every probability of the former plan being adopted, and it is the intention of the Government to make the building worthy of the nation.

PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	6 10 0	7 0 0
Teak, E.I.	load	9 0 0	14 0 0
Sequoia, U.S.	foot cube	0 2 4	0 2 7
Ash, Canada	load	3 0 0	4 10 0
Birch	ton	2 10 0	4 0 0
Fir, Dantisc	ton	3 10 0	4 10 0
Oak	ton	2 10 0	4 10 0
Canada	ton	3 0 0	6 0 0
Pine, Canada red	ton	2 0 0	3 10 0
Yellow	ton	2 5 0	4 0 0
Lath, Dantisc	fathom	3 0 0	5 0 0
St. Petersburg	ton	4 0 0	5 10 0
Waincoat, Riga	log	2 15 0	4 0 0
Odessa, crown	ton	3 5 0	8 7 6
Deals, Finland, 2nd and 1st. std. 100	ton	7 0 0	8 0 0
Riga	ton	6 0 0	7 0 0
St. Petersburg	ton	5 10 0	7 0 0
2nd	ton	5 0 0	14 0 0
white	ton	7 0 0	8 0 0
Sweden	ton	7 0 0	10 0 0
White Sea	ton	6 0 0	15 0 0
Canada, Pine, 1st	ton	17 0 0	30 0 0
2nd	ton	12 0 0	17 0 0
3rd, 30	ton	6 0 0	10 0 0
Spruce, 1st	ton	5 0 0	11 0 0
3rd and 2nd	ton	5 0 0	7 10 0
New Brunswick, &c.	ton	5 0 0	7 0 0
Battens, all kinds	ton	4 0 0	12 0 0
Flooring Boards, sq. 1 in., prepared, first	ton	0 9 0	0 13 0
Second	ton	0 7 6	0 8 6
Other qualities	ton	0 5 0	0 7 0
Cedar, Cuba	foot	0 0 3	0 0 3 1/2
Honduras, &c.	ton	0 0 2 1/2	0 0 3 1/2
Australian	ton	0 0 2	0 0 3
Mahogany, Cuba	ton	0 0 4	0 0 7
St. Domingo, cargo average	ton	0 0 4	0 0 8
Mexican	ton	0 0 3 1/2	0 0 4 1/2
Tobacco	ton	0 0 4	0 0 6 1/2
Honduras	ton	0 0 4 1/2	0 0 6 1/2
Maple, Bird's-eye	ton	0 0 6	0 0 8
Rose, Rio	ton	7 0 0	10 0 0
Bahia	ton	6 0 0	10 0 0
Bor, Turkey	ton	5 0 0	17 0 0
Satin, St. Domingo	foot	0 0 7	0 0 8
Porto Rico	ton	0 0 8	0 0 1 1/2
Walnut, Italian	ton	0 0 4	0 0 5

METALS.

	£. s. d.	£. s. d.
Iron—Pig, in Scotland	ton	0 0 0
Bar, Welsh, in London	ton	4 7 6
" " in Wales	ton	4 2 8
" " Staffordshire, London	ton	5 10 0
Sheets, single, in London	ton	6 15 0
Hoops	ton	6 0 0
Nail-roads	ton	5 10 0
Copper—		
British, cake and ingot	ton	43 0 0
Best selected	ton	44 10 0
Sheets, strong	ton	52 0 0
" India	ton	0 0 0
Australian	ton	0 0 0
Chili, bars	ton	41 15 0
YELLOW METAL	lb.	0 0 0
LEAD—		
Pig, Spanish	ton	12 12 0
English, common brands	ton	12 17 6
Sheet, English	ton	13 15 0
SPRINT—		
Silesian, special	ton	14 5 0
Ordinary brands	ton	14 0 0
TIN—		
Banca	ton	0 0 0
British	ton	0 0 0
Straits	ton	101 12 6
Australian	ton	102 0 0
English ingots	ton	106 0 0
ZINC—		
English sheet	ton	18 0 0
OILS.		
Linseed	ton	20 5 0
Cocoonut, Ceylon	ton	33 5 0
Ceylon	ton	25 15 0
Copra	ton	0 0 0
Palm, Lagos	ton	23 0 0
Palm-oil Kernel	ton	0 0 0
Rapeseed, English pale	ton	21 15 0
" brown	ton	20 5 0
Cottonseed, refined	ton	17 10 0
Tallow and Oleins	ton	25 0 0
Lubricating, U.S.	ton	8 0 0
" refined	ton	8 0 0
TAR—		
American, in casks	cwt.	1 8 6
Stockholm	barrel	0 15 0
Archangel	barrel	0 10 6

CONTRACTS.

Epitome of Advertisements in this Number.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Stoneware Socketed Drain Pipes	Enfield Local Board	W. Kitteringham	October 20th	ii.
Sanitary improvements	Chichester Infirmary	Mark H. Judge	October 25th	xviii.
Making-up Roads	Wandsworth Bd. of Wks	Official	October 25th	ii.
Erection of Swing Bridge	Hull Corporation	A. E. White	do.	ii.
Homestead	Sor. of Burton-on-Trent	R. Waite	do.	ii.
Coals, Drain-Pipes, and Stores	Croydon Town Council	Official	do.	ii.
Road Formation and Construction	East Barnet Valley L. B.	do.	October 30th	ii.
Waterworks	Devonport Water Co.	P. & C. H. Hawkey	Nov. 1st	ii.
Hand Carriage Granite	Finchley Local Board	G. W. Brunell	do.	ii.
Rebuilding Pike Mills, Kidderminster	Watson Bros. & Co.	J. T. Meredith	Nov. 3rd	ii.
Construction of small Landing Pier	Rochester Corporation	Official	Nov. 8th	ii.
Sewerage Works	Sevenoaks R.S.A.	J. G. Hall, C.E.	Nov. 8th	ii.

TENDERS.

BROADSTAIRS.—For 5,000 ft. of granite kerbing, 12 ft. by 6 ft., for the Broadstairs and St. Peter's Local Board. Mr. E. L. Eiger, surveyor.

	Delivered at	Ramsgate.
	s. d.	s. d.
Mowlem & Co.	1 6	—
Treherne & Co.	1 4 1/2	—
Blower & Florence	1 6	—
Story	1 2	—
Tuckett & Sons	—	1 1
Marville	1 1 1/2	—
Chalk	1 0 1/2	0 11 1/2
Garden	0 11 1/2	0 11
West of England Co.*	0 9 1/2	—

* Accepted.

	Beach.	£s. per yard.
Whiting	—	—
Reader	—	—

CAMDEN TOWN.—For stabling, Delancey-street, Camden Town. Mr. C. E. Baker King, architect. Quantities by Messrs. J. S. Lee & Sons.

Buckridge	£3,400 0 0
Laing & Son	3,124 0 0
Paine Bros.	3,070 0 0
Castle	2,878 0 0
Manning	2,835 0 0
Dove Bros.	2,795 0 0
Martin	2,733 0 0
Macleay	2,737 0 0
Salt	2,757 0 0
Pattinson	2,750 0 0
Robson	2,740 0 0
Evans	2,739 0 0
Roper	2,737 0 0
Toms	2,717 0 0
Batley	2,685 0 0
Dobson	2,595 0 0
Wall Bros.*	2,574 0 0

* Accepted with reductions.

ENFIELD.—For additions and repairs, &c., to Chase Hill House, Enfield, Middlesex, for Mr. A. G. Kitching, J.P. Mr. W. D. Church, architect, South-place, Finsbury. Quantities by Mr. C. Stanger, Finsbury-pavement.

Field & Son	£2,332 0 0
J. Holloway	2,031 0 0
W. Shurmer	2,027 0 0
S. Godden	1,935 0 0
J. Patman	1,838 0 0
Fairhead & Son	1,797 0 0

KENSINGTON.—For completing and finishing the residences situate and being Nos. 68, 100, 102, 104, 110, 112, 114, and 116, Baron's Court-road, West Kensington, for Messrs. Hoare & Co. Messrs. Rogers, Chapman, & Thomas, surveyors, Belgrave-road.

G. T. Smith & Son	£1,446 0 0
Prestige & Co.	1,434 0 0
E. D. Hook	1,413 0 0
H. Smith & Son	1,225 0 0
Corden & Son (accepted)	879 0 0

LONDON.—For additions to the Congregational Memorial Hall, Farringdon-street. Mr. W. D. Church, architect, South-place, Finsbury. Quantities by Mr. C. Stanger, surveyor, Finsbury-pavement.

	estimate.	estimate.
Total	No. 1.	No. 2.
Colls & Sons	£10,500	£2,375
Dove Bros.	10,445	1,330
Asphy Bros.	10,250	1,400
Patman & Fotheringham	10,140	1,400
Perry & Co.	9,558	1,115
Churnur	9,200	1,100
Hall, Pettit, & Co.	9,710	1,243
Nightingale	9,700	1,200
Higgs & Hill	9,616	1,100
Woodward	8,600	1,070
J. Holloway	8,500	1,000
Brass & Son	8,333	1,050

LONDON.—For proposed new Fire Brigade Station, Great Marlborough-street, Regent-street, for the Metropolitan Board of Works. Mr. George Vulliamy, architect. Messrs. Nixon & Raven, surveyors.—

Higgs & Hill	£3,240 0 0
W. Martin	8,795 0 0
Wall Bros.	8,790 0 0
C. Wall	8,699 0 0
Staines & Son	8,953 0 0
Howell & Son	8,490 0 0
Mowlem & Co.	7,890 0 0
W. Brass & Son	7,873 0 0
Johnson	7,815 0 0
Oldrey	7,890 0 0
Stimpson & Co. (accepted)	7,860 0 0

LONDON.—For alterations to 47, Buckingham Palace-road. Mr. H. J. Treadwell, surveyor, Agar-street, Strand.—

Kiddle & Son	£2,685 15 0
Styles & Son	2,635 0 0
Grover & Son	2,678 0 0
G. & H. A. Bywaters	2,483 0 0
Drew & Cadman	2,300 0 0

LONDON.—For living-in wards at the New Workhouse, Garraworth, Wandsworth, for the Poor of the Wandsworth and Clapham Union, Mr. Thomas W. Aldwinckle, architect, East India-avenue, E.C. Quantities by Messrs. S. Young and W. B. Brown.—

Jewell	£2,143 0 0
Green	2,073 0 0
Church & Son	1,999 0 0
T. Holloway	1,960 0 0
A. & E. Braid	1,850 0 0
J. M. Macey & Son	1,853 0 0
Howell & Son	1,850 0 0
H. L. Holloway	1,847 0 0
Kirk Bros.	1,840 0 0
Staines & Son	1,839 0 0
Peters	1,825 0 0
Simmons	1,820 0 0
Turtle	1,793 0 0
Battley	1,788 0 0
Stephenson	1,771 0 0
Nightingale	1,769 0 0
W. Johnson	1,750 0 0
Mowlem & Co.	1,693 0 0
Kirk & Randall	1,684 0 0
D. Brown & Co.	1,647 0 0
Hammond, Battersea (accepted)	1,648 0 0
W. G. Wyatt & Co. (withdrawn)	1,475 0 0

LONDON.—For alteration at the Feathers, Great Chapel-street, Westminster, for Mr. C. Gurney. Mr. H. E. Pollard, architect, Duke-street, Adelphi.—

Years & Co.	£470 0 0
Lang & Son	553 0 0
Richardson	549 0 0
Jackson & Todd	548 0 0
Ward & Lambie (accepted)	339 0 0

LONDON.—For new back addition and alterations to No. 42, Beaumont-street, Portland-place, for the Misses Wilson. Messrs. Habershon & Fawcett, architects, Bloomsbury-square.—

W. Groom, Dalwich (accepted)	£231 0 0
------------------------------------	----------

MAIDENHEAD.—For residence, with conservatory and stables, at Maidenhead Court, Maidenhead, for Mr. W. Hatchell, Mr. Geo. Pearson, architect, Warfield-cour.—

W. Creed, Maidenhead	£2,009 0 0
O. W. Cox, Maidenhead	1,993 0 0
Snell & Co., Maidenhead	1,990 0 0
W. Woodbridge, Maidenhead	1,960 0 0
Little & Senecal, London*	1,747 0 0

* Accepted.

PADDINGTON.—For powdering work at the Redan, Westbourne-grove, for Mr. Vesale. Mr. F. J. Kelle, architect.—

J. Warr	£107 0 0
T. Heath	91 0 0
W. Helling (accepted)	78 15 6

SOUTH TOTTENHAM.—For an addition and shop front to house, South Tottenham. Mr. J. W. Couchman, architect.—

G. L. Wilson & Co.	£202 10 0
Grove	188 19 0
H. Knight & Son	169 19 0

STRATFORD.—For the erection of new drill-hall and stabling in The Green, for the 2nd Volunteer (Essex) Brigade Eastern Division Royal Artillery. Mr. James F. Wesley, architect, Forest-gate. Quantities supplied.—

Hearle & Son	£860 0 0	Stabling	£222 0 0
J. W. Wyles	675 11 0	...	196 8 0
S. Davis	696 0 0	...	171 10 0
J. A. Taylor	639 0 0	...	206 0 0
M. Gentry	635 0 0	...	189 0 0
J. Walker	570 0 0	...	300 0 0
M. A. Palmer & Co.	699 0 0	...	190 0 0
W. Watson	591 10 0	...	153 10 0
J. Brickell	500 0 0	...	155 0 0

For Iron Roof to Drill Hall.

Walker Bros.	£445 0 0
Gospel Oak Iron Co.	439 0 0
Croghan & Co.	246 10 0
Whitford & Co.	235 0 0

For Repairs and Painting, &c., at the Head Quarters.

J. T. Robey	£255 0 0
J. W. Wyles	346 19 9
J. Walker	338 0 0
A. & A. Emmott	235 10 0

WOODFORD-GREEN.—For villa residences at Woodford-green, Woodford, Essex, for Mr. J. R. Roberts. Mr. J. Kingwell Cole, architect.—

J. O. Richardson	£2,944 and £2,830
Bentley	2,921 " 2,671
Wells	2,883 " 2,456
Wall Bros.	2,866 " 2,420
Perry & Co.	2,640 " 2,510

Premises, Bishopsgate-street.—By a printer's error in the list of tenders for the erection of premises, No. 104, Bishopsgate-street, London, in our last, the amount of Mr. B. E. Nightingale's tender was put at £1,297. It should have been £7,129.

St. Clement's Vestryage, Fulham.—By another typographical error the firm of Messrs. Holland & White; for this work was stated to be "Holland & White"; it should have been "Howland & White."

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADES, AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under 4s. 6d.
Each additional line (about ten words) 6s. 6d.
Terms for Series of Trade Advertisements, also for special Advertisements in front page, Competitions, Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

Four lines (about thirty words) or under 2s. 6d.
Each additional line (about ten words) 6s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

* Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post Office, Covent Garden, W.C. to DOUGLAS FOURDRINER, Publisher.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C. free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 18s. per annum PREPAY. To all parts of Europe, America, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

D. R.-T. C. M.-T. & N.-T. A. (amounts are wanting)—H. & Co. (ditto).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

Not.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT DESIRED. All communications regarding literary and artistic matters should be addressed to THE EDITOR, all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone for Winter Use.

CORSHAM DOWN, } SUMMER DRIED.
FARLEIGH DOWN, }

BOX GROUND, COMBE DOWN.
WESTWOOD GROUND.
RANDELL, SAUNDERS, & CO., LIMITED,
CORSHAM, WILTS.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, WILTS. [ADV.]

Doubling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doubling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADV.]

Doubling Free Stone For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, BLUE LIAS LIME Stoke - under - Ham, (Ground or Lump), Ilminster. [ADV.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.

Seyssel, Patent Metallic Lava, and White Asphalte.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [ADV.]

MICHELMORE & REAP, Manufacturers of

CHARLES COLLINGS' PATENT.

COLLINGS' PATENT HINGES, LEVER, SCREW, & BARREL BOLTS, Self-acting "FALL DOWN" GATE STOPS, and IMPROVED GATE FITTINGS of every Description, 364, BOROUGH ROAD, DISCOUNT TO BUILDERS. LONDON, E.E.

DRABY'S PATENT GLAZING.

GLASS SET FREE.

ALLOWING EXPANSION AND CONTRACTION, AND PRECLUDING BREAKAGE.
ABSOLUTELY WATERTIGHT. PAINTING AND PUTTY SUPERSEDED.

OVER THREE MILLION FEET FIXED.

DRAWINGS AND PRICES ON APPLICATION.

- MODELS AND SECTIONS ON VIEW. -

LONDON: 352 to 364, EUSTON ROAD. LIVERPOOL: 6 and 8, HATTON GARDEN. GLASGOW: 335, ARGYLE STREET.

ILLUSTRATIONS.

Waiting Hall, Great Indian Peninsular Railway Terminus, Bombay.—Mr. F. W. Stevens, Architect	592-593
Maison de Repression, Nanterre, Infirmary Building.—M. Achille Hermant, Architect	596
Entrance Corridor to the Waiting Hall, Great Indian Peninsular Railway Terminus, Bombay.—Mr. F. W. Stevens, Architect	597
Details of Carving, Great Indian Peninsular Railway Terminus, Bombay	600
Sculpture at the Edinburgh Exhibition: "Cleopatra."—By Mr. G. A. Lawson	601
Holborn Union Workhouse, Mitcham.—Messrs. H. Saxon Snell & Son, Architects	604
Cottage Architecture in Kent.....	605

CONTENTS.

Mosaic Pavements and their Teaching	591	Sculpture: "Cleopatra"	598	Interpretation of By-laws.....	612
Ventilation of Sewers.....	593	Scotch Cottages	598	The Diminishing Remains of Roman Bath	612
The British School at Athens.....	593	Great Indian Peninsular Railway Terminal Buildings, Bombay	598	A Cement Quarry	612
Notes.....	594	A Timber-drying Apparatus.....	608	The Student's Column: Stone Quarries.—XVII.	612
The New "Maison de Repression," Nanterre (with Plan)	596	The North Sea Canal	608	Recent Patents	613
The Parment of St. Mark's	598	The Carpenters' Company and Technical Education	609	Recent Sales of Property	613
Early Roadway Art at South Kensington Museum	597	The Engineer of Russia's New Castle at Spala	609	Meetings	613
Association of Municipal and Sanitary Engineers and Surveyors:		Leeds and Yorkshire Architectural Society	609	Large Sale of Houses and Ground-rents in South London.....	613
Examinations	598	New Sewage Works at Bolton	611	Miscellaneous	613
Workhouse for the Able-bodied Poor of the Holborn Union (illustrated)	598	St. George's Hall, Liverpool.....	611	Richmond Drainage Scheme	614
		"Federation" Circulars.....	612	Prices Current of Building Materials	615

Mosaic Pavements and their Teaching.



F all the relics of the Roman occupation in Britain which in any way claim the attention of the artist of modern days, none surpass the pictorial and ornamental tessellations of mosaic

pavements,* which are found to have embellished so many villas and edifices that still mark the spot where the foreign conqueror centralised his civilising influence over the neighbouring rude and inartistic population. To a people like the ancient and uncultured Britons in the first and second centuries of our era, whose undoubted relics indicate utility and ruggedness, innocent of any real attempt to combine human need with the divineness of artistic beauty, a people whose coarse earthen urns and simple weapons sufficiently indicate the primitive character of their life, Roman fine arts must have been little short of a revelation. The few remains of domestic dwellings that can safely be attributed to the inhabitants of Britain when the Romans first made their appearance on the southern shore seem to be mere conglomerations of huts with imperfectly circular plan, fortuitous doorway, and little indication of permanent floor or roof, but the Roman idea of architecture was in the main of an entirely different order, distinguished (as befitted that great race of stalwart soldiers who owed their world-wide power to military foresight and strategies), by solid and enduring stonework, quadrangular in plan, and endowed with more or less symmetry of design. Thus it is, that although no two Roman villas or other buildings in England indicate any great closeness of conventional form in their entire ensemble, yet there are abundant perfectly intelligible details of proportion, fashion, material, and appearance, which enable the practised antiquary and the architect without difficulty to attribute to its proper origin any fragment of a building, however small it may be.

One of the most important details of the Roman edifice, whether public or domestic, sacred or profane, which had any pretension to strength or influence, was the pavement, upon which, as upon the stucco which covered the walls and the stonework which adorned the

façades, the Roman art-designer quickly seized as a vehicle for the exhibition of his ornamental handiwork. Our province on this occasion is confined to the pavement, which Mr. Thos. Morgan has illustrated in his work in a manner well becoming the subject of which it treats, but an equally beautiful and attractive companion volume might be written about the decorative patterns on the walls and the subjects sculptured on Roman stonework extant in the form of temples, altars, sarcophagi, and other enduring examples of that people's stonework. It is, perhaps, remarkable that in these late days, when the extensive labours of so many archaeological societies have recorded in their respective journals and transactions such a vast collection of miscellaneous records of Roman remains discovered in England, no one, until Mr. Morgan wrote his work, had attempted to place a summary of the Romano-British mosaic art before the world. Lysons, in his well-known "Reliquie," published at the beginning of this century, endeavoured to do so, but the magnitude and expense of the work naturally deprived it of that popular and comprehensive character which belongs to the work before us. Wm. Fowler in 1796-1818; J. R. Smith in 1850; and the learned C. Roach Smith, at a later date, have also given some attention to Romano-British mosaics.

These British relics date, it is stated, principally from a period not much earlier than the Gordians, or about A.D. 244, and for the most part follow the direction of the Roman roads which have been recorded in the "Itinerary of Antoninus," of which the author gives a copy, illustrating it with a capital account of the progress of civilisation along the course of the main roads leading from the south to such distant parts of the island as Cockermouth in Cumberland, Carnarvon, Chester, and Carmarthen. He discusses also the two classes of subjects which in Romano-British mosaics are generally found in combination, viz.: the Myth of Orpheus, or the resistless power of music personified, for music was the constant accompaniment of the Roman feast,—and by no means exclusively Roman;—and the Myth of Bacchus, who in turn may be considered as the personification of refined luxury. These myths, combined with varieties of symbolism and astronomical or season emblems, set in frames, as it were, of elaborate patterns to which the little tessellæ or rough-hewn stone cubes of various hues easily and happily lend themselves, suffice to illustrate, as they themselves are in like manner illustrated by, numerous passages in the writings of the classical and post-classical authors. The banquet of the rich and luxurious Roman could not have been, as some would have it, little better than a barbarous and hasty meal,

for in rooms devoted to the feast, such as those still extant in area at least at Bignor, Brading, Woodchester, and Cirencester, the one surviving witness to the refinement of domestic life attests by implication how ceremonious must have been the concomitant methods of daily life in the hall of the Roman governor and landed proprietor in Britain.

In many cases these remarkable pavements have been ruthlessly destroyed or seriously injured; even now there exists no accepted means of securing fine examples of them from the destructive agency of careless but absolute ownership. The greedy march of civilisation, the ploughman, and the gravedigger efface some, as at Woodchester and London; in others, an ineffectual attempt to shelter them from weather only retards the evil day of destruction; some have been covered over again with earth, which, perhaps, is a safe means of obliterating, and, so far, preserving them, but this is unsatisfactory, and an admission of our inability to conserve them in a more useful manner; and others, finally, have been removed, more or less successfully, to museums and private collections, but want of floor space in our national Museum compels the authorities to affix them to walls and set them upright, which is as incongruous a treatment as if urns or altars were to be laid on their sides. The catalogue of them is, however, a goodly one, and extends to more than 180 examples, arranged by Mr. Morgan according to counties. This list, moreover, does not pretend to completeness, but may be taken to comprise all those worthy of record for comparison by future inquirers who may desire to follow up a study shown in this book to be so attractive and so instructive. If these pavements were so common in the time of Seneca,—one of the richest periods of Roman history, when the meridian of its vitality had just passed, and the decadence which inevitably follows the heaping up of wealth had set in,—that he was accounted but a poor man who could not afford a tessellated pavement in his best room, there must, indeed, be many more such relics scattered throughout the length and breadth of the land awaiting the future discoverer, at a time when we hope a more intelligent generation even than the present will not be slow to recognise the paramount necessity of extending a Parliamentary protection to them by way of recognising the value of these ancient evidences of an art now lost; for modern mosaics, of which Mr. Morgan shows a coloured picture of one of the finest are, except in rare instances, at best but travesties. Wellow, in Somersetshire; Woodchester, Chedworth, and Cirencester, in Gloucestershire; Horkstow and Barton-on-the-Humber, in Lincolnshire; Caerwent, in Mon-

* Romano-British Mosaic Pavements: a History of their Discovery and a Record and Interpretation of their Designs, with plates, plain and coloured, of the most important mosaics. By Thos. Morgan, F.S.A. London: Whiting & Co., 1886.

mouthshire; Littlecote Park, Wilts; Stansfield and North Leigh, Oxon; Aldborough, Yorkshire; Wingham, Kent; many sites in London; Bignor, Sussex; Frampton, Dorset; Itchen Abbas, Hants; and Morton, near Brading, in the Isle of Wight, are the fortunate sites of some among the many which appear to indicate more than usually interesting characteristics. In conclusion, Mr. Morgan devotes considerable space to the consideration of the British and foreign pavements exhibited in the British Museum; but as we have already given a full account of these in the *Builder* for 1882 (vol. xlii., p. 757), it is not necessary to do more than refer the reader to that notice. This is followed by an illustrated chapter on Roman coins, having reference to British history during the period covered by the age of the pavements, A.D. 46-388; and notes on the Itinerary of Antoninus.

Reviewing the themes delineated in these stone pictures, it will be noticed that the subjects most frequently repeated are:—Orpheus with his lyre, taming the wild animals, which pass along in slow and measured step in a circle around him. There are nine of these examples altogether. Bacchus, with his companion panther, occurs six times; and without that accessory emblem, once, at Frampton. The *cantharus* or wine-jar of this deity, its emblem of the *symposium*, is seen at no fewer than eleven villas. Harmonia, the mystic wife of Cadmus, or the Music of the Spheres, once, at Morton; the Seasons, or four quarters of the year, occurs at least four times; and at Morton are seen three of the four parts which held to the constitution of the day, viz., *gallicinium* or cockcrow, *conticinium*, the midway period, and *diluculum*, or twilight. Neptune and cognate marine themes appear in eight examples. Other subjects of single or infrequent occurrence are,—*Lycurgus*, the enemy of Bacchus, with his axe; the bleeding head of Pentheus upheld by his mother Agave; Juno, the Junonian peacock, and Iris her messenger; Mercury; King Morpheus and the nymph Chalcamedia; Actæon; possibly Isis, with her peculiar musical rattle or *sistrum*; Cupid; *Æsculapius*; Hercules; and Antæus. Hunting scenes are not uncommon, and the gladiatorial arena are met with, as well as numerous designs of less importance.

We have said enough to show the great scope of the subject which this book elucidates, and it may be closed with the reflection that Mr. Morgan deserves credit for his successful endeavour to lay before his readers a succinct and general view of the art and history of the mosaics of the Romano-British era. A whole volume might be written on the subordinate ornamentation only; for in many pavements, or rather in the majority of them, the aims of the designer and workman, and the wishes of owner, have been evidently satisfied with elegantly-conceived scrolls, cables, plaits, wavy branches of foliage, and geometrical patterns of interlacing ribbons, of which the harmony of the colouring evinces the highest taste, and a profound acquaintance with the rules of prismatic contrast and secondary tints. But if we attempted to dilate on these points, we should have to go over ground which we have already treated in the article to which we have made reference.

There is a practical view, however, which must not be forgotten. In the present revival of the useful and effective art of constructing mosaic pavements, much has yet to be learned, and it can only be learned by a close and intelligent examination of the details of formation: the *technique*, in fact, practised by the old Roman architects, and those who worked under them. There is no reason why the skilful English workman should not produce specimens of mosaic floorwork as good in every respect as their prototypes; but for colour, subject, and a peculiar canon of perspective and drawing, he must train eye and hand more cunningly than hitherto. There is a stiffness and precision about modern work which has taken the place of the unevenness of outline which gives so great a charm to the old specimens. Even the colour and composition of the mortar which holds the blocks of

stone together is an important factor in the picture; the great comparative range of their dimensions is another peculiarity to which sufficient attention has not been given; and the ingenious application of opaque, transparent, and lustrous materials, must not be forgotten. The direction and angle of the light which is to fall on the mosaic should be a matter of careful study, as error in this respect is certain to mar the effect; for the same pavement seen by a low side-light, and viewed from a high-walled room with open sky-light, would present a very different effect to the beholder.

One other remark we are constrained to make before we conclude. It is this, that the lessons which may be learned from the mosaics must become eventually impossible, unless the protection which has been tardily afforded to the far more durable and far less artistic relics of the Stone age, the monoliths and megaliths of the south-west and north-west of England, be quickly extended to the fragile mosaic remains of the south and other districts, while there is yet time to secure them by comparatively inexpensive means from further injury. Many of the known examples are crumbling away for want of judiciously arresting the loss of adhesive power in the mortar which has been exposed to damp; others are jeopardised in other ways, and unless some system is established for their reparation and care, we shall before a very long time be able to study these antiquities only by means of such works as that which Mr. Morgan has prepared.

VENTILATION OF SEWERS.

IN all sewers the form and inclination are designed to conduce to the one object of getting rid of the sewage from the houses and streets as quickly as possible to an outfall where its complex nature can be simplified by separating everything it contains from the water which constitutes its chief bulk, so that this may be discharged into a river without injury, the water being first in some measure purified, either in tanks or through the soil of agricultural land, according to the situation and other circumstances. The engineer can give any form to the sewer, but not always the inclination which would be the best; in this respect he is bound by the consideration of expense, and can in some cases give no more inclination to a main sewer than that which is sufficient to create the minimum velocity which experience has shown to be necessary for the proper flow of the sewage. For these reasons sewage lingers in sewers longer than it would do if greater expense were incurred, and the longer the time which elapses between its reception into the sewers and its delivery at the outfall the longer it is in contact with a part of the atmospheric air in which we live. Taking the year round, the average temperature of the air in sewers is higher than that of the outside. This comes about from various causes, one of which is the comparatively high temperature of the liquid delivered into the sewers from the house drains, and from manufacturing premises. The air, then, in sewers, in contact with sewage, tends to rise into the atmosphere, loaded with vapours and those gases from the sewage which are lighter than atmospheric air.

What, as a practical thing, can we do with them? At present we can do no more than conduct them by channels of easy passage into the air above the house-tops, into the wind, to be blown about and dispersed so as to be practically harmless. But stress must be laid on the insufficiency of present knowledge on this subject, and when we see inventions from time to time put forward to cure the evil of sewer gases, we are inclined to look leniently upon the attempt if it appears at all reasonable and likely to succeed in effecting the object intended. It is, however, necessary to call the attention of inventors to the facts of the case, with which some of those who have turned their attention to this subject seem to be unacquainted. Any considerable length of sewer necessarily has numerous openings for the

inlet of sewage. A system of sewerage is either on the separate or the combined system. The combined system is that which admits to it all the rainfall as well as the sewage of the houses and other premises; the separate system is that which separates from the sewage as much of the rainfall as is practicable, so as to reduce the work of dealing with the sewage at the outfall, the rainwater going into the rivers as it always has done. There is a distinction to be made between a large and closely-built town and one in which there are numerous and large open spaces. In what we might call a thick population the dirt on the streets washed into the sewers is nothing but sewage, and must be dealt with along with the house sewage, and accordingly the street gullies communicate with the sewers. In the other case the greater part of the rainwater is separated and turned into its natural channels, but in either case the house-drains have to be considered, each one of which has several openings. It may be said that these openings should be trapped, to prevent the passage of air. They are so, but to what extent? They can only be trapped,—that is, when water is used as the bar to the passage of air,—by forming a dip in the drain bottom, and if the top of the drain at the trap be brought down more than about 2 in. below the bottom of the adjoining part of the drain, the obstruction to the passage of the sewage along the drain is too great, and stoppage occurs by the dipped part of the drain becoming filled with sediment; and for this reason the dip is made as little as possible. There are various forms of traps, and some allow of a greater bar to the passage of air than others do, but taking them all round, the average would not exceed 2 in.; and if the average did exceed 2 in. there would still be a number with no greater bar than that, and so it can be calculated to what extent the air on the sewer side of the trap can be rarified without withdrawing the water from the trap and letting air pass, when it is proposed,—as, occasionally, it is,—to withdraw the air of sewers at one or a few points, and purify it before it is discharged into the atmosphere. The openings in the middle of the street so often complained of are, of course, untrapped; they were, in fact, made there for the purpose of letting out the foul air of the sewers in preference to letting it escape through the gully-holes alongside the footways, being the lesser of two evils; but when the air of sewers is withdrawn or carried off in any manner these openings in the street become inlets through which fresh air enters the sewer. Now go to the trapped openings and take the bar to the passage of air to be that of the weight of 2 in. depth of water. The weight of the atmosphere on one side of a trap would support 400 in. in height of water on the other side, if the air were wholly withdrawn from it; but it is, of course, proposed to withdraw only a part of the air, whereby the pressure would be reduced in some degree. Let this degree be the one four-hundredth part of its full pressure, or, measuring it by the mercury barometer, let the pressure be reduced from 29.40 to 29.32, then 1 in. depth of water in the trap would be pressed out, leaving still 1 in. as a bar to the passage of air; but if the pressure on the sewer side of the trap were reduced by two four-hundredth parts, or the one two-hundredth part of the full pressure, that is, if the barometer were reduced from 29.40 in. to 29.25 in., then the trap would become unsealed, the water would be expelled, and it would no longer form a trap; and this would be so though the greater action were not continuous, but instantaneous only, for as soon as the air is forcibly withdrawn from the sewer side of the trap, to the extent of even 1 in., the water in the trap drops on the other side to that extent, and because the air is elastic the lowering is not gradual and regular in accordance with the power exercised in withdrawing it, but there ensues a sort of palpitation or oscillation of the water in the trap, which sooner or later causes a passage for the air and establishes a direct communication between the atmosphere and the air-extractor connected with the sewer.

This is why the foul air of a system of sewers cannot be extracted and purified at any one point, or at a few points, because wherever along a line of sewer a site were to be chosen for the purpose of withdrawing and purifying the sewer air or gases, it would be surrounded by these openings, and how then could it be expected that the air with which an extractor would be fed would travel any great distance along the sewer? It would, in fact, draw air through these openings, untrapping those which ought to remain trapped, in preference to fetching the air of the sewer from any great distance; for, in this case, the extractor would find a drag upon its action, caused by the friction of the air in its passage along the sewer, and the drag would be relieved by the supply of air from these sources.

It should be considered that any special apparatus would be expected to deal with more than one sewer, and that a district would be appointed to it, small or large according to its capabilities and efficiency, and that the district would consist of a system of main and branch sewers all connected with one another. Now branch sewers are not exactly proportioned in size to the quantity of sewage they carry off; proportionally to that they are usually larger than the main sewer, and to create a draught of even one mile an hour in the far-off branches, the velocity in the main must be very much greater. The force required to draw the air along the sewer is proportional to the square of its velocity, so that any great increase of velocity of the air approaching the extracting apparatus, which is necessary in order to fetch the air from the farther branches, must entail a greatly increased force, over what would be required for the extraction of the air of one sewer only.

Many people, with the most praiseworthy intention, have proposed means of dealing with this foul air or sewer gas, as, for instance, to make a connexion between the sewer and the gas-lamps of the street and burn it, but the foul air or sewer gas is introduced, not into, but outside of the flame,—not into the gas-pipe, which would not be allowed by the gas company or other proprietors of the gas works,—but merely to the flame, from which the greater part escapes without being touched by it.

Another and more practical proposal is to connect all factory or other high chimneys with the sewers, either directly or through the furnaces of the steam boilers, and although this is a very proper outlet for the foul air of the sewers, yet the advantages which these afford to the ventilation of the sewers are in general so few that that system cannot be reckoned upon as of much use, except in manufacturing towns. A little of a good thing is better than none, and for that reason every high chimney and every furnace ought to be connected directly with the sewer near it, but even when that is done, something else is required to get rid of the foul air of sewers and house-drains. At present, the only other practicable means known to exist consist in affording an easy outlet at numerous points in the length of every sewer, and carrying up these outlets high enough to let the foul air escape in the open air above the house-tops, rather than at the ground level; but wherever this plan is adopted, it is highly necessary that the openings be very numerous, so as to divide and not concentrate the evil. Wherever there is an offensive escape of sewer gas, it may almost certainly be said that there are too few openings between the sewer and the atmosphere. It has frequently occurred that when there has been a bad smell about a house, because the house-drain was not ventilated, it has been attributed to the nearest opening in the middle of the street, and by persistent complaint the opening has been ordered to be closed, with a few more which have been complained of, but in all cases with the inevitable result of increasing the bad smell at other openings. Now if in all these cases attention had been in the first instance given to provide proper outlets for the sewer gases, instead of attempting to ignore them by shutting them up, none of these street openings would have been offensive. The only result of closing the

openings in the streets is to drive the foul air to find its own outlet in or about the houses, where proper outlets are not provided in the house drains, and, where they are, no smell arises from the street openings. This appears to be the only practicable way at present of ventilating sewers and house-drains. That a better way may be found we do not deny, and hope to see it soon effected, for of all sanitary improvements in towns it is the greatest which could be made. In any attempt in this direction it should be observed that while the air of sewers has always a tendency to go up the incline to the higher points, there are numerous instances in which it is drawn in the opposite direction, sometimes because of the very slight inclination which the sewer has, sometimes because of the direction of the prevailing wind, and sometimes because the current of water in the sewer is strong enough to carry with it the stratum of air with which it is in contact, so that persons are sometimes surprised to find the air escaping from the sewer through the openings at the bottom of the street rather than at the top. But these are exceptional cases, and can be dealt with according to their peculiarities. The rule holds good that if a sufficient number of openings of easy ascent be provided along a sewer the gases and vapours arising from the sewer will follow these channels and escape into the air at the places appointed to them, which should be, of course, above the house-tops and away from windows; and if they are sufficiently numerous, that is to say if there is at least one to every house-drain, there will probably be no escape of foul air from any of them; but it has been proved that there is an offensive escape of air from them when they are few in number, compared with the length of the sewers. Besides the number, they need to be of considerable size; if they were 6 in. in diameter they would be all the better, but they should not be less than 5 in., and should project above the roof 6 ft., being made in 9-ft. lengths, so that the uppermost joint may be effectively secured. The usual fault is to make these air-pipes too small, a very poor economy in comparison with the benefit they confer on the drainage system.

THE BRITISH SCHOOL AT ATHENS.

THE meeting in support of the British Archaeological School at Athens, which was held in Albemarle-street on Tuesday, is one of the indications of the remarkable revival, in these latter days, of interest in the buried remains of antiquity. The antiquaries of the Renaissance drew their inspiration from Rome, where the remains of past architectural grandeur were visible before the eyes and palpable to the touch, without any of the expense and labour of speculative excavation. The *venue* is changed to Greece now, and no man can make himself more secure of honour and reputation among the educated minority than by digging up a temple, or a statue, or a collection of coins. It is the credential of antiquarian respectability to have found something in Greece. Were Hamlet alive now, he would modify one of his well-known phrases, and say "By'r lady, he must dig up temples, then, or else shall he suffer not thinking on, like the hobby-horse." Of course, we are sadly behind hand, as a nation; though individuals like Mr. Newton and Mr. Wood have done nobly for our honour and the information of posterity, and would have done more nobly still had not an unimaginative and economical Government left them all but unaided in their work. But Germany, France, and America have already their schools established at Athens; the two former for some time back, the latter, though we believe more recent, an exceedingly active and well-informed institution, disposed to anticipate its rivals wherever possible. For rivals the schools at Athens, now increased to four in number, will, we presume, be in fact, if not in deliberate intention; and it is curious to consider that there are now four foreign establishments in Athens with the special object of looking for artistic relics of ancient Greece. It would be natural to think

that, with all these forces in the field, the antiquities held in suspense in the soil must be ere long precipitated, so to speak, and that the work of the schools must cease at no very distant date through want of more worlds to conquer. Yet this stage may not, with all diligence, be reached so soon as one is inclined to expect. So many remarkable finds have been made in recent days, in places where remains had been for ages unsuspected and unthought of, that it is impossible to judge what extent and variety of remnants the Attic landscape may yet cover, to be unearthed by degrees, as new contributions to the book of ancient history. One thing, at least, is certain, that as long as new discoveries in Greek architecture and art remain to be made, so long will it be worth while to uphold and support societies to engage in the work of discovery. So remarkable, so unexampled hitherto in the world's history, as far as we know it, were the æsthetic perception and plastic power of the Greek genius, of such extraordinary interest are its remains, that we can hardly rest content until we have recovered from their tombs of ages every remnant yet left of the work of "the supreme Caucasian mind."

The proceedings of the meeting referred to, at which Mr. C. T. Newton took the chair, and which have already been very fully reported in the *Times*, commenced with the reading by Professor Jebb of the report on the financial position of the undertaking. The house, with library and lecture-room attached, has been built at a very moderate cost (about 3,000*l.*), Mr. Penrose having acted as honorary architect, and having now undertaken for a year at least the duties of Director of the School. In various ways, stated in the report, an income of 400*l.* a year is at present provided for, the University of Oxford contributing 100*l.* a year and the Hellenic Society another 100*l.*, the last-named subscription to be conditional on the provision of at least 300*l.* a year from other sources. Many of the learned bodies applied to for subscriptions replied that either they had no funds to spare from their own purposes, or that the conditions under which they held their property forbade such an application of it. Miss Harrison deserves to be specially named as having contributed, by her own efforts, the sum of 190*l.*, the proceeds of her lectures on Greek Vase Paintings, of which we gave some notice last year. All this, however, will not go very far towards carrying out in a worthy manner the objects of the institution, or enabling us to keep pace with the Germans in archaeological work and archaeological honours. Mr. G. Godwin put the very pertinent question, whether any help had been asked and was expected from the Government, a question to which the negative answer of the Chairman might have been anticipated, at least as regarded any "expectations." From Mr. Newton's account we gather that any application for help in such a matter from our benighted Government was considered so hopeless that it was thought better not to ask what was certain to be refused. A second suggestion by the same speaker, that the scheme would be furthered if the methods and terms of admission to the school were known, seems to have been the first hint given at the meeting that the whole matter was, after all, in a rather misty state, and that while asking people and institutions for pecuniary support, it would be at least logical and business-like to be prepared to state exactly what was the work to be carried on in the British Archaeological School at Athens; whether it was to be investigation and relic-hunting, or instruction in art-history, or what. Sir F. Pollock supported Mr. Godwin in this, and hoped that the *modus operandi* of the school would be made public as soon as possible. This seems nothing more than ordinary common-sense; and it is somewhat odd, and does not say much for the practical and business-like temperament of archaeologists, that things should have got to the present point without, as far as appears, any attempt to formulate a distinct statement as to the proposed objects and work of the school, which is one of the first things that any one who is asked to subscribe to such an undertaking would wish to

know, unless he were a man very reckless of his cash.

The educationalist view of the subject was represented by Dr. Warre, the Principal of Eton, and Mr. Fearon, both of whom spoke from experience of the great help given to the comprehension and realisation of history by a knowledge of the actual objects made and lived among by the people who were the subject of the history. Dr. Arnold would have gone heart and soul with this; no teacher that ever taught was more earnest in the endeavour to give a picturesque realism to the otherwise dry bones of history.

To sum up these few remarks, we may record the present position of the school as this, that a managing committee is appointed, to be composed of (1) the three trustees and the treasurer *ex officio*, and the hon. secretary; (2) of five members to be appointed annually by the general body of subscribers; and (3) of members to be nominated, one by each corporate body subscribing not less than 50*l.* a year to the funds of the school. The five members appointed for this year are Prof. Gardner, Mr. Genadius, Prof. Jebb, Sir F. Leighton, and Mr. J. E. Sandys, Mr. Walter Leaf is Treasurer, and Mr. G. A. Macmillan Honorary Secretary. It is intended to open the school in November. We hope it may receive such pecuniary and other support as may enable it really to accomplish work such as may be an honour to the enterprise and scholarship of this country, and do something to take the conceit out of "those Germans."

NOTES.

THE programme issued by the Board of Trade as to the aims and objects of the new Labour Statistical Bureau does not lack comprehensiveness; and if carried out as proposed, ought to be the means of doing much good to the working-classes. The first paragraph in Mr. Giffen's official announcement refers to the compilation of a blue book detailing the statistics of wages for the last half-century. This, though highly interesting in itself, is, we venture to think, superfluous, as not affecting in any way the question of current wages, the main point on which information is most desired. The statistics of foreign labour are always valuable, as giving the opportunity of showing the artisans of Great Britain how little they have to complain of in comparison with those of other countries, both as to hours of work and the prices paid for it. Whether the lesson will be taken to heart is another thing, though it can scarcely fail to be useful. Another point of real value will be the collection and dissemination of information on the statistics of trade unions, the knowledge of which should be free and open to everybody. Secrecy in such matters is not only unnecessary, but positively disadvantageous, as giving room for suspecting the existence of facts which will not bear the light of day; and although a trade union is not a secret society, like that of the Knights of Labour in the United States, even the members of English unions have very little opportunity of knowing the proceedings of any but their own. It is by no means the first time that such an undertaking as a bureau of labour statistics has been mooted or attempted to be established in this country. A scheme almost identical with the present one was drawn up some half a dozen years ago by Mr. Alsager Hill and Mr. G. Phillips Bevan; but the difficulties of obtaining the information first hand proved too great for any private efforts, employers being too much occupied or too unwilling to answer questions, except those bearing an official impress. America has long recognised the immense importance of placing the subject under State authority, and although we have been a long time following her lead, let us hope that its undoubted value will be felt by all concerned.

WE have received from Mr. Honeyman, of Glasgow, a copy of a correspondence bearing on the recent "Barony Church Competition," in which he was an unsuccessful

competitor, and in which he accuses the committee of having awarded the competition in defiance of their own instructions to architects. We are not disposed hastily to take up complaints of injustice on the part of unsuccessful competitors, architects being, after all, human, and disposed, like other men, to think themselves unduly slighted when others get what they wish for. But Mr. Honeyman is not a man to raise lightly an accusation of this kind out of mere disappointment; and it certainly appears to us that his charge as to the committee's decision has not received the definite and distinct reply that it calls for. It was stated, it appears, in the conditions of the competition, that the cost of the whole building was not to exceed 13,000*l.*, including all charges. Mr. Honeyman's position is, that he did send in a design which could be executed for this sum (and this appears to be admitted on the other side), and that the selected design was admittedly estimated by the architect himself, Mr. Burnet, at 15,600*l.*; and this design the committee have selected, on the ground that they prefer it, and that, with the omission of the spire and some other portions, it can be executed for 13,000*l.* We have gone through the correspondence in the matter, and as it stands we cannot see that any sufficient answer has been given to Mr. Honeyman's charge. Of course, we need not add that to advertise a competition for a building to cost a specified sum, and then award the premium to a design which has exceeded the amount, is a gross injustice to those who have endeavoured to keep within the terms of the conditions. Mr. Pearson was the architectural adviser called in by the committee: can he throw any light on the rights of the case?

THE proposal to unite by a tunnel the defences of Portsmouth with the forts on the Solent, and with the Isle of Wight, is one that demands the most serious attention of every patriotic Englishman. The execution of such a project should not be allowed to depend on the contingency of a financial return. It is, of course, in the first place indispensable to have such an exact survey of the bed of the Solent, including borings to the depth of 50 ft. or 100 ft. below it, as shall enable the engineer to speak positively as to the practicability, at a reasonable cost, of the undertaking. That once established, the arguments in favour of the scheme are very strong. Half-way between Stokes Bay and Ryde Pier Head, we are told, the Sturbridge bank rises to within 13 ft. of high-water line. Here the military advisers of the Government wished to establish a fort, and the design was only abandoned from the fear that fresh water could not be obtained for the garrison. With a submarine communication, all questions of food, water, ammunition, or re-enforcements for a garrison would be easily solved; our line of marine defence at this point would be rendered impregnable; our ironclad fleet would be set free from the duty of defending this vital pass; and, for the most costly of all defences, viz., a set of sea-going iron batteries, would be substituted a line of defences of which the first cost would be the main outlay, and the annual maintenance would be more cheaply effected than by any other method. Spread over twenty or thirty years, the result of the construction of such a line of defence would be a considerable reduction in the annual estimates.

IN the second issue of the new *Jahrbuch* of the German Archaeological Institute, Dr. Helbig calls attention to an inscribed bust of Plato, as to the genuineness of which we need have no misgivings. The bust is inscribed with letters which are of the date of the Antonines, and the style of the work, which is hard and dry, confirms the date. The bust belonged to Signor Alessandro Castellani. At his sale it fell to Count Michael Tyskiewicz, and from his possession has passed into the Berlin Museum. Together with this bust, Dr. Helbig publishes a selection of other analogous heads, hitherto conjectured to be Plato, and now known as certain portraits. These are:—(1) a bust in

the Capitoline Museum, much restored; (2) a head in the Villa Borghese, very near akin in style to the Berlin bust; (3) a double bust in the cellar of the Casino di Piero Ligorio. The head of Plato is back to back with that of Socrates; (4) a head in the Museo Torlonia, which has suffered much from the action of water; (5) a head in the "Galleria Geografica" of the Vatican; (6) bust in the Vatican Museum, falsely inscribed Zeno. To these, no doubt, now the type is clearly established, there will be added many other instances from public and private collections. Perhaps our first look at this genuine portrait will be only a disappointment: the man whose thoughts were of such matchless beauty was certainly not fair to see, nor is there about the face any of that Olympian calm we might expect to see; the forehead is contracted, with a troubled, worn expression, clearly marked in all the busts. Oddly enough, however, the only contemporary account in literature of Plato's personal appearance notes just this trait,—the comic poet Amphis speaks of him as contracting his brows like a snail in a shell, a very speaking image.

Ο Πλάτων
ὃς οὐδὲν ὁλοθα πλὴν αὐθροπάζειν μόνον
ὥσπερ κοχλίας σερμῶς ἐπὶ τῶς ὀφρύς.

Intellectual power is clearly evidenced by the broad forehead; the far-away abstracted look characterises well the speculative philosopher. The hair and beard are exactly of the fashion of the fourth century B.C., as seen on Greek grave-stones of that date, a further piece of evidence, if any were needed, that the Antonine bust is a copy of some contemporary work.

THE public is by no means satisfied that in Government work things are done as well as they might be. The recent narrow escape of the *Tyne* troopship in the late gale has called attention to the fact that, when surveyed after her safe arrival at Plymouth, it was found that work had not been done which ought to have been carried out when fully surveyed no long time ago. It was by the neglect of this necessary work that a number of valuable lives were jeopardised. On matters connected with the Army and Navy we have no criticisms to make, but when neglect in Government work, such as shipbuilding and ship repairing, is established, it necessarily arouses a suspicion in regard to other kinds of Government work, such as the erection and repair, the planning and the supervision of Government buildings. It was not very long ago since we commented on some slips in regard to new post-offices at Birmingham. Here is another example of carelessness on the part of some officials.

IN the last number of the *Athenian Mittheilungen* of the German Institute, Dr. Franz Studniczka publishes the very curious and archaic pediment sculpture, made of porous stone, recently found in the Acropolis. The fragments remaining clearly show that a fight of Hercules and the Triton was represented. There is little doubt from this that the Triton pediment is the fellow of the equally curious and archaic Hydra pediment found at no great distance. The Hydra sculptures are well known, and have proved fertile for controversy. The Triton pediment appears for the first time. The whole of one side of the pediment is filled by the Triton, his fish-tail curling down into the pediment angle in constantly decreasing spirals. A more naive form of pediment composition it would be hard to conceive. These porous reliefs represent, in fact, a stage decidedly more primitive than even the pediment sculptures of the Megara treasure-house at Olympia, which hitherto we have been taught to regard as the "incunabula" of pediment composition. They are the more interesting because they present marked analogies to the compositions of early black figured vases, and, moreover, they are of undoubted Attic work. To what building they belonged is still a problem.

IN reference to the circular about "Federation," about which two letters were printed in our last, the Institute of Architects have issued a letter to their members asking if they have signed the circular referred to under the impression that the Institute was represented on the committee which issued the said circular. A great many replies have been already received, and something will probably be heard about them next week. In the meantime it is sufficient to say that an attempt appears to have been made to obtain the signatures of members of the Institute to a document with which they would have had nothing to do had they known from whom it really emanated.

ANY ONE who walks along Shaftesbury-avenue will be struck by the announcement, appended to various little windows in somewhat squalid structures, that these are "ancient lights." It is as well to point out that such a proclamation in no way gives any validity to a claim to such a right unless the person who claims it can substantiate it by evidence. There seems to be a kind of impression abroad that the mere fact of such an announcement is sufficient to lay on a person obstructing one of these lights the burden of proving that it is not ancient; whereas, the burden of proof is, in fact, the other way. Judging from the position and character of the windows now exposed to view in Shaftesbury-avenue, it may possibly be doubted whether they ever had any very large amount of light, and we should not be surprised if some litigation were to arise from these claims.

FROM a circular dated "Venice, July 20th," but which has only just been forwarded to us, we learn that the Sixth Congress of Italian Architects and Engineers will be held at Venice in the month of September, 1887; the precise date apparently is not fixed yet. The congress will discuss, at seven successive sittings, subjects grouped under the following heads: (1) Civil Architecture in relation to hygiene, economy, and legislative enactments; (2) Bridges, Roads, and Tramways; (3) Construction and Working of Railroads, partly in relation to war service; (4) Hydraulic Engineering, in relation to river and harbour work, and industrial operation; (5) Machinery; (6) Engineering considered in its various applications to war service; (7) Surveying, topography, agricultural engineering, &c. Professor Domenico Turazza will be the President, Dr. Paolo Fambri and Dr. Emilio Pellesina, Vice-Presidents.

IT may be as well to warn householders that those who have not already looked to their roofs and gutters should do so at once. There is a fashion of spring cleaning and spring painting. It would be well, in the long run, for the pockets of householders if there were also an autumn examination of roofs and drains. A great deal of the mischief which is laid at the door of frosts, thaws, snows, gales, and rainstorms is attributable to a want of proper inspection of houses. It is already becoming late for such examination, but late is better than never.

THE *Bulletino della Commissione Archeologica Comunale di Roma* (1886, fasc. 8) reports the discovery of a large number of marble statues at Rome. Among many of subordinate interest, we may note the following—a torso of Artemis, somewhat above life-size and of excellent work. The statue is in several fragments, but it was at once seen that the type is the same as the celebrated "Diana de Versailles" (Diane à la Biche), now in the Louvre: the stag which accompanies the goddess has been found, broken into several pieces. From the report of the style we may hope that this discovery will lead us a step back towards the reproduction of some great original. Further, of great interest is a statue (unhappily headless) of a "Running Girl," analogous to the well-known "Running Girl" of the Galleria dei Candelabri in the Vatican. The new statue is reported as of the late fine period, whereas the Vatican replica is of

archaic, or, more probably, archaistic type. Further, three plinths of statues have been discovered on the Esquiline, all of which are signed with the sculptors' names. In the next issue we are promised a facsimile of these signatures, hitherto unknown in the history of Greek art. Till then we reserve our fuller notice.

SOME time ago we reported that the Acton Local Board had come to a provisional arrangement with the Native Guano Company for the treatment of the sewage of Acton under the "A B C" system. But it appears from the correspondence read, and the statements of members at the meeting, on Tuesday, of the Acton Board, that a rather curious hitch has occurred in the progress of the more detailed negotiations. The point at issue obviously possesses some interest to Sanitary Authorities along the Thames Valley, and special interest, it may be said, to the Thames Conservancy Board, one of whose duties is to preserve, as far as possible, the Thames from pollution by the inflow of crude sewage. It is stated that the Native Guano Company wish inserted in their agreement with the Board a clause allowing the company during floods to pass the crude sewage direct from the sewers to the Thames at the outfall, Chiswick Eyot, thus avoiding passage through the works and proper clarification. There is necessarily greater expense incurred in the treatment of the sewage during floods than normal weather, owing to the undue proportion of surface-water with which the sewage is charged. But it is certainly matter of surprise that a public company should attempt, as they appear to do in this instance, to fly in the face of the Act of Parliament, which prohibits the inflow of unclarified sewage into the river. The Acton Board are not likely to assent to these hazardous terms, which would eventually lead them into trouble, not only with the Thames Conservancy Board, but the Chiswick authorities and residents near the outfall. The Acton Clerk has accordingly been instructed simply to acknowledge the receipt of the latest communication of the company on the subject. With the gradual construction of efficient drainage systems on the part of sanitary authorities along the lower Thames valley, by which the sewage from that wide area is clarified before its fall into the river, a material improvement in the purity of our great water-way is hopefully expected; and if any of these Local Authorities are disposed to entrust the treatment of their sewage to a company it is to be hoped that they will not assent to terms such as those indicated above.

THE last news from the Acropolis excavations reports the finding of a staircase, the exact purport of which has not yet been made clear. Twenty-two steps have been laid bare within the Acropolis walls, and it is conjectured that the continuation of the staircase was cut down the citadel rock itself. It was hoped for a short time that this might prove to be the staircase by which the Persians climbed up, but a little further consideration caused the theory to be abandoned, as the fortifications on which the steps depend are of Cimon's date. Whether his staircase succeeded some early one is as yet not clear. A few scattered sculptures of porous stone, chiefly decorative (lions' heads and the like), have been found by the side of the steps.

THE "Report of the Ordnance Committee, with special Associated Members, on the accident to 12-in. B. L. Gun, Mark II., on board the *Coltingwood*, and construction of B. L. Guns" is not a document which conveys any very definite idea to the general reader. Two pages of "Abstract of rounds fired from the 12-inch guns" simply give the weights and marks of the powder burned. That 378 rounds should have been fired from thirteen guns without blowing off the chase is not such a wonderful performance. Why, after firing only nine rounds, gun No. 16 blew off its chase, is not satisfactorily made out. The committee find that there was a want of uniformity in the

metal of which the chase was composed; that the gun had not been annealed; and that the chase had not been hooped. It does not say why these omissions were discovered so late in the day; nor do the committee furnish the means, by giving a section or sketch of the gun, by which any expert can form an opinion as to the merit of the design which so signally failed. Gun No. 16 came to grief when fired with three-quarters of the service full charge of powder. Such was the simple fact, and the report does very little more than repeat it.

MISS HARRISON announces a course of four lectures on the myths of Attica, as seen on Greek vase paintings, to be given in the South Kensington Museum Lecture Theatre on November 17 and the three following Wednesdays, at 5.15 p.m. Those who have attended any of Miss Harrison's previous lectures on Greek vase paintings will be aware of the high interest with which she is able to invest her subject. During the month of January Miss Harrison intends forming a class in Paris for the special study of the vase paintings in the Louvre; and, during April, a class will be formed in Athens for the study of Athenian monuments.

WE have to note another cynically candid business circular sent round to architects and engineers, by a Birmingham firm of iron safe makers, containing this delightfully explicit memorandum (the italics are our own):—

"In order to induce you to introduce our Safes, Iron Doors and Frames, Strong Rooms, &c., amongst your clients, we shall be pleased to allow you an Extra Discount of 10 per cent. on all orders received by us through you, or influenced by you, in addition to the ordinary discount of 40 per cent. allowed by us to non-professional customers.

Thus on a safe or iron door which at list price would cost say..... £25 0 0
We allow ordinary trade discount of 40 per cent. £10 0 0
Extra architect's commission, 10 per cent. 2 10 0
12 10 0

Reducing net cost to..... £12 10 0
Terms: free delivered to any address. Cash in one month.

Testing these liberal terms will speedily enable you to favour us with some orders. We remain, yours faithfully,
S. Withers & Co."

So that the architect, whose duty it is to see that his client has a strong-room of the best make and security, is to be regulated in his choice, not by the wish to find the best article, but by the "liberal terms" which the authors of this precious circular offer him for preferring theirs. Of course, the real result is that no architect can now specify safes by "A. Withers & Co." without laying himself open to the suspicion, whether justly or not, of a wish to handle their money. Two architects have sent us this circular with a request to comment on it, one of them remarking that the sending such a letter to an architect was "a scandal," as it certainly is.

THE NEW "MAISON DE REPRESSION," NANTERRE.

UNDER the title of the "Vicissitudes of a Royal Château in France," we described, a year ago, the "Dépôt de Mendicité" of Villars-Cotterets, a hybrid kind of establishment, at once prison and hospital, in which administrative Vandalism seems to have enjoyed the amusement of mutilating, under the pretext of successive improvements, the most interesting remains of French Renaissance. As a contrast, we describe to-day a somewhat similar establishment newly erected, also of the mixed hospital and penitentiary character, but appropriately contrived for this double destination, not by pulling about the work of the past, but by making the best of the science of the present.

The Maison de Repression at Nanterre is about six kilomètres from Paris, in a flat and sufficiently unattractive site, but with its principal entrance facing Mont Valérien. The exterior is of a severe architectural character, but the façade, in good ashlar stone, has not the desolate appearance of many buildings of its class. We enter through a fine gateway,

which does not realise the French proverb, "Triste comme la porte d'une prison," thence into a vaulted porch, giving access to the court, at the further end of which is the administrative building, three stories high, and flanked by arched openings, connecting it with the laundries, kitchen, and other offices.

Before going further, we may observe that the establishment (of which we give a complete plan as well as a view of the infirmary block), is a collection of thirty buildings united with one another by more than 1,300 mètres of galleries, surrounded by main boundary walls in rough-dressed stone, enclosing a total area of 120,000 square mètres. The constructions, which cover about one-fourth of the whole ground, are divided into two principal portions or quarters, one for 1,000 men the other for 500 women; though this accommodation could, if necessary, be considerably extended even in the present buildings. To these must be added the infirmary for 300 sick.

Each quarter is subdivided into three sections,—(1) Prisoners sentenced to "peines correctionnelles"; (2) Vagrant mendicants, "Individus surveillés"; (3) "Individus en hospitalité." These divisions, dictated by the State, were coupled with the order for a careful orientation of the building so as to allow the east and west winds to sweep freely the courts and spaces between the buildings.

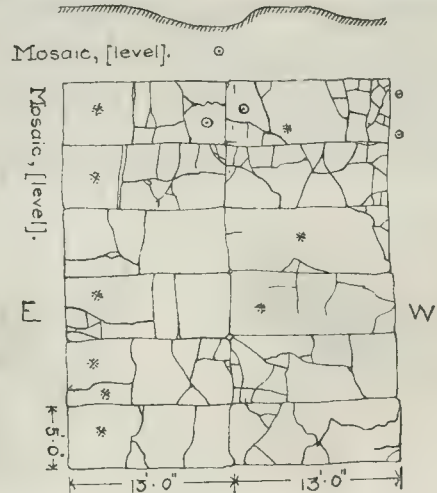
The architect, M. Achille Hermant, has accordingly placed the two main sections to right and left of the centre, in accordance with these conditions, placing between them all the services common to both quarters.

The central block, the upper stories of which are reserved for the personnel of the administration, contains on the ground floor the office of the director, the offices and archives, the library, the record office, the *conciergerie*, twelve cells for prisoners waiting, and speaking cells separated by grilles, in which visitors can communicate with the prisoners by speech alone.

If we advance from the central pavilion we find at each end of it an immense gallery, which extends to a length of 300 mètres, communicating with all the buildings. Other galleries at right angles to this run round the courts and give cross communication.

The great court, now a grass-grown waste, will eventually be transformed into a garden for the use of the *employés*. The buildings devoted to them present from here the appearance of a terrace built on an arcade, and opposite to this stands, or should stand, the chapel, which, however, is still in an unfinished state. It was to be Romanesque in style and with polychromatic decoration internally, but at present there are only roofless walls and windowless openings. The explanation of this is that when the building was commissioned, or rather when the competition for it was held, freedom of religious worship was admitted; and religious communities were not proscribed by the State. The chapel then made an integral part of the programme to which competitors were to conform. The Conseil-Général of the moment, however, and more particularly some of the irreconcilables of the extreme left, have bitterly reproached M. Hermant for having dared to raise a religious edifice in the midst of an establishment of this kind, and the building of the chapel has been officially stopped when two-thirds finished, and thus is produced this melancholy spectacle of the abandoned building in the midst of the courtyard. It is difficult to understand such a bigotry of anti-religious zeal as this; it would be better, at all events, to finish the building, and then "laïcise" it, rather than leave the half-built walls to be disintegrated by rain and frost.

On each side of the first court are the cells or prison buildings. The cells open from tiers of balconies on each side of a central gallery or bay, the whole height of the building. Each cell is 4 mètres long by 2 wide and 3 high. Each cell contains a lavatory and a water-closet, which latter is supposed to be hermetically sealed against any leakage of air into the cell, which is further guarded against by a special system of ventilation of the closets. Each cell has also a sink for waste water, which is carried to the sewer; no less than 6,000 mètres of Donlon ware pipes have been fixed for the connexions to the sewer, which (we regret to note) after a course of about a mile, eventually discharges into the Seine.



The Pavement of St. Mark's, Venice: * Level Portions; O Depressed Portions.

Each cell possesses also an air-inlet pipe and a heating-pipe, a gas-jet controlled from the outside, and an electric apparatus communicating with the indicator in the "Pavillon de Surveillance," the upper platform of which, of ten-sided shape, is made to serve as a chapel; the doors being partially opened and so secured that each prisoner can take part in the service without seeing or being seen by his neighbours. The doors are furnished with wickets for passing in food.

Between each cellular building extends a rectangular court, of which the divisions, following the "panoptic" central arrangement, serve for the solitary promenades of the prisoners, isolated as much as in their cell, and unable either to see any one or to get out of sight of the prison officers.

These buildings are lighted at each end by very large arched windows occupying their whole height.

The buildings of the *Régime en Commun* are, like the rest, arranged on the left for women and on the right for men, with large interspaces for circulation of air. Above are the dormitories furnished with lavatories much better and more comfortable than those of French barracks, or even of *lycées*. Beyond the chapel (which, by the way, is flanked by two little oratories for non-Catholic worshippers,—will these at least be spared?) is an elegantly designed pavilion in two stories with Gothic windows, and behind this building,—which constitutes the greatest offence of M. Hermant against the Conseil-Général, since it was intended for members of religious communities,—is a green enclosure surrounded by a wall, and with an arched cloister running round; the architect, no doubt rather weary of the stern practical character of the rest of the building, having apparently chosen this opportunity to give a little scope to his fancy and invention. At the back of a third court is the large infirmary building, the general character of which is sufficiently shown in the view of it which we give. (See lithograph in present number.) The ground-floor contains the doctors' rooms, dispensaries, and sitting-rooms. The internal arrangements and furnishing are what may be called luxurious. The principal entrance is decorated with sculptural accessories, and three large arches give access to the grand staircase, which, at the first floor, leads to the "Salle des Consultations," and along corridors to the large and well lighted and ventilated dormitories. There are also separate dormitories, to be used either for invalid prisoners or for patients suffering from contagious diseases. Two lifts provide for the ascent of patients and for the removal of dead bodies in case of death in the infirmary; these latter are conveyed by a subterranean passage to mortuaries, previously to interment in the special cemeteries of the establishment, situated without the walls.

The baths pavilion, large enough for all the needs of such an agglomeration of inmates,

terminates the last court, and beyond this and outside the boundary are the machine-buildings for the service of warming and ventilation on Geneste & Herscher's system; these buildings have no communication with the main buildings except by a double subterranean gallery extending the whole length of the buildings, and which is not the least curious portion of the edifice. By these passages gas, water, steam, and compressed air will be distributed to all parts of the establishment. There are eight boilers and six steam engines, three for the ventilation of the infirmary and three others for *bâtiments cellulaires*.

Such is the general outline of the plan and construction of the Maison de Répression of Nanterre, the cost of which will reach eleven millions of francs; not an extravagant cost considering the number and importance of the buildings, the rise in the price of labour in the last six years, and the special means taken to secure the best sanitary conditions and provide special opportunity for repairs as often as required.

M. Hermant has for a period of nine years given his thought and care to planning and superintending this work, not without many of those vexatious interferences and "free fights" which an architect carrying out a large Government work has almost always to put up with; but he has succeeded in producing a building which may fairly be said to be a remarkable example of its class, and which is well worth a visit of inspection.

THE PAVEMENT OF ST. MARK'S.

The diagram shown above is traced from a sketch made some time ago by our correspondent "Delta," whose letter we printed last week. It represents the slabs of grey marble in front of the choir of St. Mark's, with all the cracks in them, as sketched on the spot, showing that where the marble remains level, or tolerably so, it is uninjured, and that at the parts where it is undulated it is full of a network of cracks. This little bit of evidence of cause and effect seems effectually to dispose of the theory maintained by the late Mr. Street and by Mr. Arthur Street, that the undulations of St. Mark's pavement were intentional and symbolical.

New Monument at St. Petersburg.

A new monument, commemorating the Russian victory over Turkey, 1877-78, similar to the celebrated "Sieges" monument in Berlin, raised in memory of the Franco-German war, is to be unveiled this autumn at St. Petersburg. The monument which has a height of 75 ft., consists of a pedestal 18 ft., supporting a single column 57 ft. in height, crowned by an allegorical female figure, symbolising "Victory." The monument will be ornamented with 104 captured Turkish guns, which are gilded.

EARLY SCANDINAVIAN ART AT SOUTH KENSINGTON MUSEUM.

THERE has been recently added to the South Kensington Museum a series of casts of objects of ancient Scandinavian art, which will be regarded with no little interest by English students, since they not only indicate a class of design of great novelty but little known away from the north of Europe, but because they are, perhaps, not unlike what once existed in our own Saxon churches.

The finest of the three fonts is shown by sketch, fig. 3. The whole of the composition is covered with elaborate strap work in flat bands raised slightly from the surface, the upper part being filled in with a series of nondescript quadrupeds arranged face to face, each contained within a niche having a depressed semicircular arch. The original is in the Stockholm Museum. The height is 2 ft. 11 in., and the diameter 2 ft. 3 in. The bowl is 11 in. deep. This font is also assigned to the twelfth century. Close to these three examples, a cast of the Bridekirk

who approach, with uplifted hands, the figure of the Saviour, sculptured in the fourth panel, there being an angel in the third, apparently a sick man in bed in the second, and a kneeling figure in the first. An inscription on the fillet, which occupies the place of the eaves, has been deciphered. It states that it was made by Karl in honour of his relative Björn. The opposite side is only partially covered with sculptured quadrupeds with wings. This is also Swedish work of the first half of the twelfth century, the original being now in Stockholm Museum,



Fig. 1.



Fig. 2.



Fig. 3.

These objects have been acquired by the museum authorities by the system of exchange with foreign museums, which is working well and producing mutual benefit. They are arranged in the large hall to the east of the present temporary entrance, close to some other casts of Scandinavian and Northern work, the whole now forming an interesting group for study.

Font, Cumberland, has been placed, and the similarity of the work is noteworthy, although the design is very dissimilar, the latter being a square block without a base, each face carved with patterns in low relief.

Figure 4 shows another object acquired by exchange with the authorities of the National Museum, Stockholm. It is a solid gravestone, unlike anything in England, although its form

having been formerly in the churchyard of Botkyrka in Södermanland. The length is 5 ft. 7½ in., the width at the east end 1 ft. 7 in., and the height 1 ft. 7½ in. The patterns can be made out, but, owing to exposure, they are observed with difficulty. As in other instances, the lines of the work are very irregular.

The other casts, examples of Scandinavian work in the Museum, are deserving of careful study, since they bring to our notice in a very graphic manner the remarkable wooden churches of these districts, buildings that are becoming fewer in number, as the collection testifies. Thus there is a cast of the remarkable doorway of the Church of Flaa, demolished in 1854; another from the Church of Sanland, demolished in 1860; and some others. These doorways consist of narrow openings, of great height for their width, having mostly semicircular arches springing from a roll moulding forming a pilaster with caps and bases, the whole of the wall space, so to speak, and the arch itself, being covered with elaborate patterns of entwined snake-like reptiles and elongated animals; the work being cut in pine, and executed with remarkable technical skill, all the more worthy of observation from the very early date assigned to these works by northern antiquaries, namely, the eleventh or the early part of the twelfth centuries. The latest of the series, and the most elaborate, a doorway from the Church of Aal in Hallingdal, about A.D. 1200, is a mass of deeply-sunk and boldly-designed carving, the leading lines of the griffin-like forms being clear and well defined. Other nameless animals sit bodily on the caps of the pilasters, carved in bold relief. The original of this fine work is in the Christiana Museum. The doorways referred to are similar to better-known examples at the wooden churches at Borgund, Hitterdal, and Urnes, but are more elaborate.

Fig. 5 is a sketch of another class of work. It represents a part of the door-posts of the Hof Church, Solberg, Norway, the original being in the Christiana Museum. The effective nature of the work is sufficiently shown by the sketch, but English students may be surprised at the remote date assigned to it. Notwithstanding the well-developed foliage, which is remarkably like our own Early English work, it appears that it was executed in Norway in the tenth century. This date supposes the existence of the style at the introduction of Christianity. If this early date can be sustained, we must look for the beginnings of our crisp twelfth and thirteenth century foliage from an unexpected source.

The works in wood may be taken as illustrations of the appearance of many of our own Saxon churches constructed in that material. The casts from Christiana were presented by the authorities.



Fig. 4.

Fig. 1 is a font, the original of which is now in the National Museum, Stockholm, but formerly in the church of Gällstad in Västergötland. It is square on a square base, the bowl, which is small, being circular, and, like the other fonts to be described, with sloping sides and a flat bottom. The outer sides are covered with very diverse patterns in low relief. The sketch indicates the nature of the designs, and it but remains to say that the third side, not shown, is filled in with foliage; and the fourth with a peculiar entwined triangular pattern, of which there are several examples in work of Saxon date in England; one of these, the cross at Gosford, is illustrated at the Museum by a cast, which is placed adjoining this font, in a position therefore admitting of immediate comparison, indicating the similarity of the work of the two countries. There is an inscription in Runic characters which have been read as follows:—"Andreas made the bowl." The date is given as the twelfth century, but the patterns are similar to what may be found on much earlier works, the Gosford cross, in fact, being of greater antiquity. There are four small incised crosses on the upper part. The height is 2 ft. 8 in., the width being 2 ft. It will be noticed that the patterns are irregular and the lines are not straight.

Fig. 2 is a circular font on a circular base, the latter ornamented with large heads in bold relief. The upper part is covered with an effective pattern in low relief, very irregularly worked. The original is also in the Stockholm Museum. The date is the twelfth century. The height is 2 ft. 4 in., and the diameter of the upper part is 2 ft. 2 in.

may remind us and no more of the Saxon hog-backed stones, of which a few examples remain in the north of England. It is shaped in the form of a church, consisting of a nave with a

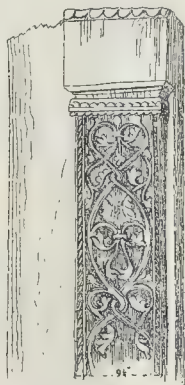


Fig. 5.

sloping roof, the side shown in the sketch having a series of seven arches, while the building ends in a semicircular apse. The sloping roof is covered with good interlaced foliage and strap work. The side arches contain figures

ASSOCIATION OF MUNICIPAL AND SANITARY ENGINEERS AND SURVEYORS:

EXAMINATIONS.

THIS Association held its second examination of candidates for the offices of Municipal Engineers and Local Board Surveyors at St. George's Hall, Liverpool, on Friday and Saturday, the 1st and 2nd instant. The examiners in the various subjects as set forth in the syllabus were,—1st, Engineering as applied to Municipal Work, Mr. W. G. Laws, M. Inst. C.E., City Engineer, Newcastle-on-Tyne (Past President); 2nd, Building Construction, Mr. R. Vawser, M. Inst. C.E., Manchester (Past President); 3rd, Sanitary Science, Mr. E. B. Ellice-Clark, M. Inst. C.E., County Surveyor, West Sussex (Member of Council); and 4th, Public Health Law, Mr. J. Lobley, M. Inst. C.E., Borough Engineer, Hanley (President of the Association). Twenty gentlemen offered themselves for examination, and of these the following satisfied the examiners, and will receive the Association's certificate of competency:—

Sykes, E., Reddish, Lancashire.	Young, Wm., Pendleton.
Board, E. T., Lincoln.	Pickering, J. S., West Bromwich.
Mallinson, T., Selby, Yorkshire.	Crowther, J. A., Leeds.
Thomas, R. J., Carnarvon.	Turner, V. H., Leeds.
Ball, G. Scarborough.	Jamieson, M. W., Leeds.
	Brownridge, C., Leeds.
	Silcock, E. J., Leeds.

The next examination will be held in London in April, 1887, particulars of which will be duly published.

Illustrations.

WORKHOUSE FOR THE ABLE-BODIED POOR OF THE HOLBORN UNION.

THIS establishment, erected for the accommodation of about 1,000 able-bodied paupers of Holborn Union, is situated at Merton-lane, in the parish of Mitcham, Surrey. The foundation-stone was laid on the 14th of April, 1885, and the building was opened on Thursday last. Both ceremonies were performed by the chairman of the Board, Mr. Benjamin Garrod.

The Workhouse buildings were designed, and their erection superintended, by the Guardians' architects, Messrs. H. Saxon Snell & Son. The builders were Messrs. Wall Brothers, and their estimate was accepted as being the lowest of the eight tenders sent in competition for the erection of the buildings.

The greater part of the engineering works of the Union Buildings, as the heating, cooking, and laundry apparatus, has been executed after competition with other firms by Messrs. May Brothers; the gas-pipes and fittings have been in like manner executed by Messrs. Berry & Sons, and the various sanitary and other apparatus have been supplied by Messrs. Bolding & Sons, Wilcock & Co., Doulton & Co., Bradford & Co., Macfarlane & Co., Bacon & Co., Hawke & Son, and Thomas Eley. The wood block flooring has been laid by Mr. Roger Lowe, and the pavings of yards and outside corridors by Mr. Alfred Walker, of Leeds.

General Arrangement.

As will be seen, the general arrangement of the buildings is upon what is known as the "block system," each department being a detached and separate building, connected to the others only by open covered ways. Many hospitals and infirmaries have been erected upon this system of late years, but it is believed that this is the first attempt to apply the principle in its entirety to a workhouse.

The establishment is approached from Merton-lane through two gateways,—the one for carts, which gives access to a road that encircles the whole of the various blocks of buildings, and the other for foot passengers, who at once enter the receiving-house, containing the porter's office and residence, and a waiting-room, also probationary wards for the temporary accommodation,—pending their admission into the body of the house,—of twelve inmates of each sex (twenty-four in all). Bath-rooms and clothing-stores are also provided here, together with arrangements for disinfecting and washing all personal clothing, before being admitted into the house. In the rear of this block is a dead-

house and post-mortem room. Passing through and out of this receiving-house, a covered way is entered, which leads to the various blocks of building situated on either side of it.

On the left are four three-storied buildings, each fitted for the reception of 112 male pauper inmates (448 in all), and between each of these blocks, one-storied buildings are provided for use as workrooms, whilst the intervening spaces form enclosed airing-yards.

The central one-storied building is reserved for workshops, such as wood-cutting, stone-breaking, and oakum-picking; but this has not yet been erected, as it is uncertain, until the establishment has been brought into use, what description of labour will be most remunerative in this locality.

The covered corridor terminates at the furthest of the block of buildings just described, but it is continued onwards by a raised and paved pathway leading to the Infirmary,—an entirely detached building, planned for the reception of thirty inmates of each sex (sixty in all).

Passing through to the opposite end of the infirmary building, a pathway and covered corridor similar to that last described returns and gives access in like manner to four three-storied buildings, each providing accommodation for 112 pauper (but in this case female) inmates. Work-rooms and airing-yards, corresponding to those on the opposite side, are also provided, but the central one-storied block is designed for the use of twelve married couples.

Between this outer ring of buildings, and separated from them by the encircling cart-road, are five blocks of buildings. The one facing Merton-lane contains the principal offices, viz., the Board and committee room, the master's and matron's and the assistant-master's and matron's residences, and also the dispensary. In the rear of this building is a recreation-ground, with tennis-lawn for the use of the officers; and beyond it a block containing the dining-hall, kitchen, and general store-room. Then a roadway intervenes, and on the other side is a building containing the laundry and washhouse, with coal-stores, engineers' shops, and furnace-rooms. At each angle of the rear portion of this building is a bath-room for the use of the officers. On the opposite side of the roadway, running past the back of this building, there is a water-tower, on the upper part of which is placed the tank through which the whole of the water for the supply of the various buildings passes. The basement story of this tower is fitted with two cells for the temporary detention of refractory inmates.

Between this tower and the infirmary there is a large space of ground, upon the central portion of which it was intended to erect a chapel; but the Guardians have determined (at any rate for the present) to make use of the dining-hall for this purpose. Of this hall an interior view is subjoined.

Cost.—The total cost of the buildings, including fittings, laying-out grounds, boundary walls, and drainage, also professional fees and clerk of works' salary, is estimated at 66 $\frac{1}{2}$ per inmate.

Heating.—The receiving-house, officers' and day rooms, married couples' quarters, and the front administrative offices are warmed by means of open fires; the work-rooms by Musgrave's slow combustion stoves, and the dormitories generally are heated by means of hot-water pipes which run round the side walls next the floors. These pipes are all heated from the furnaces near the engine-house, and these furnaces also provide steam for the heating pipes in the dining-hall, which are carried across and beneath the floor in an open trench covered with gratings; they also traverse the two side walls above the floor line.

Gas.—Works are in course of erection on adjoining ground for the manufacture of the gas required for the use of the new workhouse, and also for the adjacent schools. The gas will not only be used for lighting the buildings, but also for heating the laundry closets, the disinfecting chambers, and refractory cells. It will also be required for the Otto gas engines of the laundry and of the water-softening apparatus. The mains are, however, as a matter of precaution, connected with those of the Local Gas Company.

Water Supply.—All the water for use in the building will be supplied from an artesian well in the adjoining school grounds, but before reaching the buildings it will be passed through

a patent water-softening apparatus now being erected by Messrs. Atkins & Co. It is anticipated that by the use of this apparatus a great saving will be effected in the quantity of soap and soda used in the establishment. The softened water will be pumped into a tank, situated on the upper part of the tower in the rear of the laundry block, and from thence it will descend by cast-iron pipes for the supply of the various cisterns in the lower parts of the buildings.

The sinks, baths, and lavatories throughout the building are supplied by hot water heated by steam pipes running from the furnace-rooms in the rear of the washhouse and laundry.

Drainage.—The drainage of the buildings is effected by means of two deep drains carried beneath the roads running down either side of the central administrative blocks, and cross drains run into those from between the yards and roads separating the various blocks of buildings. Both of these main drains converge under the lawn in front of the building, where there is a ventilated manhole, and a syphon-trap for cutting off any foul gases from the sewer that runs down Merton-lane. There are, however, additional ventilated manholes at other important connections with the cross drains, and many inspection pits fitted with air-tight covers. At the head of the southern main drain next the boundary-wall in the rear of the infirmary, a large tank fitted with Doulton's flushing apparatus is provided for periodically cleansing this length of pipe. The main drain beneath the northern road receives all the drainage from the schools, and this is occasionally flushed by the letting off of the water from the swimming-bath of that establishment. The rain-water is conveyed away by a separate system of drains. All drains are stoneware, and those of the two main drains are "Boulton's" patent pipes, 9 in. and 12 in. diameter. The other pipes are ordinary socket-pipes, generally 6 in. diameter. All rain-water pipes, and bath and sink wastes, discharge over grated gullies, especially made with angle outlets by Messrs. Bacon & Co.

SCULPTURE: "CLEOPATRA."

We give an illustration this week of the very fine and impressive figure of the dying Cleopatra, by Mr. G. A. Lawson, which was exhibited in the octagon hall of the Royal Academy two or three years ago. It is at present in the Edinburgh Exhibition, where the photograph was taken from which the present illustration is reproduced.

KENTISH COTTAGES.

AMONGST so much that is charming to be seen in journeying through the fair and fruitful county of Kent, the picturesque cottages, whether clustered together, as at Ightham and Leeds, or dotted here and there on the roadside, form a pleasing, and to the architect and artist an important feature, worthy of more than a passing notice; for, whether they be constructed of timber and plaster, brick or stone, or, as in some few instances, a combination of all four, including a bit of tile-hanging, there is always something about them satisfactory, giving the impression that each one is just the right thing for the position it occupies. This feeling, no doubt, gathers strength from the surroundings of these humble homes; for where has Nature been more lavish, where do creepers climb up and cling to weather-stained walls in more luxuriance, or gay flowers bloom more beautifully, than within the mossed and lichened stone walls which form the boundaries of the patches or garden ground in which these cottages stand?

Though it is probable one might search through the whole county without finding two of these cottages exactly alike (unless it were some modern imitations), there are features which occur so frequently as to indicate a particular liking for them on the part of the builders.

The most noticeable is shown in the sketches from West Malling, East Sutton, and Leeds (the latter is now incomplete, part of it having been taken down and replaced by a lean-to on the farther side), which have, on the upper story, two projecting wings at either end of the front of the building, carried on heavy joists and curved brackets at the angles. Between these wings a bay of one or two stories is carried up, but quite as frequently the recess



Dining-Hall, Holborn Union Workhouse, Mitcham.—Messrs. H. Saxon Snell & Son, Architects.

between the wings is uninterrupted, a coving springing out from the wall to the face of the wings, so that the roof is carried straight through from end to end; this coving is relieved by a curved bracket springing from each wing, and generally one somewhere in between from the face of the wall; occasionally the coving is omitted, and the soffit of the roof over the recess finished square. Whatever the value of this arrangement may be internally, there is no doubt its effect outside is decidedly good, the wings giving relief to an otherwise plain face, and the opportunity of many interesting shadows being cast upon it. When executed in timber and plaster, as in the sketch from West Malling, the arrangement seems to be emphasised by the constructive lines, and the effect is

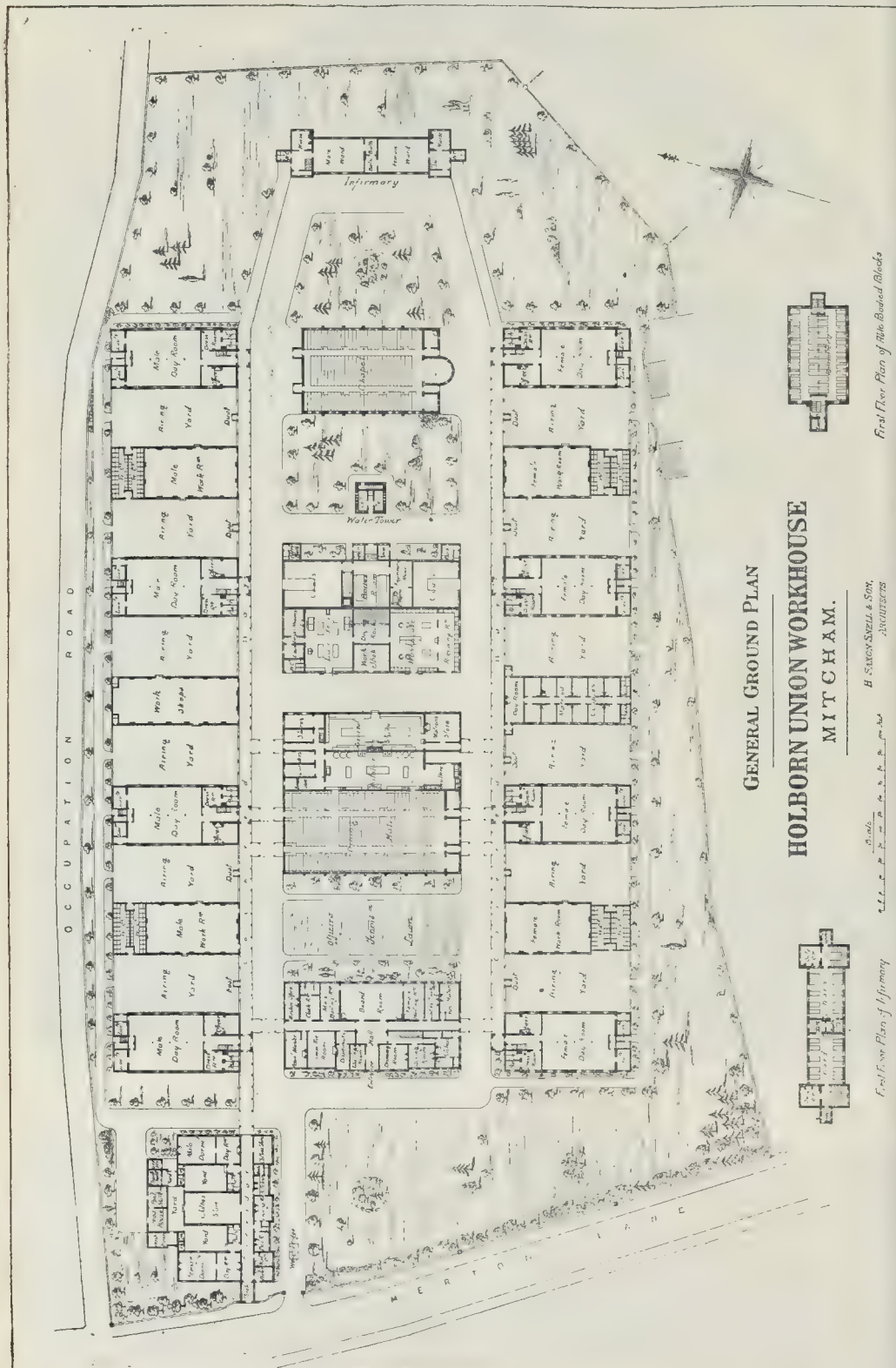
particularly pleasing. A simpler arrangement is where the wings are tile-hung and the recess plastered.

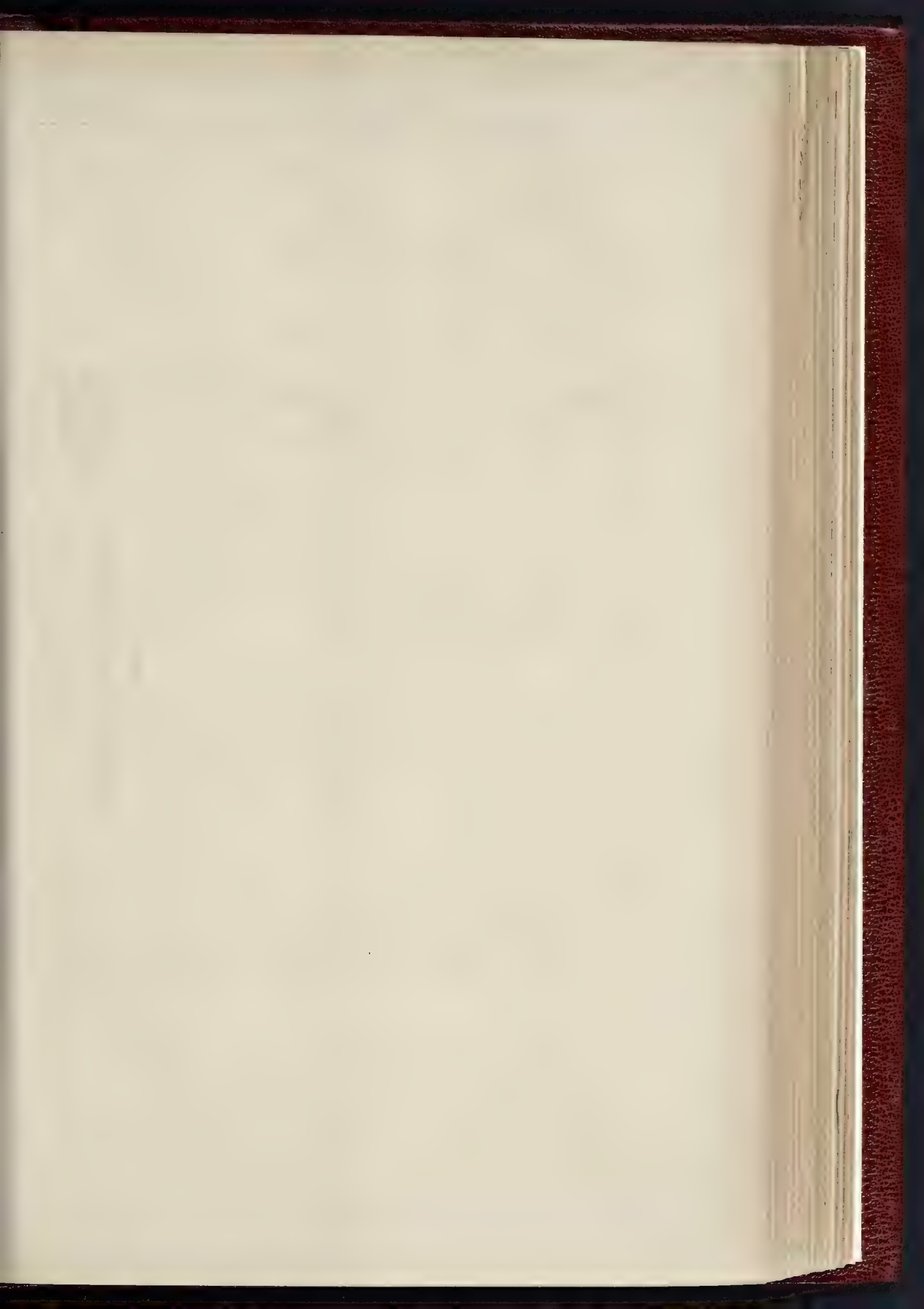
The roofs generally are as simple as possible, of one span, hipped at the ends. The chimneys are usually massive and carried up to a good height above the ridge, and where they occur at the ends of a building, they are brought well out from the face of the wall and made quite an important feature of, suggestive of the cosy corner and wood fire on the hearth. Frequently brick and stone are used together, more especially in the chimneys, and with very good effect as regards colour, three courses of brick to two of stone bonded in.

The sketch of a dormer is from the miller's

house in Leeds village. The wall plates are carried right through to the barge-board, and supported by shaped brackets with a plaster cove between. There are two of them on the house referred to.

In many of the gardens may be seen one or more yew trees, cut and trimmed into quaint forms; the Malling sketch affords an example. Much more might be said of these simple and instructive buildings, but no description nor any sketch in black and white can tell all the lessons they have to teach or picture half their beauty of colour, which, to be fully realised, must be seen, and, with either Leeds or Igham for a centre, sufficient interesting material for either pencil or brush will be found near at hand for two or three good long summer days.

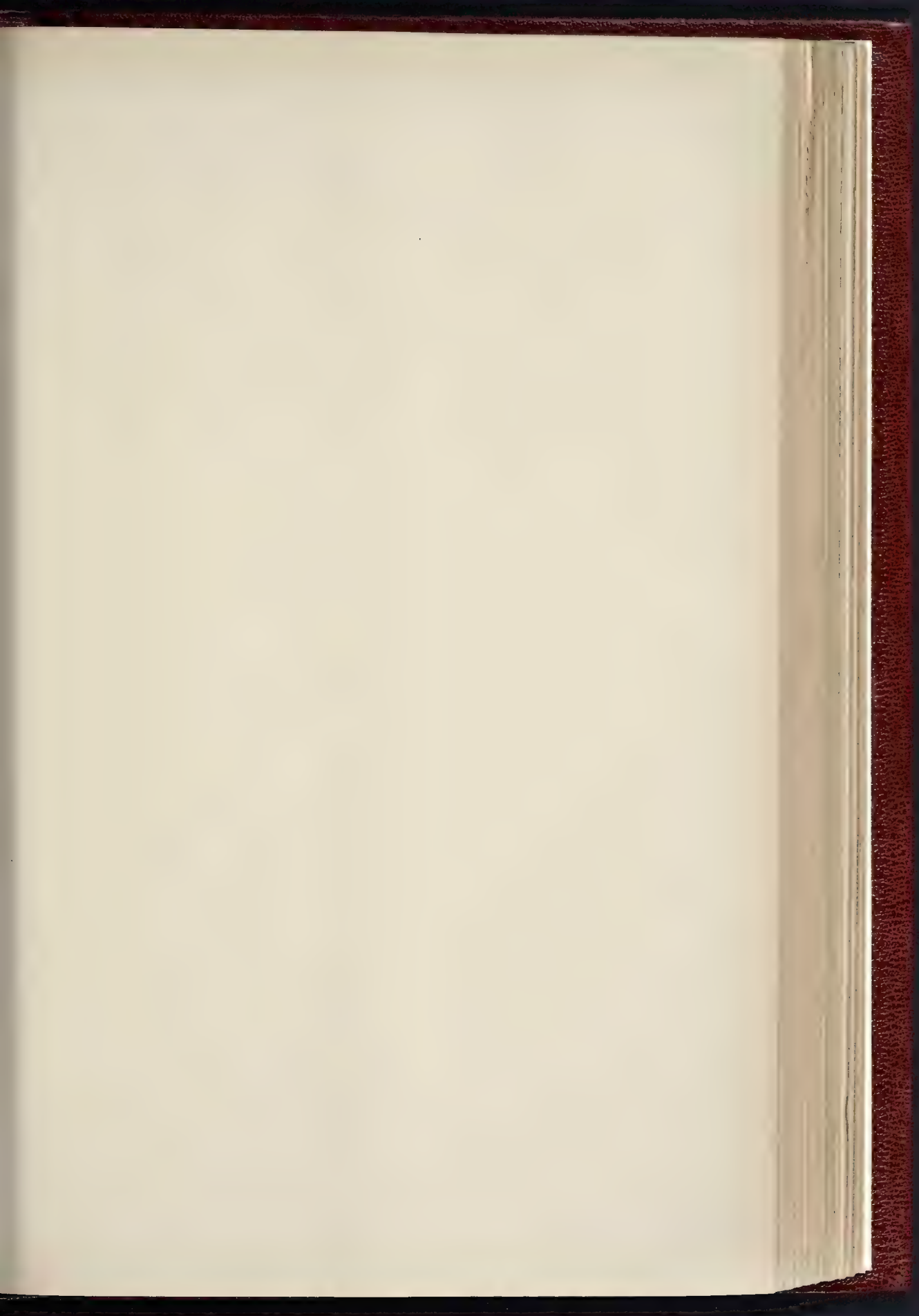






WAITING HALL. GREAT INDIAN PENINSULAR RAILWAY

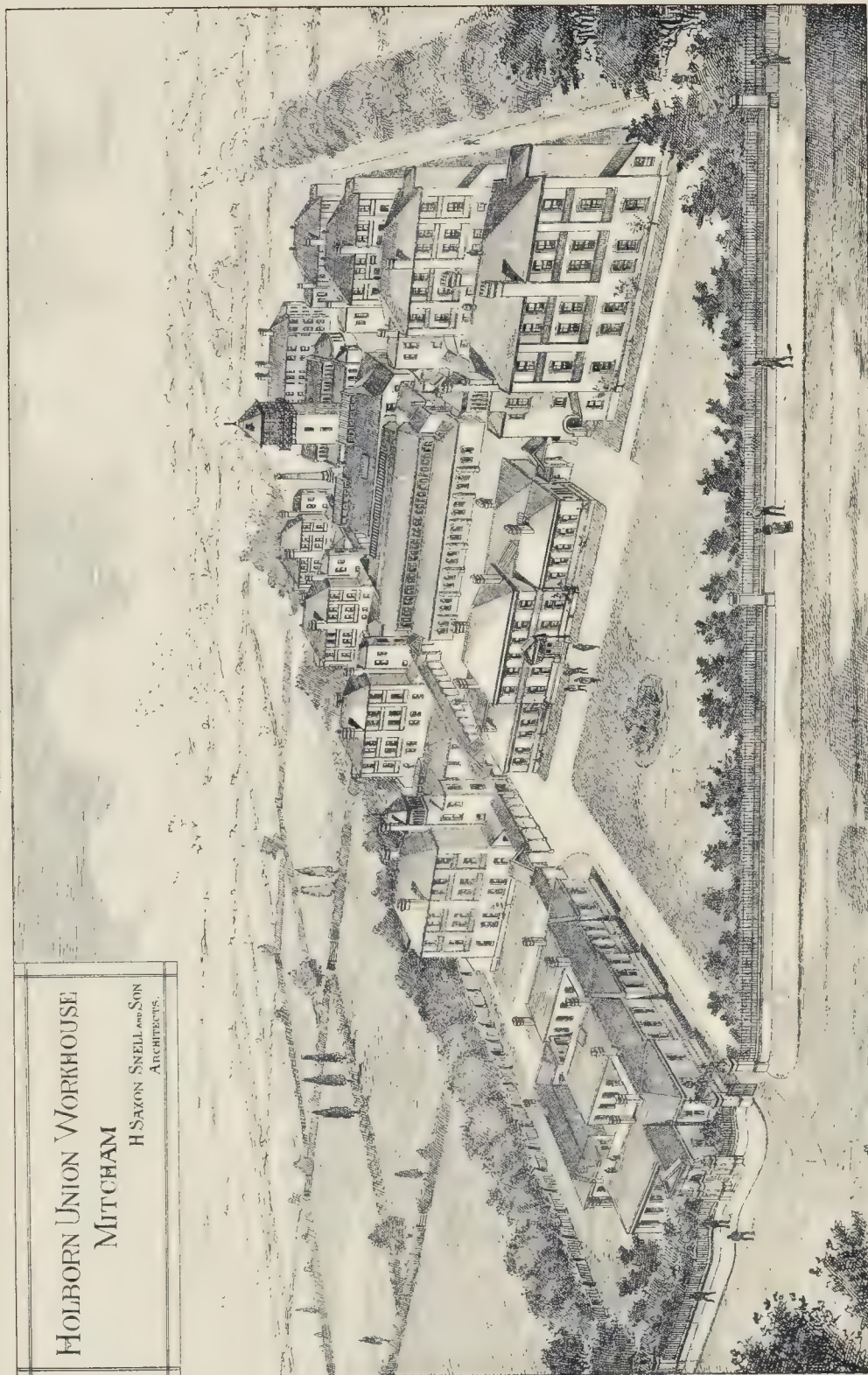


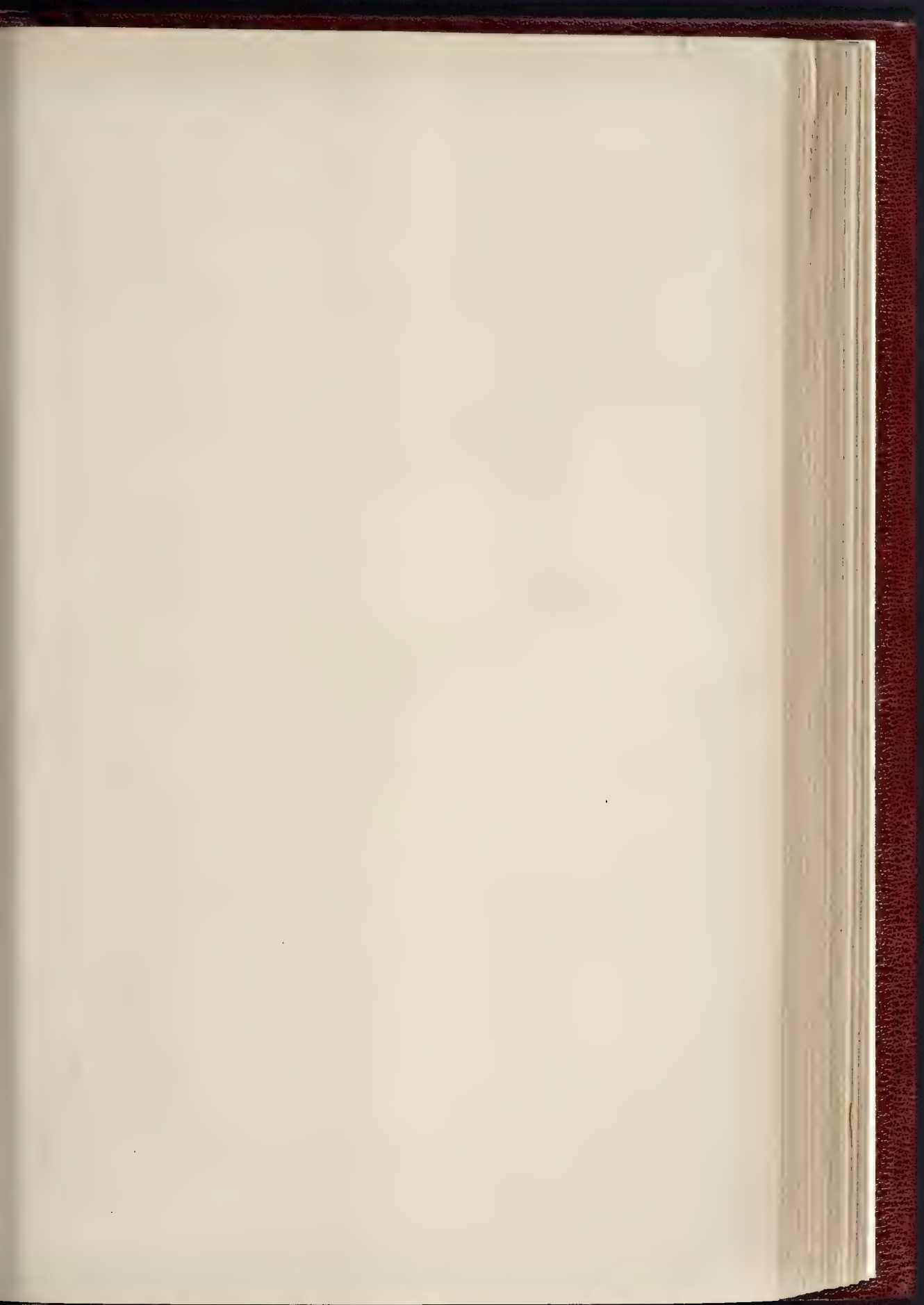


THE BUILDER, OCTOBER 23, 1886.

HOLBORN UNION WORKHOUSE
MITCHAM

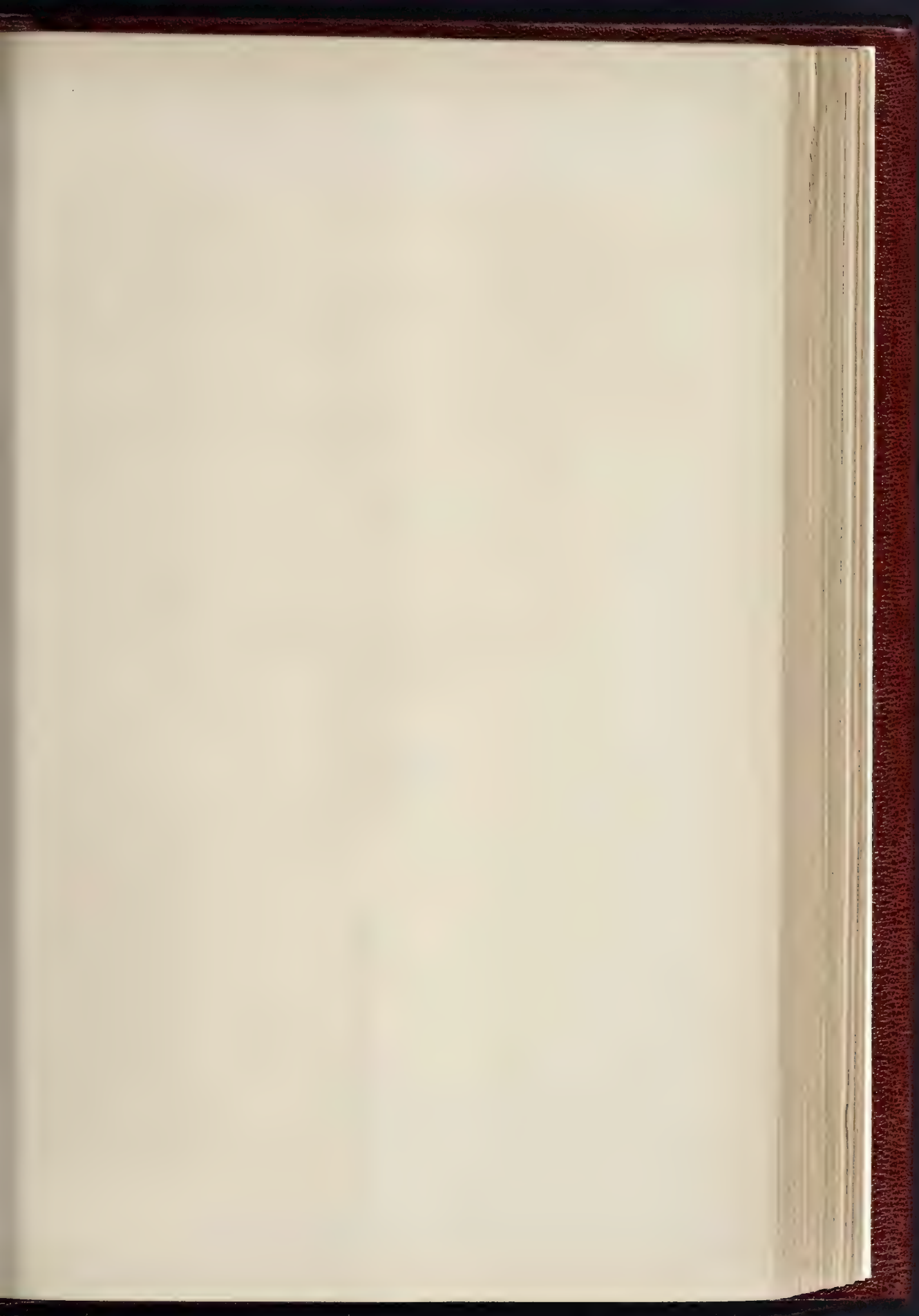
H Saxon SNELL and SON
ARCHITECTS.





THE BUILDER, OCTOBER 23, 1886.





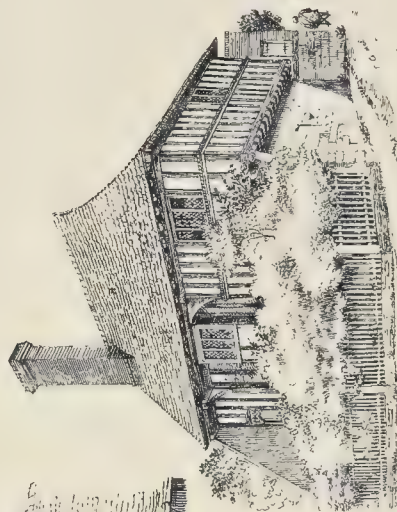
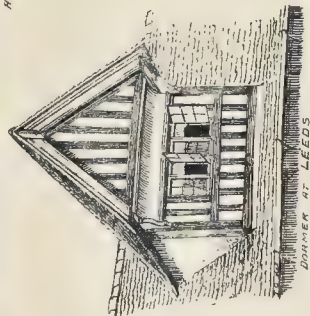
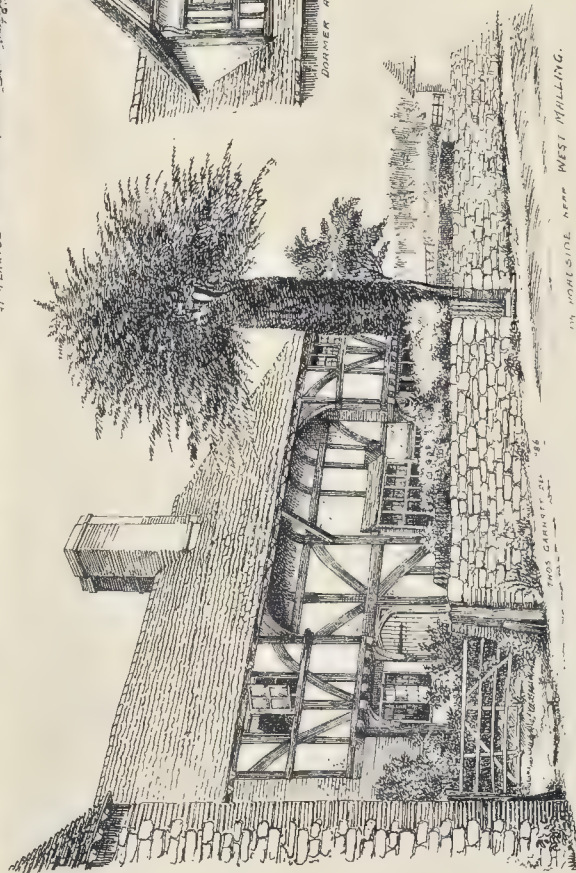
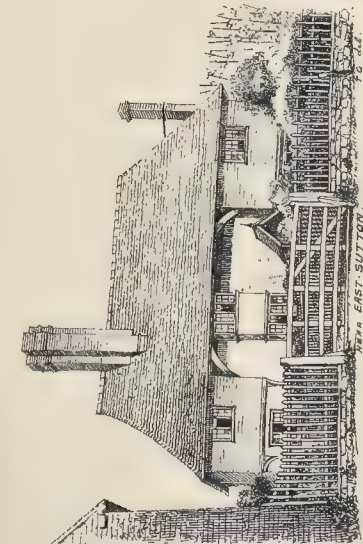


SCULPTURE AT THE EDINBURGH EXHIBITION. "CLEOPATRA" BY MR G. A. LAWSON.



ENTRANCE CORRIDOR TO THE WAITING HALL, GREAT INDIAN PENINSULAR RAILWAY TERMINUS, BOMBAY.

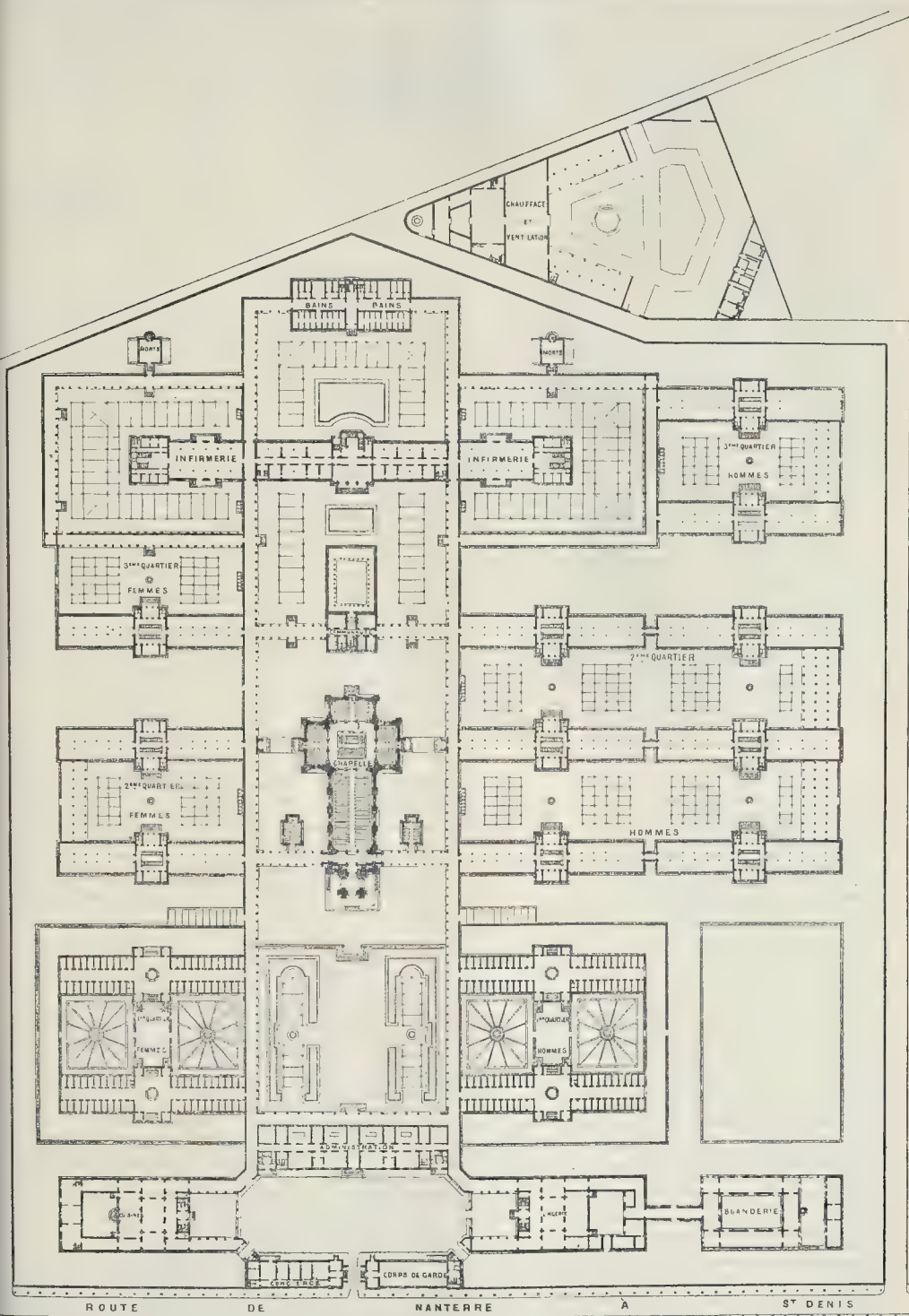
MR F. W. STEVENS, F.R.I.B.A., A.M.I.C.E., ARCHITECT



ON HOME SIDE NEAR WEST MILLING.

THE BUILDER, OCTOBER 23, 1886.

COTTAGE ARCHITECTURE IN KENT.



Plan of the Maison de Repression, Nanterre.—M. Achille Hermant, Architect.

GREAT INDIAN PENINSULAR RAILWAY TERMINAL BUILDINGS, BOMBAY.

OUR illustrations show the interior views of the waiting-hall and entrance corridor, which form the north wing of the above extensive range of buildings. The hall is 82 ft. in length by 76 ft. in width, and 42 ft. in height, and contains first and second class booking-offices on the east side, a telegraph-office on the south side, and a luggage-office on the north side. On the south side, the buildings overlook a garden, which will be tastefully laid out. The hall is spanned transversely and longitudinally by large pointed arches, resting on massive Coorla basalt buff-coloured stone central piers and columns of beautiful polished Italian red and grey marbles, capped with rich foliated Seoni stone caps carved out of solid stones *in situ*, weighing over 4½ tons each. The walls of the offices above the hall and the groining are carried by the arches, and the piers are consequently built of very solid fine cut-stone masonry. Corridors 13 ft. in width are placed on either side of the hall, the arches and columns of which carry the galleries and superstructure. The columns of the corridors are of polished black marble with bright yellow veins, and grey marble beautifully marked, surmounted by massive carved Porebunder stone caps of bold design. These columns are placed alternately in pairs, and are very effective in contrast with the surrounding coloured materials. The wooden groining is decorated with gold stars on an azure ground, and the mouldings of the main ribs are strongly emphasised in red, dark blue, and gold, the carved work being picked out in the same colours. This decoration, although simple, has an imposing effect. The columns of the galleries or upper corridors are of black marble with yellow veins, and the railing is of ornamental wrought iron, with French-polished handrail, and is decorated in chocolate-colour, picked out with bright red and gold. In the centre arch on the south side is placed a large clock, 3 ft. 6 in. in diameter, in a delicately-carved white Seoni sandstone stand. A dado, 4 ft. 6 in. in height, runs round the hall, composed of Maw & Co.'s glazed tiles, of rich foliated design, in red and buff colours, with a base in chocolate, buff, and black, and above this the walls are lined with white Porebunder stone. The flooring is paved with unglazed coloured tiles, of foliated and geometrical patterns, arranged in large square panels. The panels of the stone tympanums of windows are filled in with coloured glass of subdued tints and varied design, the former having the effect of toning down or reducing the glare of the Indian sun. The tympanums of the arches of doorways are filled in with ornamental wrought-iron open grille-work, appropriately decorated in colours and gold, and perforated woodwork of rich design, for ventilation. The counters of the booking, telegraph, and luggage offices are beautifully executed in local coloured woods and are provided with handsome open brass railings. The hall is approached from the public road, on the west side, through a spacious carriage porch and an entrance corridor. The latter we illustrate, and now proceed to describe.—The corridor is 42 ft. in length, 11 ft. in width, and 22 ft. in height, and is divided into four bays by transverse moulded arches, each bay being groined in a star pattern in Porebunder white stone and Hemnugger red stone, three courses of the former to one of the latter. The main diagonal ribs are richly moulded and carved, and spring from the backs of grotesque animals at the angles. The central bosses are formed into heads of the lion and tiger (typical of the United Kingdom and India) from the mouths of which the ornamental gas-pipes of lamps for lighting the corridor are suspended. The arches and groining of corridor are supported by massive red and grey polished Italian marble columns, beautifully marked, with richly-carved caps of varied design. The moulded and carved bases of columns rest on pedestals, which are panelled and moulded. There are four large arched doorways leading from the corridor to the hall, each being 8 ft. in width. The doors are of teakwood, massive in design, and handsomely moulded and panelled, and French polished. The polished brass mountings, such as hinges, &c., are ornamental and bold in character, and are well executed. The tympanums of arches of doorways are panelled in teakwood, and are filled in with coloured glass of subdued tints and foliated design at the bottom, and ornamental open wrought-iron grille-work decorated in colours

and gold at the top. The paving and large entrance steps are of hard blue basalt stone, the former being worked in panels with a hearing of diamond-shaped stones, and a border running round, 1 ft. in width. The decorations, carving, and all other work were executed by native workmen under European supervision and guidance. The models of foliated sculpture were designed and provided by Mr. Gomez and the students of the Bombay School of Art, under the direct supervision of Mr. J. Griffiths, the superintendent. The ornamental counters were supplied by the East India Art Manufacturing Company, Bombay, from the architect's designs. Signor Gibello was the contractor for the coloured decorations, and the ornamental wrought ironwork was supplied by the Metal Department of the Bombay School of Art, also from the designs of the architect. Messrs. Burjorjee Kustomjee, Maistry, & Co., were the general contractors for the work. The whole of this important work has been, from its commencement, under the direct supervision and control of Mr. F. W. Stevens, F.R.I.B.A., A.M.I.C.E., who also designed the buildings, and he has been ably assisted by Mr. Siteram Khanderao, assistant engineer, and Mr. Mahderao Janardhan, supervisor, Public Works Department. The work, of which the hall forms part, is rapidly approaching completion, and will be the largest of its kind yet erected and certainly the most extensive modern architectural work in India. A coloured drawing of these buildings was exhibited at the Royal Academy in 1881, the principal feature of which was a large masonry central dome, the first, we believe, applied to a Gothic building on scientific principles. This we hope to illustrate in detail among other drawings at some future time. The cost of the buildings when completed will be about a quarter of a million sterling. The illustration of the hall is from a coloured drawing by Mr. Nattress, and that of the entrance corridor from a photograph by a Bombay native artist, Mr. Shushunker Narayan.

We may add that the illustrations of the carved details, &c., are taken from the photographs of the models prepared at the School of Art. These carvings were modelled from the local flowers, plants, and animals, and have been beautifully carved by native workmen under the direct supervision of Mr. Stevens, who considers the quality of the work to be quite equal to anything of the kind in Europe.

A TIMBER-DRYING APPARATUS.

WITHIN the last few years several systems of drying timber have been invented. We have now another new one, that of the Universal Cool Air Drying Company (agent, Mr. Paul Ewens, No. 20, Bucklersbury). They claim for this patent process of drying perfect and speedy effectiveness, and that by it any substance can be dried without injury of any kind. Atmospheric air is drawn through a specially constructed furnace, the effect being that the moisture held in suspension is eliminated. The hot-air thus obtained is then cooled down in a special apparatus to the required temperature and conveyed to the drying-room, where, being kept in a state of perfect circulation, it comes into contact with the goods, with the result that any moisture in them is rapidly absorbed by this dry, cool air, which, having now resumed its original condition of damp air, is drawn out of the drying-chamber and its place supplied by fresh dry air and so on until there is no further moisture in the material under treatment. The dry air being of one uniform temperature dries the material without warping and twisting it.

The timber-dryer is constructed with doors at each end. Tramways are arranged from one end to the other, with light trucks, and on these the timber, previously sawn into boards, is stacked, and run into the chamber, and the doors closed, and the process then commences, the temperature being kept at about 75°. After treatment from three to nine days, varying with the thickness of the boards and the kind of timber, it will be found that the timber is perfectly dry, and the inventors claim that the sap and other fluids in the pores and cells are solidified, and that it has not that affinity for moisture which is marked in the case of ordinary stored timber. Fir timber that had been in the canal for three years was reduced from 13 cwt. to 8 cwt., and hard woods lost one-fourth of their weights, in each case

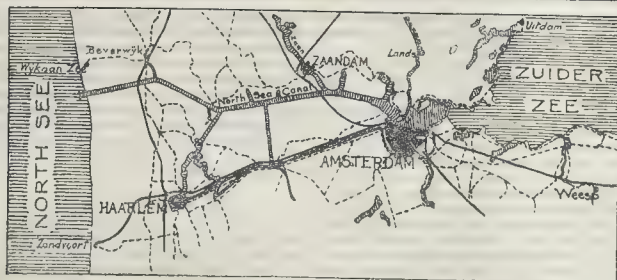
without warping or twisting. Necessarily the process requires to be carefully carried out in accordance with the instructions; and as the company offer to dry samples sent, we should advise our readers to try it, and test for themselves the results. The Government have erected one of the dryers at Woolwich, and would no doubt give the result of their experience for the benefit of any one applying to them.

THE NORTH SEA CANAL.

THE modern commercial importance of Amsterdam is in no small degree owing to the fact that it has been possible to connect it with the North Sea by means of two canals. In the sixteenth and seventeenth centuries Amsterdam, it is true, was a notable seaport, even though a port on the Zuyder Zee, with its sandbanks, its intricate navigation, and its exit to the North Sea by the island of Texel. But so in years gone by was Chester a seaport of importance. Now it can scarcely be called a port at all. The fate of Chester would probably have been the fate of Amsterdam, had it not been for the North Holland Canal and the North Sea Canal. The former was constructed in 1825, and after passing through North Holland for fifty miles reached the sea at Helder. For the purposes of inland navigation and drainage this canal will always remain useful, and for a time it answered its original purpose by continuing to keep Amsterdam a seaport; but it would never in recent years have enabled Amsterdam to compete with Rotterdam and Antwerp, or to have had foreign produce shipped straight to her quays. Its length alone was a drawback, and, except in the case of ships from Russia, the position of the entrance caused an extra carriage of nearly 100 miles along the coast of Holland. To connect Amsterdam with the North Sea by means of a larger and a shorter ship canal was therefore the most natural thing in the world. In consequence, there now exists the North Sea Canal,—opened in 1876,—which has not only prevented Amsterdam from degenerating as a seaport, but has put her on a par with Rotterdam, and has given her an advantage over Antwerp. For the North Sea Canal is fifteen miles only in length, whilst Antwerp is sixty miles from the sea. Her commercial position is now, therefore, not only preserved, but improved. Her geographical position is such that she cannot fall from year to year to become of greater importance to North Germany as a seaport, and with due allowance for the slow deviation of the current of trade, it is scarcely doubtful that she will eventually rival Antwerp as a seaport. With such an example, it is not to be wondered at that Manchester would fain have her Ship Canal, or that the possession of Holland is obviously an object which German statesmen regard as desirable.

There may be said to be two parts of the canal. There is the canal proper from the harbour of Amsterdam to IJmuiden, with its great gates and its external appurtenances, two lighthouses, a tidal basin, and a harbour protected by two breakwaters stretching into the sea. There is also the great dam, one mile and a quarter in length, from Schellingwoude to Zeedam, which stretches across the entrance to the Zuyder Zee. This is reached by several locks at the north end of the dam. This dam has, in fact, made the mouth of the Y, which is here more than a mile in breadth, a completely land-locked harbour,—equally advantageous for purposes of commerce or of pleasure. For here the amateur of Amsterdam can sail about with impunity to his heart's content, and the citizen take a little fresh air afloat for three stivers and a bucket of beer at Nieuwendam or Zeedam.

The primary cost of the work was, speaking roundly, nearly three millions, but of this sum three-quarters of a million was reimbursed from the sale of reclaimed land, which the construction of the canal enabled to be cleared of water. Half a million of the cost was also defrayed by the city of Amsterdam. Four times a day the steamers *Dolphin* or *Stadt Pomerend* ply from Amsterdam to IJmuiden, so that the canal forms also a means of local communication through this particular bit of North Holland. The surroundings of one canal in Holland are very much like those of another,—the same windmills rushing round, the same fat cattle sleepily grazing on grassy meadows, and neat red-roofed houses with green doors and windows. But in one sense the North Sea Canal is the most characteristic piece of



The North Sea Canal.

Holland. It focusses from time to time the entire national characteristics of the country in a single glance; for the nearest object to the passing steamer may be a great barque just arrived from the East being laboriously towed to her berth at Amsterdam: she nearly touches the bank of the canal just where a windmill is propelled by the fresh north wind, and a small pumping-house keeps the low-lying polders free from water. On these, as far as can be seen, speckled cattle are dotted in groups, and in odd corners of the fields husbandmen are steadily at work. In the distance the spire of Beverwyk or the red roofs of Zaandam easily catch the eye. When the sun shines, and the wind blows refreshingly, IJmuiden is attractive enough. It is a rendezvous of sailors and fishermen in quaint costumes. Among them are mingled sober-looking peasants watching the working of the locks, the women with large gold lappets and earrings projecting on to the face. A few years ago IJmuiden was simply a spot in the great sandhills which stretch along this coast. Now it is sprinkled with houses scattered about these barren sand-heaps, and in a few years these will become a populous place, with *cafés* and *restaurants* looking on to the sea.

THE CARPENTERS' COMPANY AND TECHNICAL EDUCATION.

THE Carpenters' Company, as our readers know, has done much of late years to advance the cause of technical education, especially in relation to the building trades; and now we have to mention a new and most laudable effort on the part of the Company. The Company are the owners of a large and rapidly-developing estate at the East End, in the midst of a busy and industrial centre at Stratford, a little to the westward of the Great Eastern Railway Station. Upwards of 500 houses have already been built and inhabited, the estimated population on the estate being nearly 5,000. To meet the wants of the residents on this estate and the surrounding neighbourhood, and to promote the spread of technical knowledge, the company have just built a Workmen's Institute and Lecture-hall in Jupp-road, leading out of Lett-road, and this building was formally opened on Tuesday, when, on the invitation of the Master and Wardens of the Company, some fifty or sixty gentlemen connected with the Company, or with local industries and educational work, visited the estate. The visitors included Mr. R. W. Kennard (Master of the Company), Mr. Alderman William Lawrence, Mr. W. Willmer Pocock, Mr. Alfred Preston, Mr. Stanton W. Preston (Clerk to the Company), Professor T. Roger Smith, Mr. Wilfrid Nicholson, Mr. W. Ritchie, Mr. A. Boake, Rev. Mr. Sant, Rev. G. Towner, Mr. H. J. Cook (vice-chairman of the West Ham School Board), and other gentlemen connected with the locality. The buildings (which have been erected by Mr. William Gregar from plans by Mr. T. Roger Smith, the Surveyor to the Company) include a lecture and recreation-hall capable of seating about 300 persons, a commodious cookery class-room in the rear, and a detached iron building for use as a workshop. Mr. Alfred Preston, in the course of an interesting statement, said that the Carpenters' Company, recognising that property had its duties as well as its rights, and recognising the value and importance of facilities for technical education and wholesome recreation, had put up these buildings, and, furthermore, a large piece of ground to the westward of them would be preserved as an open space or

recreation-ground, possibly to be provided with a gymnasium. In the lecture-hall various educational and recreative lectures and entertainments would be given. In the evening there would be technical classes, illustrated with workshop operations, in carpentry, plumbing work, sheet metal work, and other subjects, besides classes for such subjects as mechanical drawing. The instruction in these subjects was to be of the same character as that given in the City Guilds' Technical Institute and at the classes at the Polytechnic Institution. Lectures would also be given from time to time, and the first two lectures would be by well-known architects, Mr. Thomas Blashill and Mr. John Slater. While these advantages were being offered to the lads and young men, the girls and young women were to be taught cooking in the room allotted for that purpose. It was proposed that the new Carpenters' Institute should be managed by a committee composed partly of members of the Court of the Carpenters' Company, partly of local employers of labour and other gentlemen of influence, and partly of workmen themselves. The instruction to be given would not be gratuitous, but the fees would be so low as to place the opportunities of self-improvement within the reach of the poorest lad or young man who desired to avail himself of them. Other addresses were also delivered, the speakers including the Rev. Mr. Sant, who described work of a somewhat similar nature which had been carried on at the Church Hall, West Ham; the Rev. George Towner, Baptist Minister, who was thanked by the Master for the great assistance which he had rendered to the Company in this local effort; Mr. Alderman Lawrence; and Mr. W. Willmer Pocock.

THE EMPEROR OF RUSSIA'S NEW CASTLE AT SPALA.

DURING the last few weeks the Russian press have been teeming with accounts of the new castle which the Emperor has been building at Spala, in Poland, and which is now completed.

The Castle of Spala stands in an exceedingly pretty position, on the banks of the little river Pilnitz, and is modern in style. The principal parts are built of red granite and sandstone, the building itself being of brick. There is very little ornamentation, and the roof is an ordinary tiled sloping one. Through the principal entrance, which is in the form of a porch with a lofty arched roof, the great hall is entered, whence splendidly-carved oak doors lead to the dining-room, which, with a few retiring-rooms, occupy the ground floor. The former is a beautiful room in Renaissance, 40 ft. long, 24 ft. wide, and 16 ft. high, lighted by six pointed windows.

From the hall a broad sandstone staircase, covered with thick red carpets, leads to the first floor, the middle and left parts of which contain the rooms of the Emperor, those of the Empress being on the right. On this floor are, besides, eight rooms for the accommodation of the Cæsarewitsch and his suite. The cabinet of the Emperor is remarkable by its plain but solid elegance. Between the two windows stands a large heavy writing-table of oak, and against the wall, right opposite, a marble chess-table, beautifully designed. The window-curtains and *portières*, as well as the carpets, are of heavy rich brown damask, and the furniture covered with brown leather. Adjoining the cabinet are the Emperor's bed, bath, and dressing rooms, which are mostly furnished in marble

and oak. The bath is of real China, with an oak frame.

The saloon and boudoir of the Empress are furnished in walnut covered with dark purple velvet, into which various lighter designs have been woven. The frames around the mirrors and paintings are also covered with dark purple velvet, a substance to which the Empress is very partial, whilst a splendid Turkish carpet covers the floor. Here stands also the grand piano used by her majesty. On the walls are a number of oil-paintings, representing certain Imperial hunting incidents and a number of water-colour drawings by the celebrated Russian court painter, Zichy, illustrating the Meeting of the Three Emperors at Skierniewice. Some are of a humorous nature, as, for instance, one representing the three Imperial chancellors in animated conversation in the foreground, and the correspondents of the leading European organs rocking on telegraph-wires in the background. A broad covered balcony, decorated with plants and flowers, runs outside the saloon along the northern façade.

Along the roof of the castle large water-tanks have been placed, whence the rooms are supplied with hot or cold water. The rooms on the third floor are used as bedrooms for the attendants, and are reached by a special staircase. The kitchen is situated in a separate building, and communicates with the room in which the dishes are dressed, next to the dining-room, by a covered passage. Close by the kitchen are the stables, with room for fifty horses, the carriage and harness rooms, &c. A paved roadway, 60 ft. in length, leads to the park, which has an area of about 100 acres, the whole being enclosed with wire netting. All the roads and paths in the park are covered with thick moss. During the Imperial hunts in the neighbouring forests some 1,500 huntmen rangers and drivers are employed.

The castle has been designed and all arrangements connected with it carried out by Count Wielopolsky, a Polish nobleman distinguished for his artistic taste, to whom the Emperor left everything. The first stone was laid in April, 1885, the whole building, &c., having thus been completed in eighteen months. It should, however, be mentioned that the Count had *certainly* as to money and workmen, but not to time, the Emperor having stipulated that the castle should be ready this autumn, in time for the hunting season.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.

AT the opening sessional meeting of this Society on Monday last, the President, Mr. C. R. Chorley, delivered the inaugural address, from which we give the following extracts:—

In meeting together for the inauguration of another winter's meetings, it becomes my pleasing duty to congratulate the members of this Society on the uniform success which has attended the work of the Leeds and Yorkshire Architectural Society during the past year. The section which embraces the younger members has maintained the enterprise and activity to which my predecessor alluded in his presidential address of twelve months ago. The sketching club has worked assiduously, with results that have afforded as much pleasure to those whose multifarious duties have almost extinguished the opportunities for pursuing the fascinating art of sketching, as it must have afforded permanent benefit to the members of the club who have so well exercised their pencils during the summer.

The Associates of our Society will not, I am sure, misunderstand the tenor of my remarks, or imagine that I am degrading the value of sketching, when I venture to warn them against devoting too much attention to this enjoyable department of their work, to the detriment of the more solid and less pleasurable portion of an architect's acquirements. It is possible to be an efficient architect, even to be an artistic architect, without being a skilled sketcher, yet no one can be a finished architect, having the confidence of his clients, or confidence in himself, without possessing the fundamental professional need of business capacity, and a thorough knowledge of scientific and sanitary building requirements.

The architectural student can no longer plead ignorance of the curriculum to be followed in preparing for his future calling in life. That has now been carefully laid down by the Royal

Institute of British Architects, in the pamphlet issued for the guidance of those preparing themselves for the Examination for the Associateship of that body; and it cannot be too often or strongly impressed upon the coming race of architects that in the near future no one can hope to be held in esteem by the public, or consider himself qualified for the pursuit of the profession of architecture, who has not, by successfully passing the examination alluded to, qualified himself for admission into the circle of the Institute.

The general work of the Society has shown uniform if uneventful progress during the year. The most significant mark of this is seen in the necessity which has arisen for our removal to larger premises. To our members and friends I offer a cordial welcome to our new home, and trust that the steady progress which has characterised our Society from the commencement may attend it in the future, and justify the enterprise of the committee in providing enlarged facilities for carrying on the work it has in view.

Financially, the Society is in a sounder condition than it has ever before been in, and though our expenses have grown considerably, our income has increased in a slightly better ratio, so that we have been able to almost extinguish the liabilities which the activity of the past has laid upon us, and to remove the anxiety which is a necessary accompaniment of a condition of insolvency.

As I before remarked, the most impressive proof of our continued progression is to be found in to-night's inauguration of our new premises, as it shows how we have successively out-grown the different places which have previously accommodated us. I am sanguine enough to believe that we have not yet reached finality in our professional home, but that eventually architecture in Leeds will come to have a permanent centre in buildings erected and owned by this Society. It is in this direction we ought to steadfastly keep our attention, and, though such a prospect for the moment seems visionary and too ambitious, I have confidence that in good time it will be realised.

To aim high is the only way to attain much, and we shall fail in our mission if we ever allow ourselves to feel perfectly satisfied in our present position. Above all, we must never cease to remember the pre-eminent importance of collective action, and the pressing need for setting aside individual advantages for the general good.

No profession has suffered so severely or lost so much in material profit as our own, for want of organisation. Until recent years each competent member of the general body has pursued his way, unconcerned by any regard for the general welfare, and careless of anything further than the immediate present.

We can hardly complain because this selfish isolation has permitted our profession to be robbed of many branches of honourable and lucrative employment, and has allowed the estimation in which it is held to be lowered in the sight of the outside public.

That there is a marked and welcome improvement in this respect is owing wholly to the establishment of, and activity in, societies like our own; but it will never become all that we are entitled to expect until every architect belongs, and is loyal to, the local and central organisation.

There are still, in many towns more than our own, respectable fellow-professionals who are unattached to any Society. There are others who, whilst belonging to our own or other bodies, give but a lukewarm and half-hearted support to the collective interests. Such men are traitors to the art of architecture, and selfish robbers of the birthrights of their children who succeed them, or the rising generation who have their work to take up and carry on. If even they are deaf to the rights of others they are blind too to their own interests, which are bound up, more or less, with the common good.

The special province of our Society is to guard the interests of the art of architecture, not for our own good when that may be attained against the general benefit, but for the purpose of preventing injury being done to that art by ignorance or carelessness, and of raising by all legitimate means the estimation in which it may be held by the public. To do this is indirectly the surest way of improving the tone of our profession, and of ensuring to it the

respect and deference which should be paid to all professions, when moving in questions affecting the particular province of each.

The attention of our members has recently been again called to the ever-recurring question of competitions, by the erratic and aimless movements of the Corporation Committee who have in charge the arrangements for the erection of an Art Gallery for Leeds. Not the least peculiar of the resolutions arrived at by this body has been one rejecting somewhat brusquely the advice of this Society regarding the sum to be expended on the erection of the new building. The opinion of nearly all the leading architects of Leeds, men of all others the most competent to form a sound judgment on a question of the cost of building operations, was entitled to influence the decision of the Art Gallery committee, however well and wisely they might consider themselves to be advised. That opinion ought to have been doubly binding on them, because we know that the most experienced of their professional advisers held views in this matter coinciding with our own. How absurdly ridiculous the amount fixed for the erection of the Art Galleries is, in comparison with the work to be done, any rational and honest architect will admit, when he hears that the rate per cubic foot which the Leeds Art Galleries Committee consider sufficient to erect public buildings hardly exceeds 3d. This, too, to include fireproof floors and all the special arrangements for lighting, ventilating, heating, &c., which the future presence of valuable contents demands.

With care and economy a cottage house of the poorest character might be erected at this rate, but I defy the committee or their advisers whom they quote to name one single public building of the same class, which is not a temporary erection, anywhere in the United Kingdom, that has been completed for anything, even approximately, near the sum they have named, and which, in the face of our correction of their error, they insist upon as being sufficient for the completion of public art galleries worthy of the Borough of Leeds.

There was, too, no room for ingenuity to curtail the area of the buildings. The conditions of competition laid down clearly the ground to be covered, and fixed the height of the rooms, so that any reduction of cost could only be realised by resorting to all the expedients of jerry building, which it is supposed to be the special province of town councils to suppress.

It is usual for the annual address of this society to make mention of such buildings of note as have risen in our streets during the past year. I regret that the long-continued depression in the building trade obliges me to dismiss this portion of my duty in very brief manner.

This month sees the completion of All Hallows' Church, from the designs of Messrs. Kelly & Birchall. The reputation of the firm will lose nothing from an inspection of this most recent of their productions.

The only other building of moment in progress is the new offices for the *Yorkshire Post*, which are slowly rising, from the designs of the firm to which I belong. It would hardly have found a place in my address had it not been that it is worthy of study as an excellent illustration of the advantages and disadvantages of the use of terra-cotta.

It is an unquestionable gain to street architecture and to the cheerfulness of towns that we have at our disposal an imperishable material, which will always preserve its bright colouring amidst the gloom of a darkened atmosphere. There is no doubt that, as yet, these welcome advantages can only be obtained by the exercise of a seldom-found patience on the part of our clients. The difficulties incidental to the manufacture of this material of excellent quality, appear to set a bar to anything approaching to rapidity of building when it is made use of. The original difficulty in obtaining regular lines has been largely overcome, or, at least, to so great an extent as to no longer make this objection to terra-cotta in any measure a serious one. So soon as the greater rapidity of delivery can be counted on it will grow rapidly in popular favour and become the recognised facing material of town buildings.

Leaving matters of local and personal interest for those affecting the general well-being of the whole profession, the most notable incident of the past year has been the completion of the new Charter of the Royal Institute of British

Architects, so far, at least, as the labours of the Institute itself are concerned. This document, possessing so much interest and importance to architects, is now before her Majesty's Privy Council, and so soon as their and the Queen's assent is given to it, we may hope to find the Council and the members of the Institute assiduously engaged in the preparation of the by-laws which will be essential before the possibilities enclosed within the Charter become of practical value.

It cannot be alleged, even by Professor Kerr, that this document has been hastily prepared, or that its provisions have not received the most thorough investigation on the part of the members of the Institute. The process of evolution which it has undergone has been singularly and tediously slow, and we can only hope that the final result will be commensurably perfect.

There can be no doubt that when it becomes the guide to the actions of the Institute, that body will commence a new era of usefulness and influence. Its members will have far more power than has been the case heretofore, and its actions will, in an immeasurably larger degree, be those which have the sanction and support of the general body of architects.

The watchful attitude which this Society has maintained during the settlement of the terms of the Charter, must not be relaxed until the preparation of the new By-laws is at an end. Upon the wording of these will wholly depend the successful working of the Charter, and the influence of provincial members over the actions of the Institute will depend so largely upon the way in which they are framed, that it will be more than ever important that every clause should be minutely examined by us and other societies before it is allowed to come before the Privy Council.

It is of special importance that the power of voting by papers should be granted by the by-laws; for in no other way can the influence of provincial members be made felt in the guidance of the future decisions of the Institute. The opinions of the metropolitan and provincial Fellows are so frequently at variance, that we can no longer afford to have our views overridden by the mere incident of living further from Conduit-street than others do.

Another subject for just congratulation is the increased tendency which the promoters of public architectural competitions show in favour of the appointment of professional assessors to assist in the decision of these contests. That this movement is largely the outcome of the great spirit of cohesion which architects now exhibit is unquestionable. The idea would hardly suggest itself spontaneously to public bodies that greater wisdom on special matters might be found outside themselves; yet these bodies would not yield on such a point even to outside pressure, if there did not exist amongst them a higher sense of honour than formerly prevailed, or if they were not actuated by a keener desire to do full justice to those whom they invite to take part in architectural competitions.

We may rejoice in both changes. That a higher tone of morality prevails in public life is to the gain of all. That a keener perception of the necessity for brotherly union amongst ourselves is dominant, is a matter not only of personal material advantage to each, but will serve inevitably to raise the whole architectural profession in the esteem of the public, as well as to improve the general tone and strengthen the *esprit de corps* of the profession itself.

Sanitary Assurance Association.—At the monthly meeting of the Council of the Sanitary Assurance Association, held last week, Mr. Andrew Stirling in the chair, a communication was received from Dr. R. Farquharson, M.P., in reply to the request of the Council that he would again take charge of the Sanitary Registration of Buildings Bill. Dr. Farquharson consented to the request, and will bring in the Bill again, in connexion with the Members for South Manchester, Central Hackney, and Glasgow; and the following resolution was unanimously passed:—"That the thanks of the Council be given to Dr. R. Farquharson, M.P., for having undertaken to re-introduce the Sanitary Registration of Buildings Bill next Session; also to Sir Henry E. Roscoe, M.P., F.R.S.; Sir W. Gwyer Hunter, M.P., M.D., and Dr. Charles Cameron, M.P., for consenting to again back the Bill."

NEW SEWAGE WORKS AT BOLTON.

The new outfall sewage works for Bolton were opened on Monday last. They are situated at Hacken, on the River Croal, and have cost about 30,000l. Mr. J. Proctor, Mr. Inst. C.E., is the engineer. They are capable of treating upwards of four million gallons of sewage daily. The site contains 21½ acres. Mr. Proctor has forwarded to us a pamphlet describing the works and those at Burnden. He says:—

"Topographically, the borough has three water-sheds, namely, the Croal, which embraces the heart of the borough to the extent of 1,627 acres, and the townships of Heaton, Runworth, and Lostock; the Tonge, including the eastern and northern portions of the borough, having an area of 358 acres, and the townships of Darcy Lever, Brightmet, Tonge, Sharples, and Halliwell; and Jenny Beck, which includes 193 acres of the southern portion of the borough and portions of the townships of Great Lever, Middle Hulton, and Over Hulton. Intercepting sewers of sufficient capacity to meet the requirements of these water-sheds have been laid by the Corporation along the valley lines within the borough, and as close to the rivers and streams as practicable.

The Croal intercepting sewer discharges at the Burnden Sewage Works from an oviform sewer of 4 ft. by 2 ft. 8 in., and is reduced as required along the route to a section of 2 ft. diameter at the borough boundary, Blackshaw-lane, with a total length of 3,700 yards. The Rural Sanitary Authority have continued this sewer to Deane Clough and Runworth, and contemplate extending it through the townships of Heaton and Lostock.

The Tonge Intercepting Sewer forms a junction with the main outfall sewer, a little below the confluence of the River Tonge with the River Croal, near Hacken-lane, in Darcy Lever, and traverses the Tonge Valley and Asley Brook, to the north end of Raglan-street, Halliwell. Its diameter decreases from 24 in. at the outlet to 12 in. at the commencement, having a total length of 5,530 yards.

The Jenny Beck Intercepting Sewer discharges into the main outfall sewer near Burnden Bleach Works, and follows the valley line to Adelaide-street, thence along that street and St. Helen's-road to the Railway Crossing, at which point a connexion will be made with the sewers of the Rural Sanitary Authority now laid in the townships of Over and Middle Hulton. The total length of sewer laid by the corporation is 3,900 yards.

The main outfall sewer runs along the valley of the Croal from the Hacken Outfall Works to the Burnden Works, at which point it joins the catch-pit of the Croal sewer, and receives in its course the sewage from the Tonge and Jenny Beck sewers. Its section at the point of outlet is 6 ft. by 4 ft., and the discharging power is equal to 50 million gallons per day of twenty-four hours, or of more than sufficient capacity for a population three times the number requiring to be accommodated at present upon the water-shed within the environment of the scheme.

The Burnden Works were constructed in the year 1870, for the purpose of dealing with the sewage from the Croal intercepting sewer, then laid between Burnden and Great Bridge, Chorley-street. They are situated on the west bank of the Croal, near Rosehill, and consist of six tanks, averaging 5 ft. 6 in. deep, with a total capacity of 400,000 gallons. The buildings consist of one block, 100 ft. by 60 ft., cellared throughout, boiler-house, and other sheds, with a chimney-shaft 150 ft. high. These buildings were originally designed under the advice of the ABC Company for the reception of drying floors, upon which the mud from the tanks was dried, partly by the exhaust steam and partly by the gases from the boiler fire. This was discontinued, as the dried mud fell in value from 5l. to 5s., after which the arrangements with the ABC Company were brought to an early termination.

In consequence of the buildings and machinery then existing at these works, it was decided to utilise them for the preparation and application of lime or other precipitant for the new works at the Hacken, instead of duplicating the machinery at that place, involving a large outlay upon capital account, in addition to a heavy fixed charge for a second staff of workmen. Such alterations to the machinery and mixing pits as were deemed necessary have been made, a new catch-pit, 20 ft. long and

10 ft. wide, has been constructed, with the requisite breakwater, sluice, gauge, screen, and other apparatus, by means of which the flow of sewage to both Burnden and Hacken can be computed, as the depth flowing over the gauge may be seen at once upon the graduated plate affixed to the side of the pit.

The Hacken works are situated partly in the township of Darcy Lever and partly in the township of Great Lever, and are bounded on the north and east sides by Fogg's-lane, on the south by the river Croal, and on the west by a new street, 12 yards wide, leading from Hacken-lane over the new bridge to Smith-road.

As previously stated, the precipitating medium, whether milk or lime, animal carbon, or sulphate of alumina, is added to the sewage at the Burnden Works, and is thoroughly mixed and blended together whilst passing down the main outfall sewer, a mile in length. On its arrival at the outlet or junction with the storm sewer it passes through two penstocks to the catch-pit, where gravel and other heavy matter are retained; thence through the screen to the gauge basin, over the gauge, through either of the conduits as desired to one of the detritus-tanks, where all solids heavier than flocculent matter are deposited; when this tank is full, the sewage which has left behind the majority of suspended matter flows through the outlets into a conduit alongside, having a bellmouth connexion with a system of iron pipes communicating with settling-tanks, each controlled by a valve; these pipes run beneath and through the centre of each tank, and communicate with the surface of the tank floor by means of three large gratings, up and through which the sewage flows until the tank is full; after a period of rest, the effluent is drawn off from the surface by means of six automatic floats through another line of iron pipes into the river, or through the turbine if the detritus or mud tanks require cleansing by the pump. The mud left in the settling-tank then flows into one of the mud tanks, whence it is pumped by means of a centrifugal pump to the adjoining land.

The settling-tanks, three in number, measure 297 ft. long, 96 ft. wide, and 6 ft. deep, and are alike in all respects; the floors are formed and floated with smooth concrete, dished in three sections from the cast-iron central inlets, with channels to the effluent floats; they are filled from the conduit south of the detritus-tanks through 24-in. iron pipes to the first inlet before mentioned, thence through 18-in. pipes to the second and third inlet; when one tank is filled the valve is closed, and a second tank filled; the third one may, in the meantime, be undergoing a process of cleansing. After the full tank has been at rest for a time and final purification completed, the effluent water is drawn off through six automatic floats into iron pipes increasing in diameter from 9 in. to 24 in., passing through the turbine house to the river. These floats are constructed of galvanised sheet iron, the tube is 2 ft. 6 in. by 6 in. at the mouth, and is reduced to a 9-in. pipe at the base, buoyancy being maintained by movable airtight compartments on each side, thus keeping the mouth submerged a few inches so that the clean effluent flows to the turbine, the float maintaining its level on the surface of the tank as the water rises or falls. Each float is attached to its branch by means of a V-joint with brass facings, supported in the centre and at the ends by a wrought-iron shaft, 2 in. in diameter, bearing upon a cast-iron frame embedded in and surrounded by concrete. After the effluent is run off to within a few inches of the bottom, one of the mud-tank valves is opened, and the sludge flows through the inlets whence it came into 18-in. pipes to the mud-tank; these pipes serving the double purpose of supply from the detritus-tanks and conveyers of sludge to the mud-tanks. The cubical contents of the tank space is equal to about one day's supply of sewage.

Mr. Proctor designed these works when Borough Surveyor, and on resigning that office he was appointed engineer to complete them, having the assistance of Mr. Edward Stanley Bayliss upon the ground the greater portion of the time.

Mr. William Longworth, superintendent of the Parks department, has laid out and superintended the planting of the ornamental portion of the work. Mr. John Fish, of Preston, was contractor for the tanks and conduits; Mr. Robinson, of Bolton, built the gate-house and superstructure of the turbine-house; Messrs. Stanion & Co., supplied the iron pipes;

Messrs. J. & E. Wood the penstocks, gauge, &c.; the Streets Department paved the roads; Messrs. Stott & Co., of Haslingden, supplied the dredger and screen; Mr. W. Gunther, of Oldham, supplied the turbine and centrifugal pump. The cement was obtained by the Corporation from Mr. Otto Trechmann, of West Hartlepool, and the Clitheroe Cement Co. Mr. Chadwick, of the School Hill Ironworks, supplied the gates and a portion of railing.

ST. GEORGE'S HALL, LIVERPOOL.

SIR,—In the *Builder* of the 16th inst. [p. 548] you remark, with reference to St. George's Hall, Liverpool, that "it is much to be regretted that the present municipal authorities should be so indifferent to the completion of a world-famous building, which seems now to be regarded with more interest anywhere than in the town in which it was erected." It is far worse than this, Sir; and if the municipal authorities would but let it alone the admirers of this magnificent building would have cause to thank them. I recently visited the hall after an interval of several years, and this is what I found in the interior.

1. The rich and carefully-designed central tiled floor is boarded over, thus blotting out a beautiful feature, and entirely disturbing the rich effect of colour: more than this, the architectural lines are destroyed, for the tiled floor was two or three steps below a broad margin of floor which runs round the building, but the boarding now carries the eye across flush from side to side. I am told that the alteration has also diverted the ventilation.

2. There is a richly-designed arrangement of architectural features below the organ, and, seen as Cockerell intended it, this instrument, with the supports that carry it, forms a noble termination to the hall. I found all this blotted out of sight by the steps and benches of an ordinary orchestra, and this end of the hall reduced to the bare and beggarly appearance of any ordinary concert-hall when empty.

3. Worst of all, the windows at the two ends of the vault through which the building obtains its chief light, are now filled with painted glass so crude in colour and coarse in design that they ruin the whole effect of the vault. One of these compositions represents a colossal St. George slaying a program green dragon, of vast size, who folds and curls through a great part of the picture, filling the field of vision with bright verdigris colour. I can recall no instance of so damaging a treatment of a great building as this, and if you can induce the Liverpool people to have these windows removed you will earn the gratitude of lovers of architecture throughout Europe.

Surely the guardians of such a monument as this ought, like the chapters of our cathedrals, to appoint a consulting architect of high standing, and take his advice on any alteration or addition made to a building which, I believe, is the finest work of its class, not only in England but in Europe. F. R. I. B. A.

** While agreeing entirely with our correspondent in his criticism as to the architectural effect on the Hall of the additions and alterations he refers to, we must observe that, as to the orchestra and the wooden flooring, the person indirectly, but really, to blame was Elmes himself, who was commissioned to build, not a grand *salle des pas perdus*, but a large concert-room for the triennial festivals then held in Liverpool, and which have since unfortunately dropped. Elmes wilfully ignored all musical and acoustic considerations, designed no orchestra, but a small tribune on which a few singers could stand, and laid a floor sunk in the centre of the area, with the worst possible materials for a music-room,—tiles. No doubt the alterations have quite spoiled the Hall architecturally, but without them it could never have been need for the purpose it was ostensibly built for. The moral is that the architect who is entrusted with an important commission should study to do as well as possible what he is commissioned to do, and not what he himself chooses to prefer.—E.P.

The Victoria Hospital, Burnley, was opened on the 13th inst. by Prince Albert Victor. The building is one of special interest, inasmuch as the wards are circular on plan. We will give a description of it in a future number.

"FEDERATION" CIRCULARS.

SIR,—The Architectural Federation Committee having been asked [by a correspondent], in your columns of last week, to publish the names of the gentlemen composing it, I beg to enclose the following list:—

Architectural Federation Committee.

G. W. Bourne (Edinburgh).
Basil Champneys.
Alfred Emden, Barrister-at-Law.
Walter Emden.
H. R. Cough, F.R.I.B.A., Pres. S.A.
G. G. Hoskins, F.R.I.B.A. (Darlington).
J. J. Lobb, Vice-Pres. S.A. (Newcastle-on-Tyne).
W. H. Lyon (Belfast).
G. A. T. Middleton, A.R.I.B.A., M.S.A.
F. B. Osborn, F.R.I.B.A. (Birmingham).
Arthur Pollard (York).
C. H. Robertson, Solicitor.
W. H. Seth-Smith, Vice-Pres. S.A.
Robert Walker, A.M.I.C.E., M.S.A. (Cork).
William Young (London and Glasgow).

EDGAR FARMAN.

No. 39, King-street, Cheapside, E.C.

October 21st, 1886.

INTERPRETATION OF BY-LAWS.

SIR,—We have in Chiswick what are known as "model by-laws." Among the clauses are two relating to—1st, chimney-backs; and 2nd, flue withers. The first reads as follows:—"Such person shall cause the back of every other chimney opening in such building from the hearth up to the height of 12 in. above such opening, to be 9 in. if such opening be elsewhere than in an external wall." Now this is arbitrarily made to read that where two fireplaces are back to back, the total thickness of the wall is 18 in., i.e., 9 in. for each back. The second reads as follows:—"That every smoke-flue shall be carried up in brickwork all round at least 4½ in. thick." This is read as that where two flues are together, they shall have a 9 in. wither between. You can imagine what a stack of ten flues would look like with 9 in. partitions each way. Putting aside the projection into the rooms (especially of small property) caused by extra thickness of back, and the huge size of chimney stack, and also the question of cost, I wish to ask the following questions:—

1. How do other surveyors, working under the same or similar by-laws, read these clauses?
2. Would fire-insurance surveyors care a rap for presumed extra protection from fire? Would they not rather have the 9 in. round the flue?
3. I ask architects and surveyors generally whether the above reading is not against all known practice? And if, in a case of a public building where they were not limited to cost if they would adopt these precautions?

There are other severe by-laws relating to parapet walls which press on us most heavily.

A CHISWICK BUILDER.

THE DIMINISHING REMAINS OF ROMAN BATH.

SIR,—The Roman antiquities of Bath were visited last year by no fewer than 60,000 persons. The circular bath and all now contended for were not then visible. The public interest in these relics cannot be doubted. Notwithstanding this, Mr. C. E. Davis, in his Report, dated May 3rd, 1886 (submitted first to the Baths Committee, and afterwards to the Town Council), ridicules those who "revel in stones of the past and study the habits and manners of long-forgotten Bath" (cf. p. 3). Such an expression, uttered by a professed antiquary, carries its own condemnation. At the same time it reveals the secret of the destruction so earnestly protested against.

It is strongly felt by an increasing number of people interested in the preservation of the Roman baths, &c., that the Corporation of Bath would have acted wisely had they stayed Mr. Davis's hand, and carried out the admirable and relatively inexpensive suggestion made by Prebendary Scarth in the *Bath Chronicle*, May 20th. This, in view of the 60,000, and annually-increasing, visitors to the Roman baths. His proposal was to preserve, "at no great cost, by covering over with a building of sufficient height, after the plan of the present Indian and Colonial Exhibition in London, the remains now exposed; or, the large swimming-bath might be left open to the air, and only the spaces around it arched over, so as to form a promenade where the vestiges of Roman art could be placed. All the Roman remains should be shown intact, not in any case built upon, or the present piers used simply as rests for wooden props, so that there might be no confusion of ideas. The whole might become an interesting promenade. . . . I need not suggest how taste and elegance might be displayed, without in any way interfering with, or effacing what remains of, Roman workmanship." He had previously written, "It is essential to the value of these remains that every portion should be

exposed so as to be capable of careful study. It would save many a young student a journey to South Italy, or, at any rate, to Rome."—(*Ibid.*) The practical importance of such testimony needs no commendation. It breathes the spirit of the true antiquary.

So far from the alleged recent discovery of the extant remains of Roman Bath by Mr. Davis being true, they were recorded by Guidotti, Sutherland, Lucas, and Lysons. Prebendary Scarth has unfortunately pointed this out.

FREDERICK A. H. VINON.

A CEMENT QUERY.

SIR,—In reference to the inquiry in your last, I have got rid of the runnings of liquid cement by washing the stained surfaces with hydrochloric acid.

A. E. C.

The Student's Column.

STONE QUARRIES.—XVII.

IRISH GRANITES.

WE will now turn to the granites found in Ireland. We have previously described the outlines of their geographical distribution (p. 109, *ante*), and have said sufficient to enable the student to see that that island is covered by extensive tracts of granite. Although there are large quarries dotted here and there over some of these tracts, yet, it appears to us, that the beautiful material is by no means so extensively raised as it should be. If the granites of Ireland were proportionately worked according to their respective merits, and, as compared with rocks of a similar nature in England or Scotland, there can be no doubt that a gigantic industry would be developed, which would go a long way to alleviate the sufferings and distress of the people in certain districts. It might also have a tendency to keep out the foreign stone which is gradually creeping and finding its way into our markets. If the authorities in the island employed more local stone in the construction of their buildings, and for kerbs, paving, &c., a greater stimulus would be created in opening up new ground. Most of the granite tracts alluded to are not far from the sea, whilst some of them actually form sea-cliffs, and every facility, as far as nature can provide, is afforded for the cheap raising of the stone.

The first large tracts to which we will direct the student's attention are those in the north-east of Ireland. Granite is found here in three distinct areas forming the mountain ranges of Mourne, Carlingford, and Slieve Croob.

According to Professor Hull, the granite of Mourne has hitherto been used only to a very limited extent for building; and, owing to the numerous cavities it contains, and its distinctly crystalline structure, it is probably not as well adapted to architectural purposes as the granite from the Newry district adjoining.

The granite of Newry and Slieve Croob is altogether different in texture and composition from that of Mourne. It is of metamorphic origin, and is much older than that of Mourne and Carlingford. It is a potash granite, consisting of quartz, orthoclase, and black mica. The analysis of this granite from Goragh Wood Station shows an unusually low percentage of silica.

Bessbrook Quarries.—These are situated near the town of that name, not far from Newry, and are principally worked by a limited liability company. There are three large quarries, the stone in the first being of medium-grain, and not unlike that from Dalbeattie; that of the second is much lighter and fine-grained; whilst the granite from the third is of a light blue colour. It is the last-mentioned quarry that produces the stone commonly known as "Bessbrook granite," which is very similar in appearance to the Cairngall stone, near Peterhead.

The principal quarry lies at the base of Camlough, a mountain in the Newry chain. It is a vast excavation, some 700 ft. or 800 ft. long, about 100 ft. broad, and from 80 ft. to 100 ft. deep. The blocks of stone are lifted from the floor of the quarry to the top by a "gantree," which travels over the quarry either across or longitudinally, on a line, the rails of which are laid on blocks of timber, some 80 ft. or 90 ft. apart. Much of the granite is polished, and the works where this branch of the trade is carried on are located apart from the quarries. Splendid specimens of the stone may be seen at the Manchester New Town Hall, where they are up to 21 ft. in length, polished. It has also been

extensively employed in buildings, and for kerbs, paving-sets, &c., in London, Manchester, Liverpool, Bristol, Edinburgh, Glasgow, and other large cities. An example of a dock built with it is to be found at Greenock, whilst Newry granite also forms the quays of Bucharrest. Other quarries in this part of Ireland are at Castlewellian, Mullaghglass, and Rathfriland near Banbridge.

The *Belleek* quarries, county Fermanagh, produce stone of a reddish tint, the greater portion of which is used in making porcelain. The rock has a high percentage of orthoclase felspar. Generally speaking, porcelain is made from decomposed granite, but in this case Prof. Hull says that the red felspar retains its crystalline form in its original perfection, and on being calcined loses colour and becomes white. The metallic iron which separates itself from the rock during the process of calcination is afterwards extracted by simply immersing magnets into the powdered china clay when mixed with water; the particles of iron then adhere to the magnets and are lifted out.

The great mass of granite which stretches in a south-south-west direction from Black Rock, near Dublin, to Pollmounty, near New Ross, is generally known as the Wicklow and Wexford mass. It is mostly composed of quartz, orthoclase felspar, and silvery grey mica, but frequently biotite appears, together with the usual accessory minerals. The stone runs in large blocks, and the *Killiney Hill* quarries (Carnose Point) have supplied a great quantity of granite for the construction of the harbour and pier at Kingstown, the Thames Embankment, and many large buildings in Dublin. Most of the stone is of a grey colour and of good quality, but some care should be exercised in its selection. It is interesting to note that the Killiney granite is in some places distinctly foliated, presenting that metamorphic appearance we have described as occurring in some of the grey and bluish granites of Aberdeen. A representation of this foliated Irish granite is given in the "Explanation" of sheets 102 and 112 of the Irish Geological Survey, p. 33.

The *Blessington* quarries are noted for a bluish grey stone, which works very well, an example of which may be seen in the campanile in the central quadrangle of the Dublin University. The greater part of the large buildings in Dublin are built of granite which comes from *Glencullen* and *Kilgobbin*, in the vicinity, and *Ballyknocken*, co. Wicklow. The stone from the first-mentioned places is of a brownish-grey colour, and, is no doubt, a good serviceable material. The stone from *Ballyknocken* is greyish-white, and these are said by Professor Hull to be less siliceous and more uniform in texture than that of Killiney. The granite from the *Dalkey* quarries, co. Dublin, is of a grey colour. It is used largely for buildings, kerbs, and paving sets, and is hard to work. Examples may be seen in St. Paul's and St. Werburgh's Churches, in the Irish metropolis. Other quarries in this district are at *Bagnals-town*, near Carlow, where the stone is of a dark bluish grey colour; *Glencore*, near Enniskerry; *Lough*, of a whitish-yellow colour, being fine-grained. A good example of the last-mentioned stone may be seen in the new church at Carlow.

The *Donegal* mass of granite is principally composed of red orthoclase felspar, oligoclase, quartz, black, and occasionally white, mica, and hornblende. Like the Killiney granite, it is roughly foliated, whilst it has also been observed to branch off in veins, on the confines of the mass, which traverse the surrounding metamorphic schist, &c. The Donegal granite does not appear to have been very extensively used. The principal quarries are at *Garvary Wood*, and the stone is very handsome, being composed of large pink felspars,—most likely orthoclase, but oligoclase is present,—clear and transparent quartz, and black mica. The rock found at *Dungloe* is of a reddish colour, but is only used locally.

Mr. R. H. Scott, Sir R. Griffith, and the Rev. Dr. Haughton presented an admirable report to the British Association, which was duly printed in 1863, "On the Constitution of the Granites of Donegal," and the last-mentioned gentleman has written on the same subject in the *Jour. Geol. Soc. Lond.*, vol. xviii, p. 402, *et seq.* We must refer the student to these works for further information.

The granitic rocks of Galway are spread over a large wild tract of country stretching from the town of that name to Roundstone Bay. Two

principal kinds of rock are found, and, according to the observations of the officers of the geological survey, one of these is of metamorphic origin, and the other intrusive.

The largest quarry in the former kind of stone is at *Flurbohy*, about eight miles from Galway. It is composed of large red crystals of orthoclase felspar porphyritically developed in a ground mass of orthoclase, light green oligoclase, quartz, and minute flakes of mica. The latter kind of rock is obtained chiefly from *Oughterard* quarry, and is of a light bluish tint, being composed of quartz, orthoclase felspar, and white and black mica. Iron pyrites is also present, but ranks only as an accessory.

Speaking of the Galway granites, Prof. Hull remarks that "little has been done in the way of utilising these rocks, though there can be no doubt that the porphyritic granite is capable of yielding a stone of great beauty, and is well adapted for architectural purposes. A polished pillar of a porphyritic variety of granite may be seen in the Museum of the Royal College of Science, Dublin."

Before concluding our observations on granite, it may be well to mention that a most valuable series of experiments on the crushing weight, and other qualities of various Irish granites has been published by Mr. G. Wilkinson, M.R.I.A., in his work on the "Ancient Architecture and Practical Geology of Ireland," 1845.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,771, Dovetailing Machines. J. Knott.

This invention is stated to produce dovetailing exactly as usually performed by hand labour, viz., producing in one piece of wood forming the joint a long "traverse" or opening and a narrow "pin" or locking-piece between the opening, and in the other piece of wood forming the joint a long pin or locking piece and narrow traverse or opening, the two pieces corresponding exactly with each other and forming a perfect joint similar to the ordinary hand-made joint. The chief point of novelty is in the form of the carrier, and a rack and pinion operated by an alternating cam-motion derived from a metallic disc driven by a belt or other suitable means.

13,766, Fireproof Floors. W. H. Lindsay.

The superstructure of the floor is made by passing steel wires through holes drilled in the main girders. The wires are bent and crossed or twisted so as to bind all the wires one to another. The whole of the structure is then embedded in concrete, the concrete being made to extend a distance above and below the parallel girders. In this way a floor is constructed of great strength and has the further advantage that if there should be any cracking of the concrete of the floor, no large portions could drop away as it would always remain upheld by the girders and wires.

4,378, Improved Syphon Cistern. J. Barnes.

The working parts are made of copper, and are therefore non-corrosive. It is very simple in its arrangement, and its great merit is the facility with which any plumber or handy man can repair any part of the said apparatus as there is no cast work in connexion with any of the working parts.

10,441, Removal Stand Pipes for Gas. J. Surl.

The loss of gas by the connecting and disconnecting the taps of street lamps, stand pipes for market lights, smiths' anvils, engine-pit lights, and other gas connectors that are frequently removed, or that may be required for temporary lights is by this invention obviated. A nipple with a hole at the side is fixed so as to be covered by a plug when screwed up or uncovered, when screwed the reverse way a seating of indiarubber passing over the hole and thus cutting off the supply of gas.

10,526, 10,528, and 10,529, Knob Attachments. W. I. Alford.

These three specifications describe improvements mainly designed to ensure simplicity of construction and a ready attachment to the door. The first relates to an arrangement of the spindle and collar, and the second gives details of construction of the handles and the method of attaching the knob spindles to the hubs; the third specification deals with an alternative form, in which a longitudinal channel is made in the spindles, and the fastening effected by lugs and recesses to fit in the channels so formed.

10,530, Water-closets. Bernard Havanagh (U.S.A.).

This invention consists in an improvement on water-closets. A basin is provided having a water-holding concave of an area slightly larger than that of the seat-hole, and with the escape-passage arranged beneath the cover and out of sight. Water is admitted to flush out the concave by force.

NEW APPLICATIONS FOR PATENTS.

Oct. 8.—12,824, J. Pollock, Window Fastenings.—12,832, F. Hilton, Driving Screw Files.
Oct. 9.—12,874, T. Stanton, Movable Bridge.—12,881, R. Dick, Hand Slotting or Shaping Machine.—12,889, H. Obbard, Chimneys and Chimney Tops or Caps.—12,894, A. Attwood and T. Barber, Self-sustaining lifts, &c.—12,899, T. Ford, jun., Hydraulic Lifts.
Oct. 11.—12,914, W. Whitehead and A. Emley, Boiler for Heating Buildings, &c.—12,938, J. Muller, Shooting Planes.
Oct. 12.—12,948, J. Lowe, Automatically Cutting and Preparing the Edge of Wall-paper ready for affixing.—12,950, H. Allison, Lock Hinges.—13,021, H. Dale, Fireproof Shutters for Stairways.
Oct. 13.—13,033, M. Heighley, Syphon Flushing-Cisterns.—13,045, J. Thorpe, Carpenters Braces.—13,056, A. Gray, Window Fastenings.
Oct. 14.—13,088, E. Marland, Securing Pots to the Tops of Chimneys.—13,103, J. Rikehie Street, Orderly Bin.—13,114, W. Burnett and D. Petrie, Fixing or Suspending Sashes.—13,130, P. Westnacoct, Cranes and Hoists.

PROVISIONAL SPECIFICATIONS ACCEPTED.

1,149, H. Hartung, Door-checks.—10,834, C. Groombridge and J. Rickman, Bolts for Doors, &c.—10,954, W. Copping, Stay for Casement and other Windows and Doors.—11,170, J. Watson, Ventilators.—10,484, G. Hudson, Shutter.—10,919, T. Bayliff, Chimney-Tops, Cows, or Ventilators.—11,079, J. Slack, Furnace Roofs and Bricks for same.—11,144, E. Ludwig, Decoration of Wood, &c.—11,764, C. Jackson, Safety Hoist.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

14,525, J. Gordon, Syphon Drain Traps.—14,695, C. Carson, Electrical Apparatus for Releasing Doorfastenings, &c.—15,248, O. Elphick, Joints of Stoneware Pipes.—15,255, J. Shauks, Water-closets.—14,67, W. Whittington, Connecting Lead Pipes, &c.—8,903, G. Knight, Step Ladders.—6,756, G. Walker, Construction of Doors.—8,873, E. Grach, Paving and Building Stones, Tiles, &c.—10,631, J. Moberley and H. Perry, Bricks.—11,027, J. Sutherland, Construction and Arrangement of Wall Ceilings, &c.—15,001, J. Cant, Ventilation.—15,259, G. Couch, Fittings of Doors, Gates, &c.—15,518, W. Robertson, Ornamental Woodwork.—2,850, H. Owen, Chimney or Ventilator Tops.—6,007, T. Harby, Doors for Fireproof Buildings, &c.—6,546, D. Saunders, Hanging Sashes.—8,090, R. Ash, Ventilation.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 12.

By S. WALKER & RUNZ.
Portman-square—15 and 18, Little George-street, 39 years, ground-rent 35s. £800
Rotherhithe, Raymouth-road—A cab and van yard, 65 years, ground-rent 5l. 225
Ground-rent of 6l. a year, term 95 years 95
By HANLEY BROS.
Clapton—189, Evering-road, 99 years, ground-rent 5l. 650
By MESSRS. GRANT.
Commercial-road, E.—28 to 30 even, Yale-court, 50 years, ground-rent 16l. 12s. 250
By BEAN, BURNETT, & CO.
Paddington—27, 27A, and 28, Sale-street, and 15, Market-street, 35 years, ground-rent 5l. 1,100

OCTOBER 13.

By SPOWICK, SOY, & WALL.
Watford, Stratford-road—The freehold residences, Nutfield and Westfield 4,875
Edmonton—Ground-rents of 48l. a year, reversion in 65 years 900
By B. BROWN.
Homerton—59, Wick-road, freehold 900
Wick-road—The Eagle beerhouse, freehold 800
Hackney-road—28 and 30, Maidstone-street, 23 years, ground-rent 6l. 12s. 105
Burdett-road, E.—Ground-rent of 13l. 10s., reversion in 4 years 740
1 to 6, Baythorne-street, 76 years, ground-rent 6l. 5s. 1,800
By C. & H. WHITE.
Stockwell, Aylton-road—Ground-rents of 65l. 6s., reversion in 62 years 1,580
Ground-rents of 75l. 6s., reversion in 80 years 1,535
Herbert-road—Ground-rents of 238l. 15s., reversion in 65 years 5,720
Sidney-road—Ground-rents of 4l. 10s., reversion in 33 years 110
Ground-rents of 62l. 8s., reversion in 54 years 1,680
Ground-rents of 61l., reversion in 50 years 1,655
Ground-rents of 14l., reversion in 50 years 365
Stockwell-road—Ground-rents of 75l., reversion in 67 years 1,900

OCTOBER 14.

By C. O. & T. MOORE.
Bethnal-green—135, Cambridge-road, freehold 480
By A. J. JACKSON.
New Barnet—1 to 16, Vernon-terrace, freehold 2,030
Four freehold houses in Victoria-road 465
Brentwood—1 to 11 odd, Deans-road, 94 years, ground-rent 12l. 235
By C. & H. WHITE.
Battersea—22 to 28 even, Gladstone-street, 76 years, ground-rent 20l. 1,150
Kennington—2, Nos. 61 and 63, freehold 1,790
Nos. 177 to 187 odd, 181 and 193, 81 years, ground-rent 126s. 2,165
Nos. 175, 65 years, ground-rent 3l. 930
Lambeth—13, 17, 19, and 19, Berkeley-street, and 4, Mill-street, copyhold 1,235
87, 89, and 99, Royal-street, copyhold 900

Vauxhall—11, Spring Garden-walk, freehold £345
Brixton—Ground-rent of 25l., reversion in 37 years 750
Kennington—Ground-rent of 40l., reversion in 63 years 980
Ground-rent of 35l., reversion in 73 years 800
Ground-rent of 136l. 10s., term 72 years 2,605
Ground-rent of 85l. 10s., term 72 years 1,530
Ground-rent of 37l. 19s., term 82 years 665
By FURBER, PRICE, & FURBER.
West Brompton—4 and 6, Drayton-gardens, freehold 1,800
Chelsea—45, King's-road, 57 years, ground-rent 77l. 3s. 375
By NEWSON & HARDING.
Kingsland—8 and 7, Nancy-street, 40 years, ground-rent 12l. 405
4 to 12, Shacklewell-row, 50 years, ground-rent 22l. 10s. 1,555
Holloway—Freehold ground-rents of 44l. 6s., reversion in 34 years 980
7, Eden-grove, freehold 351
South Hampstead—7, Fellows-road, 75 years, ground-rent 10l. 1,155
Stoke Newington—68 and 70, Cowper-road, 72 years, ground-rent 7l. 640
Islington—10 and 11, Prospect-place, freehold 665
Hoxton—2 to 27 odd, Hoxton-street, and 48 to 54, Hensworth-street, 13 years, ground-rent 12l. 1,165
By WILKINSON & SOY.
Brighton—19, Pelham-street, freehold 430
74, 77, and 85, St. George's-road, freehold 1,220
8, 9, and 5, West-hill, freehold 1,035
New Shoreham—Freehold cottage in Middle-street 65

MEETINGS.

MONDAY, OCTOBER 25.

Society of Arts.—Canon Isaac Taylor on "Domesday Book." 8 p.m.
Architects' Benevolent Fund.—Annual Meeting of Donors and Subscribers (Estate Exchange, Auction Mart, 3.30 p.m.).

Royal Academy.—Professor John Marshall on "Anatomy." VII. 8 p.m.

TUESDAY, OCTOBER 26.

Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. III. By Professor David Masson. (Masonic Hall, Edinburgh, 8 p.m.).

WEDNESDAY, OCTOBER 27.

Royal Academy.—Professor John Marshall, on "Anatomy." VIII. 8 p.m.

FRIDAY, OCTOBER 29.

Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. IV. By Professor David Masson. 8 p.m.
Royal Academy.—Professor John Marshall on "Anatomy." IX. 8 p.m.

Miscellaneous.

Large Sale of Houses and Ground-rents in South London.—Last week Messrs. C. & H. White, at the Auction Mart, conducted a two days' sale of freehold and leasehold houses and ground-rents, situated in Lambeth, Kennington, Brixton, and Stockwell. The sale took place by direction of the executors of the late Mr. Robert Parris, and comprised eleven houses in Kennington-road, producing an annual rental of 620l. a year; ten copyhold houses in Berkeley-street and Miles-street, Lambeth, producing a rental of 258l. per annum; together with freehold and leasehold ground-rents amounting to 944l. per annum, secured on 160 houses and shops, with reversion to the rack-rents, estimated at 5,900l. per annum. The property was submitted in eighty-two lots. The first day's sale consisted of fifty-three lots, comprising the ground-rents on houses in Aylton-road, Herbert-road, and Sidney-road, Stockwell, amounting to 584l. per annum. They were sold for an aggregate sum of 14,845l., representing about 4 per cent. on the purchase money. The second day's sale contained twenty-nine lots, and included the freehold and leasehold houses in Kennington-road and Lambeth, together with the ground-rents, amounting to 350l. per annum, secured upon houses in the same localities. The freehold houses in Kennington-road and the adjoining districts were sold at prices representing from six to seven per cent. upon the purchase money; whilst the leasehold property, held for unexpired terms varying from sixty-five to eighty-one years, realised sums amounting to about ten per cent. on the outlay after payment of ground-rents. The ground-rents sold during the day produced 7,215l., or about five per cent. on the purchase money. The proceeds of the day's sale was 14,630l. and the aggregate sum produced by the two days' sale amounted to 29,475l.

Cremation in Denmark.—The first crematory in Denmark has just been completed on the Pheasant-road, near Copenhagen. It is a building in Italian style, designed and erected by the well-known Italian architect and engineer, Venini. A large plot of land belonging to the owners of the crematory, and adjoining it will, when the necessary funds have been obtained, be laid out as gardens with a columbarium for the deposits of the urns containing the remains of the cremated in tastefully designed niches with inscriptions. The first body of a Dane was cremated here a week ago.

A Private Lunatic Asylum at Formby, near Liverpool, called Shaftesbury House, was opened last week. The new building is the property of Dr. Stanley A. Gill, M.D., who has at a great outlay had the asylum erected on plans approved by the Commissioners in Lunacy. The buildings, which are designed as a private asylum for the treatment of those mentally afflicted, comprise two distinct wings, one being for ladies and the other for gentlemen. The apartments are large, cheerful, and airy, having chiefly a southern aspect, and are so arranged that patients can have their own suites of rooms if required. Special means have been adopted for warming and ventilation, and the drainage has been carried out according to the requirements of the Local Government Board, while the water is being supplied from the Southport Waterworks. Fire escapes have also been provided for. The buildings are enclosed in nine acres of land, which are being tastefully laid out into siring grounds, bowling-green, lawn tennis courts, and ornamental gardens. The buildings are erected to accommodate forty patients. The central feature under the tower is the reception-hall, 28 ft. by 25 ft., having a handsome pitch-pine staircase and ornamental pitch-pine block flooring. From this is approached the doctor's residence, the consulting-room, the visitors' room, and the corridor, on the right and left of which are the ladies' and gentlemen's apartments respectively. The large entertainment-room, the chapel, and the approaches to the grounds are between the two wings, being separated by vestibule doors. Each wing comprises two storeys, identical in design, and the arrangements corresponding on each floor as regards day-rooms, drawing-rooms, bedrooms, bath-rooms, lavatories, &c.; and there are two stone staircases to each wing. A padded-room, admirably fitted up, is provided for violent cases on the ground floor in each wing. The heating and ventilating arrangements have been under the care of Mr. Blake, of Messrs. Haden & Sons, of Manchester. The exterior work is of grey brick, with patent red brick and terra-cotta dressings; the roofs have bands of green slates interspersed with the blue, and to the east of the building a large conservatory is provided. The sole contractor for the pile of buildings is Mr. Joseph Sawyer, of Waterloo, and the whole has been built to the designs and under the superintendence of Mr. William Parslow, F.R.I.B.A., whose representative, Mr. Robert Williams, has been in constant attendance as clerk of the works.

The Large Chimney at Manningsham Mills, Bradford, has just been undergoing repairs, and has had two new lightning conductors fixed upon it. The chimney, according to the clerk of the works, is widely known as "Lister's Pride," and is one of the largest stone chimneys in the country; in fact, it stands unrivalled as to the size of flue from bottom to top, the flue being 14 ft. across in every part. The outside dimensions of the chimney are 21 ft. across, and it is about ninety yards in height. The highest thirty yards form a very elaborate piece of stonework. The first outside projection is 4 ft., the panelling and the window-sills, with heads, which are circular, and all the other work between this and the top cap, have required all the ability and skill that Mr. Ball possessed to point so many difficult and dangerous places. The lightning conductors are two of the largest that have ever been fixed upon any chimney in Great Britain. They are of solid copper tape, 2 in. by 1 in., and have two elevation rods some 14 ft. long, made of 1½ in. copper bar, the same being non-insulated. Mr. Joseph Ball, York Castle, Oldham, who has completed the work throughout, has also pointed the chimney about thirty yards down from the top, which gives the structure a fine appearance, and has removed the jagged, weather-beaten look which it formerly had. The chimney is said to have cost from 10,000 to 11,000*l.* when it was built.

Mountain Ranges.—Messrs. Taylor & Francis will shortly publish a work by Mr. T. Mellard Reade, F.G.S., entitled "The Origin of Mountain Ranges." In addition to containing a systematic theory of mountain-building, with detailed experimental illustrations, the structure and geological history of the great mountain-masses of the globe will be discussed. The work will also contain many maps and sections of mountain ranges and a contoured map of the North Atlantic Ocean, together with numerous sketches of mountain structure and scenery, from nature, by the author.

The Auctioneers' Benevolent Fund.—The annual meeting of the donors and subscribers of this Institution will be held at the Estate Exchange, Auction Mart, Tokenhouse-yard, on Monday next. In their annual report for the year ending June 30th, 1886, the Committee state that the subscriptions amounted to the sum of 222*l.* 12*s.*, and the donations to 87*l.* 16*s.*, for the year ending June 24th last, being an increase over the preceding year of 20*l.* and 23*l.* 4*s.* respectively, exclusive of the legacy of 200*l.* received from the executors of the late Mr. George Trist. During the year several cases have been relieved, and the sum of 350*l.* has been invested in consols in the names of the trustees, and in order to increase the income and thus enable the Society to grant another annuity, a further sum has been sold from Consols and invested in Queensland Four per Cent. Inscribed Stock, the investments now being, Consols, 624*l.* 11*s.* 2*d.* Stock; Queensland Four per Cent. Inscribed, 2,976*l.* 8*s.* 6*d.* Stock. The members of the committee retiring by rotation are,—Messrs. Baker, Elgodd, Mann, Murrell, Savill, and Storr, all of whom are eligible for re-election.

The Evictions at Chelsea.—The demolition of dilapidated property is as much demanded at Chelsea as elsewhere, and although some portions may be sufficiently good to stand for some time longer, the small minority, however sound, cannot be allowed to stand in the way of the general improvement required by the majority; hence a few homely cottages, clad with ivy and creepers, must perforce be pulled down to make way for widened streets and proper access to main thoroughfares. The contemplated plans deal with two large areas, the first comprising the district between Sloane-square, Pimlico-road, and Lower Sloane-street,—this property containing a mixed population with an average number of the working-class, possibly some 700 or 800, and for whom accommodation will be provided in special dwellings on a piece of land to be reserved, containing 39,000 feet superficial, which is estimated to be sufficient for present wants. The second scheme principally affects Leese-street, on the north of the King's-road, the dwelling-houses being small and the tenants of a grade higher than those just mentioned.—*Sanitary Record.*

Sale of Building Sites near Woking.—On Friday in last week, Messrs. Debenham, Tewson, & Co., offered for sale, by direction of the National Liberal Land Company, a number of freehold building sites, being a portion of the Horsell Grange Estate, situated within a mile of the Woking station of the London and South-Western Railway. The estate is nearly 1,000 acres in extent. The sites submitted were fifteen in number, varying in size from about one to four acres, each site having frontages of from 160 ft. to 220 ft., and depths of 400 ft. and 500 ft. The stipulations provided that no house to be erected on the estate should cost less than 605*l.* The sale took place in a barn adjoining Castle House, which forms a portion of the estate. Of the fifteen lots offered, seven were sold for the aggregate sum of 2,260*l.*, being at the rate of about 300*l.* an acre.

Asphalte and Wood-Paving in Berlin.—There are at present in Berlin 365,000 square metres of streets paved with the so-called asphalt *comprimé*, of which 30,000 metres have to be re-laid yearly. Latest experiments have been made with German asphalt, but it is as yet too early to pronounce upon its qualities. At present asphalt is only obtained from three places in Europe, viz., Ragusa, in Dalmatia, and Val de Travers and Seyssel, in the department of Aisne, in France. In Berlin asphalt has entirely superseded wood for street paving, the latter being now only used between the metals on the tramways. The wood-paved streets in Berlin only cover 44,000 square metres.

Domesday Commemoration.—Canon Isaac Taylor will deliver a popular lecture in the great hall of the Society of Arts on Monday evening next, the 25th inst., at eight p.m. Tickets may be had gratis on application to the honorary secretary, Mr. P. Edward Dove, Barrister-at-law, 23, Old Buildings, Lincoln's Inn. The Commemoration will commence at three p.m. on the same day, with a visit to the Public Record Office, where Domesday Book and other interesting MSS. will be exhibited. This exhibition will be open only to subscribers to the Commemoration.

Richmond Drainage Scheme.—The detailed plans and sections of the Richmond Drainage Scheme having now been completed by Mr. Melliss, C.E., and several alterations having suggested themselves as desirable, the vestry of that town has resolved to increase the sum to be borrowed, and for sanction to which application is to be made to the Local Government Board, from 96,000*l.* to 100,000*l.* It has now been decided to lay the sewer through Barnes 2 ft. lower than was originally intended, so as to embrace within the scheme the drainage of many houses there at the lowest levels. And to correspond with this alteration the Petersham end of the sewer will be lowered 1 ft. 6 in. or 8 in. This will involve an additional outlay of 1,200*l.* Then, in order to avoid any possible risk of the site of the proposed pumping station at Mortlake being flooded during storm or high tides, it is proposed to raise it 6 ft. higher than the level shown in the original plan. Provision has now been made for the erection of a wharf at the side of the river near the works. And, as already reported in the *Builder*, the Vestry have, since the date of the first application for loan to the Local Government, made arrangements for the purchase of certain plots of land adjoining the proposed pumping station, which plots belong to the Duke of Devonshire, the Pullman Trustees, and Mr. Popham. By this arrangement the Vestry hope to diminish materially the cost and strength of the opposition, as certain of these plots were acquired by their present owners to secure them a *locus standi* in opposing the scheme. Complaint was made by one or two of the Vestrymen that the proper levels for the sewers had not been ascertained at the beginning; but Mr. Burt read a letter from the engineer, in which the latter stated, "I am perfectly satisfied that the depth is sufficient; but in order that there may be no controversy, let us put it 2 ft. deeper." It is expected that the Local Government Board will hold shortly a public inquiry in connexion with the application for the loan.

Cable Tramways, Birmingham.—The *Daily Mail* says that the Tramways Sub-Committee of the Public Works Committee were lately placed in a difficult position with reference to the giving out of some of the contracts for the cable tramway, from the fact that steel rails of German manufacture were offered at an appreciably lower price than English. The difference in price upon about 1,000 tons of rails required amounted to about 500*l.*, and the tramway company, who are the contractors, urged that they had a right to purchase in the most favourable market. The Public Works Committee, on the other hand, were desirous of using materials of home production. The company, appreciating the position taken by the committee, have been able to arrange terms whereby the rails of the Barrow Hematite Steel Company shall be employed. The contract, which has been placed with the Barrow Company, represents the first of the three sections into which the tenders were divided, and comprises the ordinary girder section rails, the slot rails, and the necessary fish-plates. The schedule of prices sent in by Messrs. Tangye Brothers, Soho, has been accepted for the supply of the ironwork required in the construction of the tramways from Colmore-row to the borough boundary at Hockley, comprising over 250 tons of tee-iron yokes for cable tube, wrought-iron tie-bars, bolts and nuts, washers, angle and tee iron, rolled iron girders, malleable iron pulleys and frames, inspection hatches and frames, side entrance doors and frames, crucible steel points for tramway and slot rails, crossings, &c. The contract for laying the lines between Colmore-row and Hockley has been secured by Mr. Jacob Biggs, of Handsworth. Arrangements are being made for the work to be commenced forthwith.

The Timber of British Columbia.—An idea of the value of British Columbia's forest wealth may be gathered from the fact that four logs recently cut near Vancouver contained 20,580 ft. The logs were as follows:—One log, 62 ft. long, 40 in. in diameter, 5,299 ft.; one log, 53 ft. long, 44 in. in diameter, 5,600 ft.; one log, 36 ft. long, 54 in. in diameter, 5,625 ft.; one log, 24 ft. long, 58 in. in diameter, 4,066 ft. The Douglas pine has long been celebrated for its great size, but it has hitherto been, except where found near the water's edge, comparatively valueless. Now that the railway can carry it to the sea it will become an important export.—*Liverpool Journal of Commerce.*

PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	6 10 0	7 0 0
Teak, E.I.	load	9 0 0	14 0 0
Seab, S.S.	foot cube	0 2 4	0 2 7
Ash, Canada	load	3 0 0	4 10 0
Birch	"	2 6 0	3 10 0
Elm	"	3 10 0	4 10 0
Fir, Dantsic, &c.	"	1 10 0	4 0 0
Oak	"	2 10 0	4 10 0
Canada	"	3 0 0	4 10 0
Pine, Canada red	"	2 0 0	3 10 0
" yellow	"	2 6 0	4 0 0
Lath, Dantsic	"	3 0 0	7 0 0
St. Petersburg	"	4 0 0	5 10 0
Waincoat, Riga	log	2 15 0	4 0 0
Odessa, crown	"	3 6 0	3 7 8
Dane, Finland, 2nd and 1st, std. 100	"	7 0 0	8 0 0
" 4th and 3rd	"	6 0 0	6 10 0
Riga	"	5 10 0	7 0 0
St. Petersburg, 1st yellow	"	8 10 0	14 0 0
" 2nd	"	7 0 0	8 0 0
" white	"	7 0 0	10 0 0
Swedish	"	6 0 0	15 0 0
White Sea	"	7 0 0	17 10 0
Canada, Pine, 1st	"	17 0 0	22 0 0
" 2nd	"	11 0 0	17 0 0
" 3rd, &c.	"	6 0 0	8 0 0
Spruce, 1st	"	8 0 0	11 0 0
" 3rd and 2nd	"	6 0 0	7 10 0
New Brunswick, &c.	"	5 0 0	7 0 0
Battens, all kinds	"	4 0 0	12 0 0
Flooring Boards, sq. 1 in., Pre-	"	0 9 0	0 13 0
pared, 1st	"	0 7 6	0 8 6
Second	"	0 5 0	0 7 0
Other qualities	"	0 3 0	0 3 4
Cedar, Cuba	foot	0 0 2 4	0 0 3 4
Honduras, &c.	"	0 0 2 4	0 0 3 4
Australian	"	0 0 2 4	0 0 3 4
Mahogany, Cuba	"	0 0 4 0	0 0 7 0
Construction of small Landing Plank	"	0 0 4 0	0 0 7 0
Mexican	"	0 0 3 4	0 0 4 4
Tobacco	"	0 0 4 0	0 0 6 4
Honduras	"	0 0 4 0	0 0 6 4
Maple, Bird's-eye	"	7 0 0	10 0 0
Rose, Rio	"	7 0 0	10 0 0
Bahia	"	6 0 0	10 0 0
Bat, Turkey	"	6 0 0	17 0 0
Satin, St. Domingo	"	0 0 6 0	0 10 0
Porto Rico	"	0 0 7 0	0 10 0
Walnut, Italian	"	0 0 4 0	0 5 0

METALS.

METALS.		£. s. d.	£. s. d.
Iron—Wig, in Scotland	ton	0 0 0	0 0 0
Bar, Pils, in London	"	4 7 6	4 15 0
" in Wales	"	4 2 6	4 7 6
Sheets, Staffordshire, London	"	5 10 0	6 0 0
Hoops	"	6 15 0	8 10 0
Nail-roads	"	5 0 0	7 0 0
"	"	5 10 0	6 10 0
COPPER—			
British, cake and ingot	ton	41 0 0	45 0 0
Best selected	"	45 10 0	46 0 0
Sheets, strong	"	52 0 0	4 7 6
" India	"	0 0 0	0 0 0
Australian	"	0 0 0	0 0 0
Chili, bars	"	41 0 0	41 7 6
YELLOW METAL	lb.	0 0 0	0 0 0
LEAD—			
Pig, Spanish	ton	12 10 0	0 0 0
English, common brands	"	12 17 6	0 0 0
Sheet, English	"	13 12 6	13 15 0
SPELT—			
Silesian, special	ton	14 5 0	0 0 0
Ordinary brands	"	14 0 0	14 2 6
TIN—			
Banco	ton	0 0 0	0 0 0
Billiton	"	0 0 0	0 0 0
Straits	"	100 0 0	0 0 0
Australian	"	100 0 0	0 0 0
English ingots	"	104 0 0	0 0 0
ZINC—			
English sheet	ton	18 0 0	18 5 0
OILS.			
Linseed	ton	20 5 0	20 10 0
Cocunut, Cochiti	"	34 10 0	35 0 0
Ceylon	"	26 0 0	0 0 0
Copra	"	0 0 0	0 0 0
Palm, Lagos	"	23 10 0	0 0 0
Palm-nut Kernel	"	0 0 0	0 0 0
Refined, English pale	"	22 5 0	22 10 0
" brown	"	20 15 0	21 0 0
Cottonseed, refined	"	18 0 0	19 0 0
Tallow and Oleine	"	23 0 0	45 0 0
Lubricating, U.S.	"	8 0 0	10 0 0
" refined	"	8 0 0	13 0 0
TURPENTINE—			
American, in casks	gw.	1 6 6	0 0 0
Tar	"	0 15 0	0 15 6
Stockholm	barrel	10 16 0	0 11 0
Archangel	"	0 10 0	0 11 0

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Boys' School and Offices, Hartlepool	Gova. Henry Smith Schl	25l., &c.	Nov. 20th	i.
Enlarging Infirmary	Richards Union	45 guineas	Not stated	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up Roads	Wandsworth Bd. of Wks	Official	October 28th	xiii.
Completion of Twelve Houses	St. Martin-in-the-fields	T. F. Shaw	do.	i.
Works and Materials (Sewers)	Vestry	Official	October 28th	ii.
Road Formation and Construction	East Barret Valley L. B.	G. W. Brunell	Nov. 1st	ii.
Hand Broken Guernsey Granite	Finchley Local Board	Official	Nov. 2nd	ii.
Clearing-out Lake, &c., Finsbury Park	Met. Board of Works	Official	Nov. 3rd	xiii.
Asphalting & Graveling, &c.	Lewisham Bd. of Wks	Official	Nov. 3rd	xiii.
Sewering Road	Chiswick Local Board	A. Ramston	Nov. 9th	ii.
Broken Granite	Borough of Dover	Official	Nov. 9th	ii.
Stoneware and Iron Pipe Sewers, &c.	Cromer Local Board	J. C. Mallins	Nov. 9th	ii.
Construction of small Landing Plank	Rochester Corporation	Official	Nov. 9th	ii.
Sewerage Works	Sevanake R.S.A.	J. C. Hall, C.E.	Nov. 9th	ii.
Two Class-Rooms	Walthamstow Schl. Bd.	W. A. Longmore	Nov. 9th	ii.
School for Boys	do.	do.	Nov. 15th	xiii.
Painting, &c., Works, Daresbury	Met. Asylums Board	A. & C. Harston	Nov. 15th	xiii.
Repairing, &c., Venetian Blinds, Daresbury	do.	do.	Nov. 18th	ii.
Pumping Machinery	Tottenham Local Board	— De Pape	do.	ii.
Engine-House, &c.	School Bd for London	Official	Not stated	ii.
Calverley Iron Duct-Bus	do.	do.	do.	ii.
Removal and Erection of Two Iron Buildings	do.	do.	do.	ii.
Making Two Playgrounds	do.	do.	do.	ii.
Thr-Paving Playgrounds	do.	do.	do.	ii.
Restaurant and Bouthouse, East Moulsey	do.	Burnell-Burnell	do.	xiii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Inspector of Nuisances	Plumstead Bd. of Wks.	65l. and residence	October 30th	xvi.

TENDERS.

BIRMINGHAM.—For the whole of the works required in the construction and completion of a double line of cable tramways between Snow-hill Terminus and the Borough boundary, including the removal of existing lines, and repairing roadway with granite setts, for the Birmingham Central Tramways Company, Limited. Mr. E. Frisland, M.Inst. C.E. and Mr. J. Kincaid, M.Inst. C.E., engineers.

Jacob Biggs, Handsworth, Birmingham, accepted.

(Schedule of prices.)

[Note.—Rails, ironwork, and paving setts provided.]

W. Rowe	£2,180 0 0
F. Higgs	5,680 0 0
Cander	5,550 0 0
Dickinson	5,500 0 0
Kynoch & Co.	5,335 0 0
Mason	5,193 0 0
Holliday & Greenwood	4,949 0 0
Rodwell	4,600 0 0

BATTERSEA.—For the construction of concrete river wall, dumb dock, finishing-chamber, &c., Lombard-road Wharf, Battersea, for the Board of Works for the Wandsworth District:—

Howard	£2,173 0 0
Marchant	1,600 0 0
G. Neal	1,434 0 0
Bat-chellor	1,460 0 0
King	1,460 0 0
Richards & Mount	1,449 0 0
H. R. Trehearne & Co.	1,440 0 0
B. Cooke & Co.	1,380 0 0
Torkington	1,180 0 0
Dickenson	1,100 0 0
Cunliffe	870 0 0

[Surveyor's estimate, 1,450l.]

CHATHAM.—For building the Bible Christian Chapel, Trafalgar-road, New Brompton, Chatham. Messrs. Margate & Son, architects, Chatham:—

Nye Brothers, Rochester	£2,167 0 0
Naylor & Son, Rochester	2,180 0 0
Alloway, Chatham	2,060 10 0
Skinner, Chatham (accepted)	1,985 0 0

[Architect's estimate, 2,177l.]

CHISWICK.—For laying 12-in. sewer, with manholes, &c., complete, in the Duke's-avenue, Chiswick, for the Imperial Property Investment Company, Limited, Moor-gate-street. Mr. G. H. L. Stephenson, surveyor:—

G. Bell £792 0 0

Cook & Co. 750 0 0

Pizzey 757 0 0

Adams 683 0 0

Walker 553 0 0

Wilson (accepted) 555 0 0

CLAPHAM.—For alterations and additions to No. 1, The Chase, Clapham, for Mr. T. R. Pace:—

Kynoch & Co. £170 0 0

HAMMERSMITH.—For the erection of a new branch bank, for the Directors of the London and South-Western Bank, Limited, at No. 8, The Broadway, Hammersmith. Messrs. Thos. & Wm. Stone, architects, Great Winchester-street. Quantities by Mr. G. A. P. Cusson, Westminster Chambers:—

N. Lidstone £3,660 0 0

J. T. Chappell 3,940 0 0

J. Smith & Son 3,838 0 0

H. Smith & Son 3,895 0 0

Adams & Son 3,990 0 0

R. B. Nightingale 3,670 0 0

C. Kynoch 3,642 0 0

W. Greger (accepted) 3,628 0 0

H. Johnson 3,637 0 0

IPSWICH.—For gardener's cottage, Henley-road, Ipswich. Mr. Frank Brown, architect, Thorougfare, Ipswich:—

R. Girdling	£242 0 0
T. Turner	225 0 0
F. Bennett	222 10 0
W. Grayton (accepted)	197 10 0

KENNINGTON.—For proposed warehouse, stabling, &c., at rear of No. 10, South-place, Kennington, for Mr. Stanley Jouniffe, Mr. Edward Clark, architect, Strand. Quantities by architect:—

J. Benle £1,017 0 0

T. L. Green 961 0 0

J. Anley 990 0 0

Wilkinson Bros. 985 0 0

J. O. Richardson 929 0 0

W. Smith 919 0 0

LEAMINGTON.—For the extension and renovation of the Pump-room baths:—

T. H. Jones	Building Work.	£779 0 0
T. Bailey	.....	715 0 0
G. F. Smith	.....	695 0 0
W. Jenkins (accepted)	.....	607 10 3
J. & F. May	Engineering Work.	1,357 0 0
J. Smeaton Son, & Co.	.....	1,293 16 6
A. Adams	.....	1,083 0 0
W. Jenkins (accepted)	.....	948 12 10

LONDON.—For the erection and completion of the London Central Fish Market, for the Honourable the Corporation of the City of London. Sir Horace Jones, architect. Quantities by Messrs. William Reddall & Son:—

Cooke & Co.	£22,634 0 0
Webster	20,902 0 0
Boyes	20,090 0 0
Nixon	20,790 0 0
Bywaters	20,620 0 0
Hall, Reddall, & Co.	20,330 0 0
Holliday & Greenwood	20,300 0 0
Conger	20,160 0 0
Morter	20,000 0 0
Colls & Sons	20,390 0 0
Perry & Co.	20,768 0 0
Holland & Hannen	20,933 0 0
Chappell & Co.	20,622 0 0
Mowlem & Co.	20,936 0 0
Hart	20,210 0 0
Nightingale	20,946 0 0
Kilby & Gayford	20,830 0 0
Gentry	20,876 0 0

LONDON. For alterations, &c., at the Lord Clyde Tavern, Commercial-road East, for Mr. T. W. Yenner. Mr. E. E. Mountford, surveyor, Pigott-street:—

Palmer & Sons £575 0 0

Lusk 540 0 0

Nicholls 504 0 0

Walker, Limehouse 464 0 0

LONDON.—For alterations, &c., of Copenhagen Tavern, Salmon-lane, Limehouse, for Mr. M. J. Wesson. Mr. E. E. Mountford, surveyor, Pigott-street, Limehouse:—

Nicholls, Leytonstone £480 0 0

Walker, Limehouse (accepted) 434 0 0

LONDON.—For painter's work at the Mitre Tavern, Chancery-lane, for Mr. Drew. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—

Helling £127 10 0

Sanders & Sons 128 0 0

T. Heath (accepted) 105 0 0

LONDON.—For alterations and repairs to the Horse and Dolphin, Macclesfield-street, Soho, for Mr. W. H. Cooper. Mr. Edward Clark, architect, Strand:—

T. L. Green £688 0 0

Munday & Son 825 0 0

Jackson & Todd 792 0 0

J. Anley 738 0 0

J. Hocking (accepted) 682 0 0

Stayer & Son 667 0 0

RAMSGATE.—For the erection of six dwelling-houses at Southwood, Ramsgate, for Mr. C. Buckley. Mr. E. L. Elgar, architect and surveyor, Ramsgate:—

Plicher & Co., Fordwich	£1,830 0 0
G. M. Dawson, Broadstairs	1,144 17
H. Miller, Ramsgate	1,990 0 0
T. Elgar, Ramsgate	960 0 0
C. Collins, Ramsgate	880 0 0
J. Neely, Ramsgate	836 0 0
J. Olive, St. Peter's	838 0 0
Newly Bros., Ramsgate	858 0 0
Bowman, Ramsgate	610 0 0
W. W. Martin, Ramsgate	750 0 0

TOTING.—For repairs and decorations to house known as Linden-road, Mitcham-road, Totting, for Mrs. General Williams. Mr. Edward Clark, architect, Strand.
Quantities by Architect:—
J. Stanger and Son £13 0 0
J. Anley (accepted) 445 0 0

TOTTENHAM.—For the construction of additional precipitating tanks at Sewage Works, for the Tottenham Local Board of Health. Mr. W. A. H. De Pape, engineer.
T. Adams, Kingsland £8,724 3 8
Edmonson, Edmonson 7,589 16 3
P. Hart, Tottenham 7,498 0 0
J. Broadfield, Tottenham 7,339 11 10
Mick Boyd, Walbrook 7,734 10 4
B. Cooke & Co., Battersea 6,938 16 6
G. Bell, Tottenham (accepted) 6,537 18 3
[Engineer's estimate, £7,739.]

TOTTH PARK.—For the completion of roads, &c., for the Totth Park Local Board. Quantities supplied by the engineer, Mr. John Price, Assoc. M.Inst. C.E.:—
Contract No. 13.—Lime-grove.
Anderson & Co., Liverpool £294 0 0
W. Hayes, Bolton 285 19 9
Walkden & Co., Bootle 253 14 3
L. Marr, Totth Park 261 7 1
J. Evans, Parkgate 244 0 5
Catterall & Co., Liverpool 234 6 11
Ireland & Hurley, Liverpool 238 6 9
McCabe & Co., Kirkdale 213 0 0
R. Lomax, Totth Park 212 0 0
S. E. Frayne, Kidderminster 209 8 4
W. F. Inglis, Liverpool (accepted) 201 9 1
A. W. Peen, Seacombe 154 13 10
[Engineer's estimate, £251.]
* Several errors in this tender.]

Contract No. 14.—Cedar-grove.
Anderson & Co., Liverpool 292 0 0
Wm. Hayes, Bolton 282 5 9
Walkden & Co., Bootle 251 13 1
L. Marr, Totth Park 245 5 4
J. Evans, Parkgate 242 6 7
R. Lomax, Totth Park 240 6 0
Catterall & Co., Liverpool 234 16 1
Ireland & Hurley, Liverpool 232 7 6
McCabe & Co., Kirkdale 214 6 2
S. E. Frayne, Kidderminster 206 9 7
W. F. Inglis, Liverpool 199 0 1
A. W. Peen, Seacombe (accepted) 179 15 4
[Engineer's estimate, £230.]

Contract No. 15.—Aspen-grove.
Anderson & Co., Liverpool 325 15 9
Wm. Hayes, Bolton 318 7 3
Walkden & Co., Bootle 280 9 1
L. Marr, Totth Park 274 4 4
J. Evans, Parkgate 272 3 0
Catterall & Co., Liverpool 263 11 7
Ireland & Hurley, Liverpool 262 7 6
R. Lomax, Totth Park 260 6 4
McCabe & Co., Kirkdale 249 18 1
W. F. Inglis, Liverpool 225 10 0
S. E. Frayne, Kidderminster 217 19 11
A. W. Peen, Seacombe (accepted) 202 5 6
[Engineer's estimate, £201.]

Contract No. 16.—Orange-grove.
Wm. Hayes, Bolton 225 1 6
S. E. Frayne, Kidderminster 183 5 3
Anderson & Co., Liverpool 162 12 0
McCabe & Co., Kirkdale 174 0 0
Walkden & Co., Bootle 160 16 4
Catterall & Co., Liverpool 155 9 2
J. Evans, Parkgate 154 9 5
J. Garnett, Totth Park 151 10 4
L. Marr, Totth Park 148 14 2
W. F. Inglis, Liverpool 144 14 0
Ireland & Hurley, Liverpool 142 7 6
R. Lomax, Totth Park 128 16 0
A. W. Peen, Seacombe (accepted) 122 5 4
[Engineer's estimate, £160.]

Contract No. 17.—Leahoe-road.
Wm. Hayes, Bolton 492 0 0
S. E. Frayne, Kidderminster 460 7 7
Anderson & Co., Liverpool 412 0 0
Catterall & Co., Liverpool 403 5 6
Walkden & Co., Bootle 392 15 0
J. Evans, Parkgate 391 0 0
J. Garnett, Totth Park 390 11 0
McCabe & Co., Kirkdale 363 9 4
L. Marr, Totth Park 346 12 1
R. Lomax, Totth Park (accepted) 328 12 10
A. W. Peen, Seacombe 307 10 9
[Engineer's estimate, £365.]

Contract No. 18.—Sandringham-drive.
Wm. Hayes, Bolton £1,101 8 6
S. E. Frayne, Kidderminster 985 4 11
Anderson & Co., Liverpool 916 0 0
McCabe & Co., Kirkdale 904 0 0
J. Garnett, Liverpool 821 3 8
J. Evans, Parkgate 815 7 11
Walkden & Co., Liverpool 791 10 11
L. Marr, Totth Park 759 10 8
R. Lomax, Totth Park (accepted) 749 4 1
W. F. Inglis, Liverpool 711 8 7
A. W. Peen, Seacombe 683 14 2
[Engineer's estimate, £730.]
* Several errors.

Contract No. 19.—Buckland-street.
Wm. Hayes, Bolton £85 18 6
S. E. Frayne, Kidderminster 690 3 1
McCabe & Co., Kirkdale 610 0 0
Anderson & Co., Liverpool 494 9 3
J. Evans, Parkgate 453 17 3
J. Garnett, Totth Park 449 7 0
Catterall & Co., Liverpool 416 15 6
R. Lomax, Totth Park 413 9 9
L. Marr, Totth Park (accepted) 404 11 2
W. F. Inglis, Liverpool 389 13 0
[Engineer's estimate, £500.]

WIMBLEDON.—For book-cases at the Wimbledon Free Library. Messrs. Fotts, Sulman, & Henning, architects.
Sage & Co. £238 0 0
Clegg 251 0 0
North of England School Furnishing Company 224 16 0
Shoolbred & Co. 230 0 0
Dyster & Clann 216 6 3
Smith & Son 182 0 0
Mower 189 0 0
Walker & Son 138 19 0
Balchin & Shopland 165 0 0
Bright & Co. 170 0 0
Laucelles (accepted) 163 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.
SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.
Six lines (about fifty words) or under 4s. 6d.
Each additional line 6d.
Terms for Series of Trade Advertisements, also for special Advertisements on front page, C. in position. Contracts, sales by Auction, &c. may be obtained on application to the Publisher.

FOUR LINES (about thirty words) or under 3s. 6d.
Each additional line (about ten words) 6d.
PREPAYMENT IS ABSOLUTELY NECESSARY.
** Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent Garden, W.C. to DOUGLAS FOURDRINER, Publisher.

Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to ADVERTISEMENTS, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY morning.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C., free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
"THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 18s. per annum PREPAID. To all parts of Europe, America, Australia and New Zealand, 28s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

"Inquirer" we cannot undertake to point out books; see standing notice to that effect.—W. & A. C. (show our mark)—W. & A. C. (see reply to "Inquirer").—O. B. (should send amount).—N. M.—J. H. (see A. C. S.).
All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

Note. The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.
We cannot undertake to return rejected communications.
Letters or communications (except notices to the time) which have been submitted for other journals, are NOT DESIRED.

All communications, correspondence, and letters, sent to the Editor, should be addressed to THE EDITOR, all communications relating to advertisements and other matters, to the Manager, and all matters should be addressed to THE PUBLISHER, and not to the Editor.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone for Winter Use.
CORSHAM DOWN, } SUMMER DRIED,
FARLEIGH DOWN, }

BOX GROUND, COMBE DOWN,
WESTWOOD GROUND.
RANDELL, SAUNDERS, & CO., LIMITED,
CORSHAM, WILTS.

Bath Stone.
BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
BOX, WILTS. [ADVT.]

Donkling Freestone.
The stone from these quarries is known as the "Weather Beds," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.

THE CHELYNCH STONE.
THE BRAMBLEDITCH STONE.

HAM HILL STONE.
Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Priores, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset.

London Agent—Mr. E. WILLIAMS,
15, Craven-street, Strand, W.C. [ADVT.]

Donkling Free Stone For prices, &c., address S. & J. STAPLE,
HAM HILL STONE, Quarry Owners, Stone and Lime Merchants,
BLUE LIAS LIME Stoke - under - Ham,
(Ground or Lump), Ilminster. [ADVT.]

Asphalte.—The Seyssel and Metallic Laves Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouses, floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADVT.]

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 80, Cannon-street, E.C. [ADVT.]

NOTICE.—THE BANNER SANITATION CO. beg to give Notice that having sold over 10,000 BANNER'S PATENT VENTILATORS, also a proportionate number of other Sanitary Appliances, and wishing to keep pace with the times, they have decided to reduce the prices of their goods from 25 per cent. to 40 per cent., thus offering to the public the best appliances at the lowest prices.

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most Important EXHIBITIONS

Gold Medal. Health Exhibition, 1884.

For further Particulars and Revised Prices, apply to

BANNER SANITATION COMPANY

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

ILLUSTRATIONS.

St. Saviour's Church, Holloway.—Mr. John P. Cutts, Architect	628, 629
New Mairie, St. Denis.—M. Paul Laynaud, Architect	632
Carlisle Mansions, Cheyne-walk, Chelsea Embankment.—Mr. W. Seckham Witherington, Architect	633
Competitive Design for the Birmingham Law Courts.—Mr. R. Stark Wilkinson, Architect	636
Great Assembly Hall, Mile End-road, E.—Messrs. Boulnois & Warner, Architects	637
Buckfast Abbey, Devon, as being Restored and Rebuilt.—Mr. Fredk. A. Walters, Architect	640-641

CONTENTS.

From Schola to Cathedral	617	Carlisle Mansions, Cheyne walk, Chelsea Embankment (with Plan)	626	St. Mark's Pavement	646
The Demosday Commemoration	618	"Great Assembly Hall," Mile End-road, E.	629	Edinburgh Municipal Buildings	646
Notes	619	Competition Design for Birmingham Law Courts.—By Mr. R. S. Wilkinson, Architect	643	Mr. Cooper's Coal-Lining Process	646
Changes in St. George's Parish, Southwark	621	The New Mairie, St. Denis, Paris	643	The Block System for Workhouse Flats	646
Edinburgh Notes	622	Buckfast Abbey, Devon	643	Drain-pipe Joints	647
The President's Address, Architectural Association	623	The Victoria Hospital Bureau: Circular Wards	644	The Student's Column: Stone Quarries.—XVIII.	647
Manchester Architectural Association	624	The Architectural Association	644	Recent Patents	648
Glasgow Institute of Architects	625	Obituary	645	Recent Sales of Property	648
Practical Class of Masonry	625	"Federation of Architects"	645	Meetings	648
Builders' Clerks' Benevolent Institution	625	Sewer Ventilation and Storm Outflows	646	Miscellaneous	648
St. Saviour's Church, Hauxley-road, Holloway	626			The Turners' Company's Exhibition	649
				Prices Current of Building Materials	651

From Schola to Cathedral.



THE book which has been published under this title,* by Professor Baldwin Brown, is one which many architects would perhaps be disposed to pass over with little notice; and cer-

tainly it belongs properly rather to the domain of history than art. The illustrations are few, and more in the way of explanatory diagrams, rather than architectural illustrations, in the strict sense of the word. There is nothing new to be learned from it in regard to architectural style and construction: regarded in such a light, it is essentially the book of an amateur; but it contains an attempt, made in a very interesting and suggestive manner, to trace the development of the architectural form of the Christian church from its first sources, and to give such continuity to the history as is possible at our present distance from the period of the founding of Christianity, and after the removal of so many of the outward and visible links of the chain of architectural evidence.

As long as we adhered to the easy and simple theory of the adoption by Christian congregations of the Roman basilica as their ready-made place of worship, which was a step, but only an incomplete step, towards the comprehension of the growth of Christian architecture, there was no obvious necessity to endeavour to trace out the origin of Christian architecture further back than this. We took up Christianity in the basilican church,—the majority of architectural students did so, at least,—without any perverse questionings as to how and where the Christian communities worshipped before they had attained to the numbers, the popular acceptance, the political immunity, which would allow of their carrying on their worship in a public manner and in great buildings. Professor Brown has endeavoured to go further back than this, and, in fact, to trace the Christian church almost from the "upper room furnished" of the New Testament narrative. The basilica theory, only partially to be accepted in any case, does not begin at the beginning. The history of Christian architecture," says the author in his preface, "can be traced in existing monuments as far back as the fourth century.

We find it then already represented by imposing buildings, with a distinct plan and an elaborate system of decoration, presupposing a series of tentative efforts. The record of these efforts lies, however, beneath the surface. The monumental evidence of them is but slight, and it is only by a search into literary records that we can discern their form and character." The object of Professor Brown's study, therefore, is to bring together this literary material into a convenient shape for the general reader and the architectural student.

Some kind of customary meeting-places the early Christians must have had before they were in a condition to fill buildings of the scale of basilicas or basilican churches with their numbers. A practical suggestion as to the nature of these meeting-places Professor Brown thinks is to be derived from the probability that the early Christians adopted, to a great extent, the outward customs and habits of analogous Pagan associations contemporaneous with them, and that this course was even an indirect protection to them, as putting them in a position to share in the immunities granted by the Roman Government to other associations, Pagan, and therefore separate from our present point of view, but among which the Christians might be classed by political rulers, as merely one among many sects or associations. That this sort of classification was quite possible is indicated in the well-known letter of Pliny, referred to by Professor Brown, in which he mentions that some recent Christians told him that they had ceased to join in the meetings of their brethren because he had issued an edict "forbidding the meeting of clubs and assemblies." If the Christian meetings were included in a prohibition of this kind, they would also share in any privileges granted for such meetings, by governors who did not care to discriminate between one sect and another, except as far as any supposed political danger was concerned.

That such meetings were not in private houses, the author points out, is evident from the expressions in the twenty-second and thirty-fourth verses of the eleventh chapter of the First Epistle to the Corinthians.* In what sort of buildings, then, did these meetings take place? It is here the author's *schola* comes into the argument. The Pagan colleges or clubs "had, as one of their institutions, a lodge or meeting room called *schola*, where they held their gatherings, and assembled for common meals, to which each member brought his share of provisions"; and in some such room he suggests the early Christians met on such occasions as those referred to by

St. Paul. The next most natural step in the argument would be that if we can find the nature of the plan and arrangement of the *schola*, of which more records might be expected to be left, we are probably pretty near to the arrangement of the Christian meeting-room. The author digresses, however, for a considerable space, to suggest the probability of the smaller Jewish synagogues exercising some considerable influence on the form of the Christian meeting-room (especially citing the use of the word "synagogue" by St. James, in a passage evidently speaking of the place of worship,—"If there came into your synagogue a man with a gold ring," &c.), and it is not till after a good many pages that we are allowed to return to the *schola* and resume the thread of the argument. We will give the author's exposition of his view of them in his own words:—

"The *schola*, the name which survives in the Italian term *scuola*, for the lodge of a *fraternity*, belong to a class of public buildings not so important as temples, theatres, baths, or basilicas, but essential to the equipment of an ancient city. Official bodies of various kinds, from the Roman or the municipal senates downwards, had their places of business or deliberation, called *curia* or *schola*. The *curia* was the regular name for a senate-house, and the senate at Rome had its *curia*, though it held its meetings very commonly in temples, especially in the temple of Concord; the ancient divisions of the Roman people, too, the *curia* met in edifices called by the same name. Bodies of officials, like those who managed the public games, or the details of municipal affairs, had also their proper offices, which seem to have been called *curia* or *schola*, according to their greater or less importance. Thus a set of public clerks at Rome were located close to the Tabularium, in a row of chambers called the *Schola Xanta*, while the august priests of Mars, the Salii, had a *curia* upon the Palatine. At Ostia the semi-official guilds of officers and workmen about the port had their *schola*, and these have recently been brought to light,—some above the magazines of grain, and others in a portico on the Forum, divided for this purpose into sundry compartments, on the thresholds of which are inscribed the names of the guilds in occupation.*"

Professor Brown gives as the best example of the form of these *schola* the plans of three small edifices standing side by side close to the Forum of Pompeii. Two of these, engraved from Overbeck's plans, show rectangular apartments, about one-third larger than their width, one of which has at the end a small apse with a square recess behind, the other a large semi-circular apse nearly the width of the plan. This latter is unquestionably the plan of a Christian basilican church in embryo, in a very simple form and without aisles; and if we are to accept it that this was a *schola*, the argument, as far as probability goes at least, is pretty complete. In speaking in a

* From Schola to Cathedral: a Study of Early Christian Architecture, and its Relation to the Life of the Church. By G. Baldwin Brown, M.A., Watson-Gordon Professor of Fine Art in the University of Edinburgh. Edinburgh: David Douglas, 1896.

* "Have ye not houses to eat and to drink in? . . . If any man hunger let him eat at home."

* Lanciani, in the *Athenæum*, July, 1890, and January, 1892.

later chapter of the actual basilica, however, the author seems too anxious to show that the apsidal addition was no essential portion of the type of building called a basilica by the Romans; and in referring to a partly obliterated plan of the Basilica Ulpia, as shown in the Capitoline plan, he even goes so far as to suggest that the large apse at one end is probably no part of the building, because not only is the double colonnade returned across the opening of the apse, but there is a third row of columns, making a triple colonnade here. We can hardly accept this view of the meaning of the Capitoline fragment. There were, of course, basilicae without apses, but unquestionably the apse was a frequent adjunct; and the author seems disposed to go too far in emphasising the view that the basilica did not originate the type of the Christian church, and to be disposed to deny the considerable degree of resemblance and connexion between the Pagan and Christian plan in this respect. It is sufficient to have maintained, what indeed seems only a matter of common sense, that the Christian church in its earliest form, being necessarily a small and obscure building, must have had other antecedents than the large basilica type, and to have given a very probable and well worked out suggestion as to what class of buildings constituted these antecedents, without attempting to deprive the business basilica altogether of its apse. We will give, however, the author's own words as to his idea of the business basilica, as they show an interesting attempt to penetrate to the reality of the thing as it would appear to a contemporary Roman:—

"The basilica was nothing more than an ingenious arrangement of colonnades put together so as to form a commodious and well-lighted interior. Starting from a simple form of the covered portico, the favourite Greek building, we may trace the development of the basilica in the following manner:—

In the early days of the ancient republics, all the traffic and barter of a city, all the intercourse of burghers discussing politics or public news, all the legal disputations before magistrates, as well as many of the popular shows and amusements, went on in the public place, the Forum or the Agora. In a busy city it would be convenient to set apart certain spaces for the transaction of particular kinds of business, and the Roman bankers congregated about the Marsyas statue in the Forum, just as in our own day at Liverpool the 'Flags' accommodate the brokers of cotton. For further distinction from the common ground of the city, such a space might be surrounded by covered porticoes, under which shelter from the weather could be obtained, while their roof supported a terrace, affording an agreeable and airy promenade. If the porticoes were bounded on the outside by a wall, further privacy would be obtained, and the result would be something resembling the ground-plan the Royal Exchange of London. The roofing-over of the central space (which has now been carried out in the last-mentioned building) would be the last step necessary to change the portion of open pavement into a regular commodious building. The roofing of the central space imparts, however, at once a new architectural character to the edifice."

The further remarks which Professor Brown makes in regard to the architectural development of the basilican church, with its aisle and clearstory arrangement, are true enough and well put, and we are glad to see them in a work which is likely to be read by general readers, as well as by architectural students, but he is mistaken in thinking there is anything new in the idea that "it is more than possible that the Egyptian clearstory gave to the builders of the columned halls of Greece the first idea of that system of construction which was perfected in the magnificent Roman Basilica of Caesar and of Trajan." To the architectural student this is a mere truism, not a new light.

The further remarks on Professor Brown's book on the Development of Gothic Architecture from Romanesque, on the Dome, and on Byzantine Architecture and its Spirit, form a readable résumé of generally-assumed truths in regard to these chapters of architectural history, with here and there a special idea, worth noting for its suggestiveness. The one or two diagrams of dome construction are not good or clear, but the remarks on the connexion which should exist between a domical covering and the plan of the building, and

the criticism on domed buildings in which the plan gives no suggestion of a dome, we quite concur in. Some remarks on the characteristics of Byzantine art, its monotony and want of freshness, its extreme technical finish without plasticity or the feeling for modelling which is so apparent in all Greek work, are in a true spirit of criticism. We question the truth of the author's conclusions as to the æsthetic aspect of the dome. He sums up with the old dictum that the dome is inclusive in its impression on the mind; it "bars egress," and has no aspiration; and "Christianity does not speak through the domes of Byzantium, Rome, or London, but through the tower of Strasburg and the vault of Beauvais." This depends a little on what you take "Christianity" to mean, which we may not discuss here.

THE DOMESDAY COMMEMORATION.

IT was wise of the Royal Historical Society to take the opportunity presented by the eight hundredth anniversary of the completion of Domesday Book to give students of the Book, and of the period, an opportunity of contributing to the knowledge of the world on this subject. For it must be admitted that for the most part even intelligent people have a very vague idea of Domesday Book. Those, however, who visited the Public Record Office on Monday afternoon had an opportunity of realising its existence, for the two volumes of which it is formed were shown to the assembled visitors. According to the memorandum at the end of the work, the book was completed in 1086. Other authorities give the date of the completion in the two preceding years; but, whether this be so or not, the fact that 1086 is given as the date in the book itself was sufficient reason to make the present year a proper one in which to commemorate its anniversary. It has also to be borne in mind that the four northern counties of Northumberland, Cumberland, Westmoreland, and Durham were excluded from the Survey. They were,—perhaps it would be more proper to say,—not included because from their state at the time it was impossible to collect the required information. Various reasons have been given as to the cause of the compilation of Domesday. That it gave William the Conqueror a complete and exact knowledge of his dominions, of their occupants, and of the population of England seems to be quite reason enough to have induced a practical and arbitrary monarch to order the survey.

The extended character of the proceedings from Monday until Friday of the present week makes it impossible for us to do more than take passing notes of some of the proceedings. Passing over the able "popular lecture" by Canon Isaac Taylor, in the Hall of the Society of Arts on Monday evening, as well as that on the history of Domesday Book, which was delivered by Mr. Hubert Hall, of the Public Record Office, at the time of the exhibition of the book and other manuscripts, on the afternoon of Monday, we may note Mr. Stuart A. Moore's paper, which was read at the evening meeting on Tuesday, in Lincoln's Inn Hall. Although the writer called his paper the Study of Domesday, two critical points were brought out with great distinctness, each of which is of historical importance. The first was that Domesday was not a mere collection of surveys by measurement, but it was a great valuation and rate-book. While it gave William the knowledge of his dominions, to which we have already alluded, it was, in Mr. Moore's opinion, a kind of assessment. This led on to the more strictly general historical point, namely, that it was conceived in a spirit of perfect equity, that it was anything but a tyrannical measure, and that, on the contrary, it was undertaken with the intention that each person should not bear a greater burden than his means would allow, but that every man should carry public burdens equally. Mr. Moore suggested the making of a tabular analysis of Domesday, which, in his opinion, would add to its

historical value, and show still further the fairness with which the assessment had been carried out.

As Mr. Moore also pointed out, Domesday is better understood at the present day than it was a couple of centuries after its compilation. It says a good deal for the capacity of the age that this should be the case, but it requires the hearing of a paper such as that of Mr. Moore, and an acquaintance with the minute labours of those who have made Domesday and other ancient records their study, to realise the scientific and accurate analysis which is laying open to the less skilled world these striking historical treasures. To the majority of persons technical papers such as those of Wednesday on wapentakes and land measures of Domesday are simply *caviare*. But it is to such papers as these that we are indebted for information which, when it is considered by the general historian, enables him to lay before us a picture of the past. It was the great merit of Mr. Moore's paper, to which we have alluded, that it combined the minuteness of the technical student with the broader work of the historian. Mr. Moore expressed a hope that the commemoration of the anniversary of Domesday might possibly be not long preceding the commencement of a Domesday of the nineteenth century which, for the purposes of land transfer and land reform, is as necessary as was the old Domesday for the purpose of William. But, as the lecturer pointed out, the modern Domesday must be one with the minutest plans, as the time had long gone by for mere verbal description. That such a new Domesday may be as efficiently worked up as that of the eleventh century we will hope, but it is not the least remarkable characteristic of this compilation that after the lapse of eight hundred years it is yet of legal value, and that from time to time when disputes on fisheries, on common rights, or on similar subjects arise, it is yet necessary to refer to Domesday.

NOTES.

THE communication from the Honorary Secretary of the Institute of Architects, which we print in another column, will probably settle, in the minds of all reasonable persons, the question of the *bona fides* of the body who have endeavoured to pose as the representatives of the highest interests of the architectural profession. The question of federation of the architectural profession, which is at present engaging the attention of the Institute, as well as other important questions relating to the status of architects, will certainly be best considered and taken in hand by the recognised representative body of the profession, and not by a self-constituted clique who have endeavoured to get the confidence of architects by means which it would be superfluous to characterise.

WE are asked to mention that at a special business meeting of the Leeds and Yorkshire Architectural Society, it was proposed by Mr. C. R. Chorley, F.R.I.B.A., seconded by Mr. J. N. Connon, F.R.I.B.A., and carried unanimously, that the following resolution be sent to the Royal Institute of British Architects and to various architectural societies: viz., that "The Leeds and Yorkshire Architectural Society (Incorporated) congratulates the Royal Institute of British Architects on the completion of its proposed New Charter, and repudiates in the strongest manner any share in the opposition to its adoption which is being threatened by a non-representative architectural society."

A FIRST step has been taken in the right direction towards an industrial Irish policy, by the appointment of a small committee to inquire into the ports and harbours, the arterial drainage, and the railway system of the country. This is as it should be, for an inquiry of this kind must form the best of all bases upon which to found the more localised subjects of individual industries. Taking, for instance, the question of improved arterial drainages, Professor Tyndall has estimated that the tem-

perature of Ireland would be raised by about four degrees, if the ground were thoroughly drained; and this, it is scarcely necessary to say, would result in a marked improvement in the condition of agriculture, besides bringing about many possibilities of local industries. But, once taken in hand, it must be done thoroughly, not following the example of the Shannon Drainage Commission, which, some thirty years ago, spent nearly a million,—relieving the upper portions, but placing the lower districts in a much worse position than they were before. While on the subject of railways, a strict investigation should be made as to the feasibility of constructing new waterways, for which Ireland appears an almost virgin field. Generally speaking, the railway rates are excessive and prohibitory, sufficient of themselves to strangle a young industrial undertaking. The Midland Great Western Company has got possession of the Royal Canal, the most important in Ireland, and is perfectly unfettered as to the limit of its charges, and it is evident that the whole system wants a complete and thorough revision.

THE canal question is beginning to make itself heard with a persistence that bodes no good to the railway interest; and unless some radical changes are made in the tariff of rates by the latter, there can scarcely fail to arise a determined organisation for the revival of water carriage. A manufacturer living on the Grand Junction Canal complains that he undertook to deliver three or four hundred tons of heavy material at Nottingham by water for 5s. per ton; but in consequence of one section of the canal being purposely choked up by the railway company that owned it he had to bring all but fifty tons to London at a cost of 3s. per ton, and send it on by rail for 9s. 10d. more. Thus, the transit cost 12s. 10d. instead of 5s., while three weeks were consumed on the journey instead of seven days. The singular part of the dog-in-the-manger policy pursued by the railways is that, after buying up canals, in many cases for a long price, they not only make no use of them, but allow them to fall into utter neglect. For instance, the Cromford Canal, which cost 46,000*l.* and paid a dividend of eighteen per cent., was bought up by the Midland Railway for 220,000*l.*, on which sum it has naturally paid no dividend. The Leeds and Liverpool Canal paid a guaranteed dividend of sixteen per cent. until 1853, when it was leased for twenty-one years to a railway combination. During this time, the traffic fell off so that the company had to make up the balance of the dividend to the canal shareholders; but since 1874, when the lease lapsed, the canal recovered so that it paid a dividend of twenty-two per cent. There are plenty of similar cases to be found throughout the country; and one scarcely knows which is the most surprising, the grasping action of the railway companies, who are also canal owners, or the apathy with which freighters and traders have so long submitted without any effort to free themselves.

IN a letter to the *City Press*, Mr. J. Douglass Mathews says that the reference in the *Builder* of the 16th inst. (p. 579), to the formation of the new street through the Mint, Southwark, recalls to mind a suggestion made by him nearly seven years ago for obtaining improved communication between north and south, and north-west and south-east, by the greater use of Southwark Bridge. He says, and very truly, that the reason this bridge is so comparatively little used is the bad approach from the City side by the steep descent from Cannon-street and the rapid ascent from Thames-street. Queen-street, being at right angles with the principal streets, there is no direct approach to the bridge from the west or north-west, which is the chief direction of the traffic. His suggestion was, and is, the formation of a spur street or viaduct, starting from the bridge, and spanning Thames-street, passing by the back of St. James's Church, Garlick-hill, and entering Cannon-street or Queen Victoria-street opposite the end of Knightrider-street. Since the suggestion was first made the District Railway

has been extended, and some new buildings have been erected; but much of the property required is sold and of comparatively small value, and Mr. Mathews says that if the buildings now in course of erection where the street would emerge could be acquired before they are occupied, the improvement could be carried out for a moderate amount. The need of such an approach will be more than ever felt when the new street in Southwark is completed, as direct communication will then be obtained through Dover-street with the Kent-road. If the proposed approach be made, it would form a link in a continuous thoroughfare from the north-west (*vid* the Angel, Islington), with the south-east (*vid* St. George's Church, Borough) and south, *vid* the Elephant and Castle; and especially if the street could be continued to the Post Office. It would materially lessen the traffic in this direction passing over London Bridge, and also reduce the ever-increasing danger in front of the Mansion House.

IN reference to the Barony Church competition, to which we referred in a Note last week, Messrs. Burnet, Son, & Campbell, the architects whose design has been selected, write to us to say that they did not send in a design from which the spire could be omitted if desired, but two designs, one with a spire and the other without, and that the latter, which came within the prescribed cost, has been selected. In the previous correspondence on the subject, however, a copy of which is in our hands, it appears obvious that Messrs. Burnet & Campbell's design was described in their report as one design, and the solicitors for the Committee even suggest, in a letter to Mr. Honeyman's solicitors, dated September 28th, that all the discussion could have been avoided if the selected architects "had prepared two descriptions instead of one, or by the use of the plural 'designs' instead of the singular 'design.'" This suggestion Messrs. Burnet & Campbell seem to be now practically adopting, —rather late in the day, as it seems to us.

THE last issue of the *Notizie degli Scavi di Antichità* (Rome) gives an interesting account of the Mithraeum, or Temple of Mithra, recently discovered at Ostia. This Mithraeum, the best preserved which so far is known to us, stands in close connexion with a private house, and from an inscription there found it is probable, though not certain, that the house belonged to L. Apuleius Marcellus. It appears that a partial and unsatisfactory exploration of the site took place at the end of the last century, under Pius VI., and that then all movable antiquities were carried off. Fortunately the foundations of the building are quite undisturbed, and of these a sketch plan is given in the *Notizie*. Further, and still more important, a very curious series of mosaics, all in black on white ground, are intact. The building seems to have been a mass of mosaics; not only the pavements, but the walls, and even the seats of the worshippers, are covered with them. On the pavement the design consists of seven doors, corresponding to the seven degrees of initiation into the mystic cult (*i.e.* Corax, Coryphus, Perseus, Leo, Heliodromus, Pater, Pater Patrum); to these is added a dagger, symbol of the familiar type of Mithras, the bull-slayer. Between the entrance-door and the front door of initiation a sort of well is sunk in the floor, in all probability a font for the baptism of the postulant. On the front side of the seats are the six planets, and on the seats themselves the twelve constellations, but neither planets nor constellations are in their usual order. At the end of each of the two rows of seats is a torch-carrying genius. The arrangement will be best understood by reference to the sketch plan in the *Notizie*.

WE pointed out some months ago that the genuineness of one of our finest antique heads in the British Museum (the Hera of Girgenti) had been impugned by Dr. Furtwängler, of Berlin, and we expressed our hope that the present keeper of Greek and Roman antiquities would have something to

say in the matter. We are not disappointed. Mr. Murray is not the man to hang back when the dogs of war are let loose. Dr. Furtwängler gets as good as he gave, and some change into the bargain. The attack was made in the *Archäologische Zeitung*. As that periodical has lapsed Mr. Murray's defence appears in the *Römische Mittheilungen*. The defence is a simple one. It turns out that the portion of the back of the head on which Dr. Furtwängler bases the chief of his argument is simply a clumsy modern restoration. We are surprised that this should have escaped an observer usually so acute as Dr. Furtwängler. We are sincerely glad that the victory rests with our Museum. Had the head proved to be really a forgery a serious slur would have been cast on the critical faculty of our two best English archaeologists. As it is, we flatter ourselves that the conceit has been for once taken out of "those Germans."

EACH week brings fresh good news from Epidauros. The last account (*Δελτίον της Επιδάου*, No. 507) reports the discovery of a large number of statues, terra-cottas, &c., the principal of which are to be promptly transported to Athens. Among them we may note seven statues of Asklepios, about half life-size, in excellent preservation; three statues of Hygieia; three statuettes of Athene in different attitudes; a small statue of Pan; one of Cybele; four statues, probably votive of youths, all about the same size; a terra-cotta statue of a nude youth, of extremely fine style; the torso of a Nike, winged. All these remains have been found in one part, *i.e.* in the north-east corner of a dwelling-house near the great Ionic colonnade. The house, though not uniformly the statues, is of Roman times.

THE *Art Annual*, published by the proprietors of the *Art Journal*, is this year devoted to a monograph on the life and work of Mr. Alma Tadema, with numerous engravings, large and small. The large frontispiece, an etching by Mr. C. O. Murray, is a reproduction of "Sappho," one of the finest of the artist's works, a fine example of etching of the more highly-finished order, and full of light; but, with all our admiration for etching as a beautiful form of artistic work, it is not the best adapted to translate Mr. Tadema's painting. The figures in the picture are very successful, but it is impossible to represent in etching any idea of the peculiar texture and brilliancy of Mr. Tadema's favourite surfaces of marble.

THE lawn on the Buccleuch Estate, recently purchased by the Richmond Vestry, has just escaped a form of mutilation other than that of the construction of the towing-path through it, to which we have already alluded. It appears not to have been generally known that the adopted scheme of Mr. Melliss for the drainage of Richmond included the laying of a 16 inch iron pipe main sewer through the lawn; and, moreover, that the consent of the Duke of Buccleuch had been obtained to this being done. But it appears that Sir James W. Ellis has intimated that if the sewer is to be laid he will withdraw his offer of 6,000*l.* for the house, which he would utilise as a residence. Mr. Melliss, however, submitted an alternative and apparently less objectionable route for the sewer, along the Lower-road, but across the corners of the Richmond House grounds; and the extra cost, it seems, is comparatively trifling. Sir James, with every desire to promote the interests of the town, while not assenting to anything which would materially damage his prospective property, has approved of this alternative plan. The Vestry have by a large majority agreed to request the Main Drainage Joint Committee to instruct Mr. Melliss to alter his plans accordingly; and the famous lawn is not to be desecrated either by a sewer or a towing-path. The community generally who are interested in the purity of the River Thames will heartily endorse the remark of Sir James Ellis in his letter read to the Vestry, that the suggestion of converting the old sewer now in the lawn into a "storm over-flow" in connexion with the

scheme cannot be accepted in the face of the prohibitory orders of the Thames Conservancy Board.

ALL architects (besides others) should look at Mr. Fulleylove's sketches from "Petrarch's Country," at the Gallery of the Fine Art Society. Mr. Fulleylove is a master of the pictorial treatment of ancient architecture, nor does he, in his attention to the texture and structure of masonry, let the feeling of the scene escape. The Roman bath at Nîmes, with the Renaissance balustrades to set it off, seems a great favourite, and is painted from several points of view. Among others that may be specially mentioned are "The Proscenium Columns at Arles" (7),—repeated from another point of view in 57, the Roman Sepulchral Monument, St. Rémy (37); "Aigues Mortes" (46), with its round tower, desolate plain, and timber bridge abutting against great square masses of masonry; "Carcassonne" (47); "Arles: Arena, Sunset" (53). The whole are well worth looking at both from the architect's and the painter's point of view, and some of the drawings exhibit also fine free sketching in pencil and pen-and-ink.

THE collection of pictures at Messrs. Tooth & Sons' gallery, which opens to-day (Saturday), boasts an exceptionally good Meissonier, "Le Voyageur," a landscape (large for Meissonier) through which a horseman is plodding against a strong wind, his horse going heavily over the soft road. There is even less story in it than is usual with Meissonier, but perfect representation in the figure and action of man and horse. There are two very good specimens of the talent of M. de Blaas, "The Offer," and "Accepted" (5 and 7), and between them a very clever work in the hard flaring manner of M. Gallegos, the interior of Seville Cathedral at a religious "function," where the carved organ-case is a study in that class of work. A charming Edouard Frère (24), two good specimens of Mr. Halswelle's mannered but effective landscape-painting (140, 148), a rustic idyll by M. Lhermitte, "At the Spring" (113), various small works by Herr Helfner, a bright Venetian scene by Mr. Woods, and a good example of Mr. Vicat Cole's art (less mannered than usual), are among the contents of the gallery.

FROM a mass of correspondence which has appeared in the *Liverpool Daily Post* during the last week, it seems to us that, even allowing for possible exaggeration in some of the statements made, there has been something exceedingly wrong in the manner in which the award of medals has been carried on. Two or three high-class firms have entirely refused to accept the gold medals awarded, and stated that, in view of what had reached them as to the influences under which some of the awards were made, the medals were of no value in their eyes, either from an honorary or a commercial point of view. The moral of the matter seems to us to go further than the special case of the Liverpool exhibition. We have long been of the opinion (which we know is shared by some of the most respectable firms, who feel under a kind of necessity to be represented at these numerous and ever-increasing exhibitions), that this constant recurrence of exhibitions is only a nuisance to the best manufacturers, who have nothing to gain by it, and the constantly-repeated distribution of medals little better than a farce; and we are rather inclined to hope that the discredit which has been thrown on the Liverpool awards, whether altogether justifiable or not, may lead to some check being put on this endless repetition of exhibitions and shovelling broadcast of medals, which are chiefly coveted by those who most require them as an advertisement.

Mr. W. Emerson.—We have been requested to state that a rumour which has been circulated to the effect that Mr. William Emerson, the well-known architect, and one of the candidates selected to prepare drawings for the proposed cathedral at Liverpool, has accepted a lucrative appointment at the Cape, is entirely without foundation.

HANS HOLBEIN'S DECORATIVE WORK.



who are most familiar with the master's work, there will be many whose thoughts will turn naturally to a series of very rough designs for title-pages, and to the four well-known "alphabets," among which is the celebrated "Dance of Death." The initial I at the commencement of this article is taken from one of them; it is not very beautiful, nor is it a very meritorious piece of design, but we have used it for a purpose to which we shall hereafter refer. In addition, however, to the title-pages and alphabets, Hans Holbein executed a great number of designs of all sorts of the rarest beauty, of which there is hardly a trace in his early work; much less is there in the title-pages any foreshadowing of that mastery of decorative detail and principle which is the characteristic

of the designs we propose to notice. In one of the Solander cases in the Print Room of the British Museum there is a collection of the original drawings for these designs as they left the master's hands. They came to the Museum direct from the Sloane Collection; but this is the only known fact in their history. The study of them will, however, form a fitting sequel to the studies we have already made of the decorative work of the early German engravers of whom we have spoken. In turning over the wood engravings of the title-pages, which were evidently designed before he left Germany, we are unable to trace the slightest influence upon him of the work of these masters. As designs, these woodcuts possess very little merit. The four alphabets were also drawn before he settled in England. Three of them are named, the "Dance of Death," the "Dance of Peasants," and the "Sports of Infants," after the subjects which form the backgrounds; the fourth is an attempt at simple decoration, and from it our initial I is taken. The "Dance of Death" is the best known of the four, and is much praised by the critics; the praise, however, is only deserved on account of the deftness and ingenuity of the draughtsmanship. The letters are about an inch square, and, in this small compass are portrayed with marvellous fidelity the various emotions with which the different persons, prince and peasant, sexton and abbot, receive the visits of the spectre, the bearer of the summons from the other world. But viewed, as an alphabet can only be viewed, as a piece of decorative design, they are of no merit whatever; the clever little pictures have no connexion with the letters, but simply form backgrounds to them; in many instances the figures do not even adapt themselves to the spaces left by the form of the letter; and it can only be said of them that the illustrations would be far more interesting were they not marred by the intrusion of the capitals. The same remarks apply to the "Dance of Peasants," and the "Sports of Infants." As to the more purely decorative

Such a condescension Hans Holbein showed, and such excellence, fancy, and beauty sprang from it.

All the drawings to which we are about to draw attention seem to have been executed during Holbein's residence in England, when he had secured the patronage of King Henry VIII. In the biographies he is described as having been a "king's servant" in 1537; and it was probably during this and the succeeding years of his service that these designs were made, doubtless, in the majority of cases, for the king himself. We must for the present, however, remain in ignorance as to where he studied the first principles of his new art. The existing records of his life are very far from voluminous or complete. So far as we have been able to study them they show no trace of his ever having been associated with any of the German



Fig. 2.

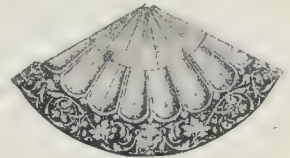


Fig. 1.



Fig. 4.



Fig. 3.



Fig. 5.



Fig. 6.



Fig. 7.

of the designs we propose to notice. In one of the Solander cases in the Print Room of the British Museum there is a collection of the original drawings for these designs as they left the master's hands. They came to the Museum direct from the Sloane Collection; but this is the only known fact in their history. The study of them will, however, form a fitting sequel to the studies we have already made of the decorative work of the early German engravers.

Apart from any question of merit or demerit, few decorative designs are so interesting as those which are the work of a great master of representative art. They are interesting as being the work of a master, but, for reasons which we do not think are far to seek, their demerits very frequently exceed their merits when they are judged by the strict rules of design. The canons of decorative and of representative art are, as we have already pointed out in our German studies, so essentially different: the painter rests so satisfied with the superiority of his own walk in art, that when, either for the accessories of some picture or for the sake of gratifying some passing fancy, he tries his hand at decoration, he is at little pains to shake himself free, even for the time being, from the trammels of his own genius; he refuses to inquire whether such things as principles exist for decoration, and he ruthlessly presses flowers and fruit and the most natural human figures into his composition. Judged, therefore, by the principles whose existence he has wilfully ignored, such work must frequently be condemned as bad; at the same time, it cannot

engravers of whom we have spoken. In turning over the wood engravings of the title-pages, which were evidently designed before he left Germany, we are unable to trace the slightest influence upon him of the work of these masters. As designs, these woodcuts possess very little merit. The four alphabets were also drawn before he settled in England. Three of them are named, the "Dance of Death," the "Dance of Peasants," and the "Sports of Infants," after the subjects which form the backgrounds; the fourth is an attempt at simple decoration, and from it our initial I is taken. The "Dance of Death" is the best known of the four, and is much praised by the critics; the praise, however, is only deserved on account of the deftness and ingenuity of the draughtsmanship. The letters are about an inch square, and, in this small compass are portrayed with marvellous fidelity the various emotions with which the different persons, prince and peasant, sexton and abbot, receive the visits of the spectre, the bearer of the summons from the other world. But viewed, as an alphabet can only be viewed, as a piece of decorative design, they are of no merit whatever; the clever little pictures have no connexion with the letters, but simply form backgrounds to them; in many instances the figures do not even adapt themselves to the spaces left by the form of the letter; and it can only be said of them that the illustrations would be far more interesting were they not marred by the intrusion of the capitals. The same remarks apply to the "Dance of Peasants," and the "Sports of Infants." As to the more purely decorative

alphabet, the above initial I is perhaps the best of the series; but the ornament is unorthodox, and the lines not very graceful. We have used it, however, for the sake of giving one example of Holbein's early decorative work, and in order to emphasise the great excellence of his English designs.

English decorative art was probably never purer than it was during the Tudor dynasty. Elizabethan decoration is, we think, the one of the many styles which have been in vogue in this country at different periods, which owed nothing to foreign influence. The simple principle of decoration, the use of lines for their own sake, has never been carried to such a pitch of excellence, and has never, except in the earliest forms of the art, been so severely

charming as he who will may see the *ipsissima signa* of the master, and not an engraver's reproduction. It is, moreover, not very useful to write about designs unless some semblance of them in black and white is at hand to help description through; we have therefore made as varied a selection as possible, and we shall limit our remarks to those we have sketched. We would only have our readers remember that "more remain behind."

The first mount of drawings to which attention must be called is the one containing about eighteen or twenty small arabesques and Renaissance designs. We have reproduced four of the finest (figures 1, 2, 3, 4): the lens has taken in three smaller ones (figures 5, 6, 7), but they are too small in the reproduction to

small drawings the firmness of the lines is not the least remarkable feature; the bold and successful use which Holbein makes of angles, breaking abruptly the flow of the curves, a characteristic feature of the style, but which in less skillful hands so frequently disfigures arabesque devices, speaks of the care which he must have devoted to the study of the best examples of this graceful style. Figs. 1 and 3 show with what equal facility he worked in Renaissance ornament. Whenever he adopts it, he invariably yields to its best spirit. In the whole series, which contains a considerable amount of Renaissance work, he has not once adopted the base and ungainly realistic devices which so frequently disfigure it. When he uses the human or animal forms, they are nearly always as conventionalised as it is possible to make them, and they lend themselves without the slightest jar to the harmony of the whole. Then if we look for a recognition of the tangential principle on which all scrollwork must be based, there is never a blemish to be found. His fancy is made strictly dependent upon it, and at the same time the strict rule is lost entirely in the play of his fancy. Note especially, in fig. 1, how charmingly the scroll returns upon itself, and, bursting into foliage and flower, fills up the space it had left vacant in its first volition. The work contained on this one mount is almost sufficient to establish a man's claim to be in the first rank of designers. Space forbids us, however, to dwell longer upon it. In leaving it, we would only add that a student of decorative art need go no further than the dozen designs contained upon it to seek a better study and inspiration for his own work, or to find a clearer exposition of the fundamental principles of ornamentation.

In figures 8 and 9 we have some specimens of designs for bookbinding; the arabesque borders in the former being very graceful and original. To show to what small uses this great genius was put during his king's service, and how well he acquitted himself of the smallest task he undertook, the complicated monogram in the centre of figure 8 should be noticed. We add another example (fig. 10) of this style of work, a monogram evidently devised for the back of a watch or locket. Figures 11 and 12 are two more designs for a similar purpose; in the first he has thrown on one side both Arabesque and Renaissance inspiration, and has gone straight to nature; his mastery over scroll-work is noticeable in both the borders, but the thorny rose strikes us as too natural, whereas the aster is rigidly conventionalised. The two legends are "Trinitatis gloria stabilimur," and "Origo mundi melioris." In the centres are sketched, just as slightly as we have reproduced them, two little pictures in the manner of the alphabet backgrounds; that in fig. 12 evidently being borrowed from one of the "Dance of Death" letters. This one, however, seems not to have given satisfaction to his royal master or mistress (Catharine of Arragon), and it has been erased with the pen.*

CHANGES IN ST. GEORGE'S PARISH, SOUTHWARK.

We recently adverted† to two schemes which have just been set on foot for improvements in Southwark,—the one for a new thoroughfare from Blackman-street to Southwark Bridge-road; the other for converting an old burial-ground into an ornamental garden, promoted by the Metropolitan Public Gardens Association. That burial-ground is none other than the graveyard occupying the site, in part, of the hospital which, dedicated to St. Leonard and St. Mary, was commonly known as Le Loke's, or the Lock. Lying without St. George's Bar, but just within the eastern slip, as readjusted, of St. George's parish, the hospital stood at the upper end of what is now the Old Kent-road, just south of the Bull Tavern (No. 2, Old Kent-road). At the lower end of Tabard (olim Kent) street, beneath the roadway, at a spot between Edwards the chemist's shop (No. 302) and J. Goldsworthy the baker's (No. 285), and at the return of the parish bounds, lay, and perhaps still lies, Lock's Bridge, of which presently.

We read in Stow :—"Then in Kent-street is a lazar-house for leprous people, called the Loke in Southwark." He goes on to say, "the foundation whereof I know not." The "spital

* To be continued.

† Builder, pp. 532 and 579, ante (October 10, 1886).



Fig. 9.



Fig. 10.



Fig. 8.



Fig. 11.



Fig. 12.

applied. Of all periods in architectural history this one alone stands out as English work *par excellence*. But during Henry VIII.'s reign the spirit of the Renaissance had reached England. The style of ornament peculiar to the Renaissance seems to have been adopted by many workmen, but it was adopted simply as it had been received, and left the characteristic Tudor ornament untouched; perhaps for the very good reason that the spirit was essentially one of purification, and in that ornament there was nothing to purify. Many of these designs of Holbein's are in the best style of the Renaissance; many are very finely-constructed arabesques, and some very few seem to "bark back," and remind one of Aldegrever's early work. It is impossible within the compass of this article to give sketches of more than a few of the choicest of these charming designs, the more

follow with ease; every drawing on the mount is well worth a careful study. The arabesques are noticeable for their great fidelity to the spirit of this form of design, both as to its essential purity and to its adaptability to the shape of the surface to be ornamented. In this latter respect, perhaps, our small figure 5 is the most remarkable, the two spherical triangles (this is a sufficiently accurate denomination) being filled in a very charming manner, the space being evenly covered from base to apex; the scrolls in both diminish gradually as they approach the apex and at the same time lend themselves to the circular bend of the sides. Figures 2 and 4 are conceived in the same spirit and are of equal excellence. Our reproductions show how true and steady was the designer's hand; they are reduced to barely a third of the size of the originals, and in such

was one of several like thereto which formerly existed in London, as at Kingsland, Stratford-le-Bow, Grosvenor-place, and Knightsbridge, together with those of St. James, Westminster, and St. Giles-in-the-Fields.* There is record that one John Pope bequeathed an annual rent of 6s. 8d. to the Governors in 1437; yet the foundation dates from Edward II.'s reign, if not an earlier period. John Pope may have been ancestor to the Sir Thomas Pope, founder of Trinity (olim Durham) College, Oxford, who made him a lordly mansion from out of the dissolved Bermondsey Priory. It subsequently passed to St. Bartholomew's Hospital and received some of the patients. Curiously enough, the chapel of Kingsland Lock was dedicated to St. Bartholomew, where the sundial bore the significant motto, "Post Voluptatem Misericordia." Falling into decay, the Southwark Lock was let out in tenements and finally removed in 1809, when they made the new road, Great Dover-street, from High-street, Borough, parallel with the then Kent-street. Most of the site was thrown into an adjoining paupers' burial-ground. Along the western side, in Buckenham-square, was erected about thirty years ago the Pilgrim church or hall, "forned 1592," tests the inscription; a memorial to those martyrs whose designation it bears, and whose church dates from 1616. Aubrey refers to the fragmentary inscription above the Lock chapel door. In Wilkinson's plate, 1st Jan., 1813, it appears in a panel, as follows:—

"M B
This Chapel Was Built
To the Honour of God and for the Use of
the Poor Infirm and Impotent People
Harboured Within this Hospital
May Mar Boni Esq, Treasurer
Anne 1636."

M. Bond gave to the charity 100l. Some would derive the name from the French *loques*, rags or lint for wounds and sores; akin to the old English *loce*, Dutch *lok*, German *locke*, a lock of hair, a curl or ringlet, a flock of wool; others from the old English *loc*, a lock or door-fastening, hence *lūcan*, *locan*, to lock or fasten (compare the Latin *ligare* and Dutch *linken*), in connexion with the leper's necessary seclusion from mankind. Now just at this spot the high road from the Borough to Canterbury and Dover crossed a tidal stream, or rather ditch, one of the many that within living memory traversed this low-lying ground. The ditch flowed from the Newington and Walworth fields, and, known as the Lock, separated St. George-the-Martyr and St. Mary-the-Virgin parishes along so much of its course as lay northwards of Warner-street, which now joins the New and the Old Kent roads. Thence it ran south-east, between the present Bermondsey New-road and Weston (*antiquæ* Hunter) street to Brook-street, by Star-corner. Bermondsey. The character of the ground which is now being excavated between the Bricklayers' Arms and Star-corner is sufficiently indicative of the marshy nature of the soil. Another long ditch, east of Tabard-street, formed a boundary line between the parishes of St. George and St. Mary Magdalen, Bermondsey. Whether the Lock ditch gave name to the hospital or *vice versa* we cannot determine. It is plainly shown in Rocque's map of Surrey, 1750; whilst in Crosse's New Plan of London, 1836, is marked Lock's Fields, just south-west of the Paragon in New Kent-road. The bridge that carried the Canterbury pilgrims' way over the channel was exposed to view during the construction of a sewer along Tabard-street some years since. It consists of a pointed arch, in stone, with six ribs, having no mouldings, but merely chamfered edges, very similar to the arches at Stratford-le-Bow, of old London Bridge, or of the moat-bridge, Eltham Palace. The bridge is 20 ft. wide; the arch has a span of 9 ft., and is 6 ft. in height to the crown. It is supposed to have been built by the Bermondsey monks, as lords of the Great Liberty Manor of Southwark, at the end of the fourteenth century. Within the bridge was fixed a tablet bearing at either side the city arms and initials MSTB, and the Bridge-house mark, commonly, though erroneously used for the Southwark arms, with initials T B W L; below are the letters S M N. The central inscription runs—

"This bridge was repaired A^d 1611, at the charge of the Inhabitants of Newington and St. George's Parishes.

And thus farre the Libertie of the Borrowe of South Warke extendeth."

In his life of Pope, *à propos* of the poet's love of his money, Dr. Johnson writes that "the great topic of his ridicule is poverty; the crimes with which he reproaches his antagonists are their debts, their habitation in the Mint, and their want of a dinner." So, again, in his life of Rowe he alludes to the death of "Poor Nabum Tate who [1716] died in the Mint, where he was forced to seek shelter by extreme poverty." Here are but two of the well-nigh countless instances that could be adduced of the reputation formerly enjoyed by so ill-favoured a quarter. But long ere this the Mint in Southwark had gained notoriety of another and more evil kind; as, indeed, we might naturally expect to find where sanctuary was given to insolvent debtors. From King Edward VI.'s day its gates offered asylum to traitors, felons, coiners, and outlaws, whilst its own black ditch (a boundary of St. Saviour's Parish) served for the maltreatment of process-servers just as did the Fleet behind Field-lane. The Mint has supplied scenes for Harrison Ainsworth's "Jack Sheppard" and for similar stories; Mat of the Mint and kindred allusions are familiar to readers of Gay's "Beggars' Opera." Jonathan Wild is reported to have stabled his horses within its precincts, at the Duke's Head, a wooden public-house in Red Cross-street, near to the Cross Bones burial-ground. Even as far back as Edward III.'s reign the London magistrates had made plain of the frequent escape of "felons, thieves, and other malefactors and disturbers of the peace" into the "village" of Southwark. Thereupon, that Sovereign granted a charter for conveying the village over to the City in fee-farm, the bailiff or sheriff to account thereof annually at the Exchequer. In 1462 Southwark came fully within civic control, but was not constituted a "ward without" until 1550. By charter of 23rd of April, Edward VI. granted to the Commonalty of London the Manor of Southwark together with all manorial rights annexed, and criminal and civil jurisdiction.* The Mayor and Citizens paid 647l. 2s. 1d. for this grant, which Mr. Loftie tells us included some houses that had belonged to Charles Brandon, Duke of Suffolk, and had been sold by him to Henry VIII.; as also the site of Bermondsey Abbey.

Over against St. George's Church formerly stood Suffolk-place, the fair mansion of Henry VIII.'s brother-in-law†. The king exchanged Suffolk-place with Brandon for the Bishop of Norwich's "inn," somewhere in St. Martin's-in-the-Fields. He then set up a mint of coinage in the re-named Southwark, or Duke's place. Queen Mary gave the Mint property in the King's Manor to Nicholas Heath, archbishop of York, in recompense for York-place, Whitehall, which his predecessor Wolsey had made over to her father. Heath sold it in 1557, when the purchasers erected many mean buildings on the estate, but left enough of the original house to serve for a residence to Sir Edward Bromefield (Lord Mayor, 1637-8), who lived here until 1650. His son John, who was created baronet March 20, 1661, settled "Suffolk, otherwise Southwark-place," upon his daughter Joyce on her marriage with Thomas, son and heir to William Lant, of London, merchant; whence Lant-street, Borough. In 7th Anne an Act was passed for certain improvements of the property, empowering Thomas Lant to give fifty-one years' leases. On Thomas Lant's death in 1722 the property passed, by his daughter's marriage, to the Bullock family. In 1773 it was advertised to be let as comprising 17 acres with 400 houses, and a rental of 1,000l. a year. At the death of Mr. J. Bullock, of Faulkborne Hall, Essex, M.P. for the shire, in 1811, the property was sold at auction in 98 lots, being 600 dwelling-houses, yielding 2,000l. annual rent.

Meanwhile the Mint had only increased in bad repute. In the Act 8 and 9 William III., for relief of creditors, the following sanctuaries in Southwark are scheduled:—"Montague Close, or the Minorities [sic], Mint, Clink or Deadman's Place. Yet matters mended but little, and another statute was enacted, 9 George I., c. 28, 1723, for the more effectual execution of justice in the Mint. The preamble to that enactment would go to show how necessary had become interference on the part of the Legislature. The "privileges" were declared to be abolished;

but, by way of clearing the place, all debtors for amounts under 50l. were enabled, under certain conditions, to obtain relief from their obligations. In his "Curiosities of London," Timbs gives a quotation from the *Weekly Journal* of Saturday, July 20, 1723, describing the remarkable exodus of "some thousands of the Minsters . . . to be cleared at the quarter sessions at Guildford."

Some silver coins issued in 1551 from Henry VIII.'s Southwark Mint bear a mint-mark Y, for Sir John Yorke, Under-Treasurer. He is the same whom in 1549,—being Sheriff of London for that year,—King Edward VI. had knighted when he rested here for dinner *en route* from Hampton Court through the city to Westminster (Stow). This Mint should not be confounded with the earlier one which was established in Southwark under Æthelred II., and continued to coin money until King Stephen's time; that is, during the interval 978-1135. Its site, though not definitely ascertained, is believed to have been either by the original town-hall in Carter-lane, over against St. Olave's Church, or in Clink Liberty under charge of the bishops of Winchester.

EDINBURGH NOTES.

The International Exhibition at Edinburgh, which closes on the 30th inst., has been a centre of attraction to vast multitudes, and has proved a success financially, the estimated surplus being stated at about 20,000l. The largest influx of visitors on any one day occurred on Saturday, the 23rd of October, when 62,981 persons entered the turnstiles, taxing the capacity of the building to the utmost. The interior, indeed, has been overstocked with exhibits, leaving too little room for passage, and detracting from the general effect. The result would have been more satisfactory had four or six additional courts been added; but it is easy being wise behindhand. The behaviour of the vast crowds which frequented the exhibition since the reduction of the entry money to 6d. has been, upon the whole, remarkably good, and very little damage has been done. Amongst other amusing *contretemps* which occurred is one showing the popularity of Mr. Gladstone, whose effigy in stucco, painted to resemble bronze, has been twice deprived of the fingers of the right hand which he holds out "in act to speak." This was brought about by admirers shaking hands with the image. Similar damage has been done to Mr. G. A. Lawson's "In the Arena," also of stucco bronze, from some adventurous wight having thrust his hand into the jaws of the lioness, and depriving her of some teeth.

Much difference of opinion exists as to the appropriation of the surplus money and the retention of the "permanent" building. It was proposed to present Sir James Gowan, the Chairman of the Executive Committee, with an honorarium of 2,000l. in consideration of his valuable and onerous services during the whole period of the Exhibition, but this offer he has declined. Parties are pretty equally divided as to the question whether the great hall should be retained on its present site or removed elsewhere. The objections to its being retained where it now is are that it occupies a considerable portion of public ground required for out-door recreation, and that, although it served its purpose as a temporary show, it is too mean and tawdry to be retained as a permanent public hall. On the other hand, it is maintained that the hall would supply a want, as there is no interior available for gatherings on a large scale. This want may, however, in course of time, be supplied in a more worthy manner, and the present erection, according to one suggestion, be disposed of to the Caledonian Railway Company to be utilised at the Lothian-road Station, which is in a state of dilapidation.

It will be remembered that some time ago it was stated in these columns that one of the newly-elected city members had indicated his intention of bestowing 50,000l. upon the University, for the completion of the new buildings. In his inaugural address at the opening of the session, Principal Sir William Muir said, "I made mention of the need of a Senate-hall as the necessary complement of our new buildings, and expressed the hope that some Mecænas might arise, as in the sister University of Glasgow, to endow us with means for the erection of the same. It is no

* The Lock Hospital, Harrow road (1841), was originally established for women, in 1746. The Asylum, hard by, forty years later, by the Rev. Thos. Scott, the Bible-expositor.

* Rev. W. J. Loftie's History of London, second edition, 1881.

† *The Builder*, 27th March, 1886 (Mr. North's drawing of old arches).

longer a secret that the hope is within sight of being fulfilled. Before long, therefore, we may look to holding the solemnities of graduation and other ceremonial assemblies, such as this, in a hall of our own, supplied by the munificence of a fellow-citizen." A senate-hall formed part of the original scheme of the new University buildings, as designed by Dr. Rowand Anderson. The design shows a semicircular hall, divided into bays by massive piers, decorated by statues, in niches of the Cinque-cento style, with a lofty campanile, bearing considerable resemblance to that in St. Mark's Place, at Venice.

Another handsome gift to the University is announced as coming from Dr. Gunning, of Edinburgh and Rio Janeiro, to be devoted to prizes in the faculty of medicine, involving a present payment of 200*l.* per annum, and ultimately a bequest of 2,000*l.* Again, a sum of 30,000*l.* has been bequeathed to certain trustees for the erection and endowment of almshouses in the vicinity of the city for the benefit of those who may be deprived of their means by the failure of banks or other companies.

The stonework of the National Portrait and Antiquarian Museum at the east end of Queen-street is now completed, with the exception of some carving to be done *en bloc*. The general aspect of the building is severe, and is entirely unlike any other public building in the city. The style is English Gothic of the thirteenth century, with large traceried windows and an upper floor lighted from above. Mr. Ruskin stigmatised Queen-street as the bathos of architecture. This building would, perhaps, to some extent redeem it in his eyes.

On the vacant ground to the south of the Synod Hall, Castle-terrace, new premises are in course of erection for the use of the School Board; they are Italian in style, from the design of Mr. Wilson, Architect of the Board, and harmonise with the adjoining building. A marked feature in the elevation is a tower at the angle of Castle-terrace and Cornwall-street. The elevation towards that street embraces the whole site back to the Lyceum Theatre.

A remarkable building has just been opened for the Edinburgh Café Company, situated in Princes-street. The site is a narrow one, and the facade is run up into an acute gable, designed in the Renaissance style of the Low Countries. There is a considerable amount of carving and enriched detail delicately treated, the grit of the Crosshill freestone lending itself to such treatment. The red colour of this stone makes the building conspicuous, a peculiarity of which time will soon deprive it; but the pointed gable and somewhat unusual detail give it a permanent individuality.

THE PRESIDENT'S ADDRESS, ARCHITECTURAL ASSOCIATION.

At the opening meeting of this Association for Session 1886-87, held on the 22nd inst., the President, Mr. J. Alfred Gutch, F.R.I.B.A., delivered the following address:—

We who are architects have set forth upon a difficult track, and, when the Banyan of our profession shall arise, he may write an "Architect's Progress" full of adventures as strange, of misfortunes as various, of comforts as few, and ambitions as high, as those which have delighted generation after generation of English children since the time when the tinker of Elstow dreamed his strange dreams in the prison of Bedford.

Ours is, indeed, an arduous profession, and it is with no light heart that those who have the shaping of a young man's destiny should thrust him upon it. Ten years of toil may, perhaps, fit him to cross the threshold of independent practice. But to many that door is never opened, while to others it opens twice, once that they may enter, and once that they may go forth, either to rejoin the army of those who work for others or to seek some different occupation, where the reward will be in greater proportion to the toil. In greater proportion,—ay, there's the rub. Surely no one will become an architect hoping to find a fortune. If he works hard during the day and for a little of the time that other men devote to tennis or billiards, a conscientious man may manage to live, and an unscrupulous man may do even better, but, as for fortunes, they fall to few in the architectural world. No; let him who enters for the race do it not for the prize but for the pleasure of running. If, by good luck, he gets the prize then is he doubly blest; but, if not, he still has

the delight of exercising fine faculties in a masterly manner. This, however, is perhaps a refined joy that it is not in every one's nature to experience, and therefore, I say, let those who regard the practice of architecture as a money-making pursuit turn their eyes in another direction, or they will find themselves mistaken when, perhaps, it is too late. I do not deny that there are architectural practitioners who turn out much lucrative work at five per cent., and a good deal less; and in their work is patent the very natural desire to do as little as possible for the money they get. But the architect and the architectural practitioner are widely different beings, and it is for the benefit of the former, and not of the latter, that this Association is maintained. The spirit that should animate the architect, in common with all artists, is not the commercial spirit of doing no more than is absolutely necessary to avoid reproach and reprisals for non-fulfilment of contract, but rather that nobler spirit that aims at reaching its own ideals, even if in doing so it gives more than was expected or bargained for. Satisfy yourself as well as your client,—

"To this own self be true,
And it must follow, as the night the day,
Thou canst not then be false to any man."

In designing a building, no matter how humble, ask yourselves two questions,—first, Will this please my client? secondly, Would this please the Visitors of the Class of Design?

Once fairly embarked upon the sea of architecture, the most vivid impression one receives is from its limitless extent. There may be an ultimate shore of knowledge to which the architect may attain in time, but it is far below the horizon at the outset; and not infrequently it happens that when the voyager has left land so far behind as to render return impracticable, the outlook becomes rather dreary, for retreat is difficult, and there is no goal visible. The best thing to do, then, is to keep your eyes in the boat. Pay heed to the handling of the craft, and she will carry you into harbour sooner or later. This magnitude of the outlook, this feeling that no knowledge comes amiss, is at once the despair and the joy of the architect. On the one hand, it induces a feeling that no length of life and no strength of memory are sufficient to acquire and retain the information which it may be essential for him to have at any moment; on the other, it assures him that no day need be wasted, no experience fruitless. Consider for a moment some of the calls that may be made upon him. He may have to design a church, which implies an acquaintance with a special form of ritual; or a chapel, which, while possessing many points in common with a church, should yet be conceived in a wholly different spirit. His next work may be a school, towards which a knowledge of religious architecture will help but little. To design a row of cottages, with appropriate arrangements and internal fittings, such as will draw forth the commendations of the inmates, implies a considerable knowledge of the habits of the poor; while a gentleman's house could never be fitly designed by one who had not mixed with gentlemen. These are but a few samples of work which might fall to any architect's lot. Other buildings would call forth even more varied requirements. A set of farm buildings, a range of stables, a bank, and a public-house, require a more intimate acquaintance with man and beast than any ordinary person would seek. Of course, much of this knowledge can and must be acquired by special effort as each case arises. It is really a matter of mastering your brief. But the knowledge must be acquired, and the more completely it is digested the easier will be the task and the better its results. I know a case of some swimming-baths where scarcely one of those concerned, including the architect, could even swim, much less claim to be a swimming man. The consequence is that all the small points of arrangement which go to make baths attractive are wanting. The brief had not been mastered.

An architect ought to be a man of wide sympathies, able to view things as much from the standpoint of others as from his own, able to throw himself into various parts as completely as an actor, and above all, perhaps, able to realise as he draws what will be the actual effect of his drawing in execution. All this he should be in his capacity as planner, that is to say, while reducing into working order the various points of the problem. In addition to this he must be able to clothe the result of his contrivance in fair outward

garments that shall appear well, not only in the elevations, but on the perspective too. And this implies a long course of study of architecture, as usually understood by amateurs,—that is to say, of the Five Orders, of the Arch, of Proportion, of Fenestration, of Rhythm, of Light and Shade, of Mouldings, and of all the other headings into which treatises on architecture are divided. But all these things, if not preceded by well-contrived practical arrangements, are but as sounding brass and tinkling cymbals.

But let us suppose that these matters have been taken into consideration by the arbiters of our youth's destinies, and that he feels that he has other qualifications for an architect beyond a great talent for drawing. What are his prospects for fitting himself for his work? It must be admitted that he is better off than his predecessors. The facilities for acquiring knowledge, at any rate in London, are increasing year by year, and the student of to-day has a more defined and easier path to follow than the student of thirty, twenty, or even ten years ago.

First and foremost among the brighter prospects is the renewed activity of the Royal Institute of British Architects. This body has an age and a prestige which necessarily weigh much with the public; and if it keeps pace with the times, as it bids fair to do under the new Charter, it will be an invaluable instrument in consolidating the profession, in training students, and in maintaining a high standard of professional honour and ability. The new Charter, gentlemen, will inaugurate a new era in professional matters. It is earnestly desired by all the best men, and should any persons take upon themselves to oppose it, they will find themselves out of sympathy with the ablest, and most influential and respectable part of the profession. But, to my mind, its most important action of recent years, and one which will have as far-reaching effects as even the obtaining a new Charter,—is the institution of the compulsory Examination. This, gentlemen, is the first step towards establishing a universal test of competency for all practising architects, and I earnestly beg you to support the movement heartily by passing the Examination yourselves, and doing what lies in you to induce others to do so too. First of all, it is a certificate of competency which must be of use in starting business on your own account. Then it helps the public to distinguish those who have had a recognised architectural training from those who merely slip into a practice, or endeavour to gain a spurious prestige by the addition of initials to their names, conferred rather as the mark of a subscription duly paid than of any architectural merit. All of which tends to the detriment of the architectural status generally, and to the confounding of good work and bad. Finally, the mere effort of going through an examination is of service to the student, as it helps to crystallise much knowledge hitherto in solution, and to show him where his strength and his weakness lie. The effort while the student-days are yet passing is a mere nothing, but when the active practice has begun it becomes a matter of difficulty to find the time amid the engrossing cares of responsible work.

To all young students of architecture I say,—Regard the passing of the Institute Examination as the first landing on the long staircase that leads to fame.

The means of preparing for this Examination are naturally of great interest to all of us, and first and foremost we may, without conceit, fairly place this Association. I do not intend to explain to-night the working of our various classes, nor to weary you with a repetition of what you can yourselves gather from the Brown Book; but this I may say, that among the brighter prospects of the present day we may certainly include the recent improvements in our course of education. But beyond this Association there are many other means of acquiring the knowledge we are in search of. There are South Kensington, the Architectural Museum, the very important series of lectures at University and King's Colleges, besides many other lectures given under various auspices in different parts of London. There is also the fine library at the Institute, a means of instruction too often overlooked, I fear. Last, but not least, there is the Royal Academy. Into the great question of the Academy and its shortcomings I will not venture; but this I will say, that through the veil with which that august institution shrouds its emaciated form,

there dimly shine neglected possibilities of an architectural training, which, if properly made use of, might go far to solve the difficult problem of how to become an architect.

I have touched upon some of the means by which students can prepare for the Examination of the Institute, and I confess to have done so less with the view of tabulating them for immediate use than of drawing a moral from them. And the moral is this,—that it is highly desirable that some more concentrated system should be established. It may be said that ample means already exist for the student to gain the information he wants, but how can he avail himself of them when they lie wide as the poles asunder, and occur with no due sequence of time? What is wanted is a definite, recognised course of study, to be followed in conjunction with office work, and to a large extent during working hours. It is not fair to students to expect them to work all day and then to apply themselves with unflagging energy to a serious course of study in the evening. There may be offices where pupils do not at all times get wearied with what is put before them to do. But there are also many offices where a day's work is quite as much as ought to be expected from a young man in a day, and from which he would issue in the evening not altogether fitted for making the best of further opportunities for study.

This question of concentrating the opportunities of education is, I am glad to say, now under the consideration of a committee appointed by the Institute, and we may hope before long to have valuable suggestions, not only how to make use of the existing multifarious and conflicting means of learning, but also, I hope, for a further departure in the direction of establishing a central educational agency.

So far, we have been considering these questions, consciously or unconsciously, as dwellers in London. It is to dwellers in London that the profession offers what instruction it has; outside of London there exist but few opportunities of acquiring knowledge other than by office work and private study, which, from lack of guidance, is often desultory and misdirected. But there must be something done for dwellers in the provinces. A better state of things would be brought about by some scheme of federation; but the lines upon which that federation should take place will require very careful consideration, and the question will have to be dealt with in a straightforward manner by persons who represent the whole profession and not merely its obscurest members. Affiliation of local societies with the Institute is another step in a good direction, and when once the profession has been bound together, further steps towards the establishment of a regular course of study and of examinations will become possible, and we may hope to purge ourselves of much that is incompetent, uncultured, and detrimental to the art we follow.

But, gentlemen,—and more especially young gentlemen,—there is no reason, because no regular highway to knowledge is yet formed, that we should not struggle manfully along such tracks as we have. Our present system of education is pupillage. Then, pupils, extract as much information from your principals as you can! Got to know the reasons for everything. I well remember how hopelessly I used to flounder about when I was a pupil, and to wonder whether I should ever learn the system upon which plans were devised, or under what circumstances one ought to use certain strengths of timber. Things became clearer after a time, and when I began to feel a real interest in the work; but for some years I felt that I certainly should never know enough to start work on my own account,—everything seemed so vague and shifting; but, then, I was taught in the country, and did not know even of the existence of the Architectural Association. These things I mention in case any beginner may be in the same plight. Stick to it, and the atmosphere will gradually clear. One way of learning is to do thoroughly what you have to do. Let every line you put on the paper have its mission. Have a reason for putting every door and window in one place rather than another. Think everything out as carefully as a move at chess; learn the meaning of every phrase in a specification, and put nothing in from one to another that is not applicable to the new work. By such means you will save yourselves much subsequent worry and many reproaches, and you will be spared the mortifi-

cation of hearing that your bedrooms have no wall-space for the bed or your drawing-room for the piano, or that you have called for extravagant work in a cottage, where every half-penny has to be saved. Depend upon it, the three qualities of thoroughness, exactitude, and neatness, though they will not make an architect, will go far to help an architect to live. There is no doubt that the pupil, if he means to get on, will have to devote much of his leisure time to acquiring those branches of knowledge which he cannot pick up in the office. But this need not necessarily be always an irksome task, for the range of subjects to be mastered is of such extent that one can generally find relaxation in change of work. Nevertheless, it is well for the beginner to realise that the task of learning to be an architect is a more serious matter than learning to be a doctor or a lawyer, and calls for a greater sacrifice of the amusements which are the birth-right of youth. It is my desire to see this changed, and to enable pupils to devote part of their ordinary working hours to the pursuit of such learning as cannot be picked up in the office; and our present system of architectural education is little better than a long-continued course of "picking-up."

There is no doubt that a thoroughly good school education is of great benefit to an architect. He comes in contact with so many classes,—the well-to-do and the cultivated, as well as the unlettered and the ignorant,—that a liberal education is of the first importance; and I would urge all concerned not to cut short the school career of the destined architect, but to ensure his obtaining a wide general knowledge before he devotes his attention to the special branches more particularly relating to his profession. The proper study of architecture implies as wide and general culture as a university education, and will, I hope, some day convey as much prestige.

But, gentlemen, we will suppose the preliminary stages past, and that our young architect is launched into independent practice. Do his difficulties cease, or are the days of his learning numbered? No more, all love tales to the contrary notwithstanding, than does the interest of ordinary life end with marriage. With the elation of independent practice comes also the burden of responsibility. The most careful design will sometimes be spoiled by bad workmanship, and the honey of forethought in plan and beauty in elevation will be turned into the gall of failure through the uncontrollable carelessness or dishonesty of others. All the mistakes which might have occurred but did not, owing to the care of the architect, are either never known or forgotten, while the one failure which is not his is remembered against him for years. Then, again and again, will come the difficulty of deciding whether in different work is had enough to condemn, or whether it may be passed with a reprimand. A cantankerous client or a stupid workman will contrive to poison the streams of life for days together.

But there is a reverse side to the medal. If there are worries which gnaw there are also joys which heal. A fine, full life is that of the architect, too diverse to be monotonous, too full of important decisions to be dull, and while the consciousness of power is elevating, a reflection on the permanence of its effects is sufficiently sobering. With such varied interests to serve he can hardly be other than broad and liberal in his views. He will hardly be so bigoted as to decline to build a place of worship for another sect than his own, or so fanatical a politician as to refuse to be concerned for a club of the opposite party. To him the desire to produce a building well adapted for the purposes it has to serve supersedes all other considerations: his art is first, his politics second.

And when he quits the shadow of his office, and seeks a respite from his cares, his own art still offers him the choicest pleasures. Where can repose be more surely found than in the long-drawn aisles of some cathedral, or amid the lichen-covered walls of some ruined mansion? To him, beyond all men, are revealed the mysteries of ancient buildings. He can read where others only stand and wonder. To him the sequence of time in pier and arch and roof is obvious at a glance. He learns the story of a building from its stones. Carving, which to others is merely a quaint puzzle, reveals to him some notable fact in the sequence of events which brought the building there. The dead speak to him from their tombs, and

write their history for him on their painted shields. In him the wayward enthusiasm of the amateur for antiquity is sobered by knowledge gained from modern work, and it is often his lot to listen with humorous sadness to the monotonous story of the verger. From the calm precincts of the cathedral he may go to the calmer lawns of some ancient house, where, amid the scent of flowers and the rustling of stately trees, he may learn the lesson of design, and fill his soul with a sense of noble beauty, which, transmuted and transformed, will find its way into the buildings of to-day, and help to stamp the architecture of our time with a fitness, a power, and an originality, such as architecture has not seen for two centuries.

[Some notes of the discussion which followed will be found on another page.]

MANCHESTER ARCHITECTURAL ASSOCIATION.

The twelfth session of this Association commenced last week, when a *conversazione* was held.

The President, Mr. Lawrence Booth, delivered an address, in the course of which he said that the coming year would be made memorable as the jubilee of her Majesty's accession. While no half-century could show such a record of real progress as the fifty years covered by her Majesty's reign, they as architects would probably be subject to the outside reproach that architecture as a fine art, distinct from the more general application of the term art, had not been enriched by the evolution of any new style that could with propriety be called the Victorian. Unless the "crystal" or glass-and-iron system of construction could be dignified by such an appellation, of which it could hardly be said to be worthy, they must accept the reproach for what it was worth, always remembering that the true principles of art were "not for an age, but for all time," and could not be invented like a new machine or those thousand and one industrial appliances which in the aggregate had conferred innumerable blessings on the people. Both the possibility and desirability were indeed debatable questions; and whether in what architects had been privileged to do there were any of the germs of a new style time alone could determine. Those who were still engaged on the work were too near it to comprehend its proper proportions. It might, however, be fairly claimed for the Victorian era that, owing in a great measure to the initiatory efforts and fervid eloquence of the elder Pugin, it had seen the revival of Gothic architecture; the resuscitation, for what it was worth, of the "Queen Anne" style; and now they were in the throes of a struggle for the reintroduction of the so-called Jacobean. Concurrently with these efforts much that was best in the ancient styles of architecture has been faithfully adopted to the modern and diversified requirements of an exceptionally progressive age. Without wandering far afield for examples, the warehouse architecture of Manchester might be cited in evidence. Given the same atmosphere and other favourable conditions, there were streets in our city whose architecture was not unworthy to be compared with that of ancient Venice. But probably the architect of the period would prefer to base his credentials on the utilitarian and hygienic character of his work,—the utilisation of such materials as cast and wrought iron and concrete; terra cotta, both as tiles and solid building material; glass at its wonderfully reduced cost and in its almost unlimited capability of adaptation; and even such articles as india-rubber and paper for constructive purposes. These, together with a host of "inventions" which the architect could for the most part only claim the credit of having adopted, had almost transformed the utilitarian character of modern buildings. In all the essentials to comfort, to a healthy and therefore a prolonged existence, the pauper of to-day was better housed than was the peer of fifty years ago,—an assertion not less true than startling. Between these two extreme representative members of society there were others for whom much required to be done, and the architect of to-day was a willing co-operator in the good work. Aided, and sometimes, he was sorry to say, thwarted, in his efforts by the numerous local sanitary authorities dotted all over town and country, he was actively engaged in the most beneficent

branch of his profession, letting in light and air on thousands who had not hitherto had their proper share of two of heaven's best gifts. There was on such matters still much hesitation to be overcome in places where it should be least expected, and only the few had the full courage of their opinions. He trusted that in the arrangements for the illustration of architecture in the Jubilee Exhibition there would be the opportunity afforded of showing hygienic and utilitarian as well as artistic progress. Some disappointment, founded on the casual reading of the prospectus and the regulations, had been experienced at the apparent omission of provision for the display of architectural work; but he was happy to say on the best authority that there had not at any time been such an intention on the part of the promoters, and he hoped his professional brethren would be well to the front in the display of what architects had done and were doing for the general good.

A vote of thanks to the President for his address, proposed by Mr. Alderman Bailey, was heartily accorded.

GLASGOW INSTITUTE OF ARCHITECTS.

THE annual meeting of this Institute was held on the 19th inst., Mr. James Sellars, President, in the chair.

Mr. Maclean, the Secretary, submitted the eighteenth annual report, which stated that the Burgh Police Health (Scotland) Bill had again occupied the attention of the Council. In the beginning of this year it was thought desirable, in view of the probability of the Bill being again brought before Parliament, to continue the efforts formerly made by the Institute to get the building regulations eliminated from the Bill and embodied in a separate Building Act applicable to the whole of Scotland. For this purpose a committee, consisting of the President, Mr. John Honeyman and Mr. James Thomson, past Presidents, was appointed. The committee brought the subject before the Edinburgh Architectural Association, and requested their co-operation in a further representation to the Lord Advocate. The Edinburgh Association was found to be in entire sympathy with this Institute in its past and present efforts, and they sent a memorial to the late Lord Advocate praying that the building clauses of the Burgh Police and Health (Scotland) Bill be embodied in a separate Bill. A similar memorial was sent to the late Lord Advocate from the Institute, and a reply was received to the effect that the views expressed in the memorial would receive careful attention. The Bill had, however, been dropped in consequence of the late dissolution of Parliament, but a new Bill would probably be introduced in the present Parliament, and the Council hoped that the Institute would continue to press the views they had held and advocated so long. It was a matter of great satisfaction to them to be able to say that their views had now the active support of the Edinburgh Association; and, further, that they were now approved and supported by the Glasgow municipal authorities. For the encouragement of students in the Glasgow School of Art it was recommended that a sum of 74. 10s. be given, the sum to be divided into two prizes of 51. and 24. 10s. respectively, under the following conditions:—That the prizes be named "The Glasgow Institute of Architects' Prizes" and that they were awarded (a) for the best set of four drawings of architectural ornament drawn from casts in the School of Art; (b) the best set of at least four measured drawings from existing buildings; (c) the best set of lecture-notes on building construction. The report also contained a letter from Mr. John Shields, one of the trustees for the Alexander Thomson Memorial, in which he stated that he expected, that at Martinmas, 1887, the sum of 751., or thereby, would be available for the prize in the first competition. One of the conditions of the trust is that the studentship or prizes shall be awarded for the furtherance of the study of ancient Classic architecture, as practised prior to the commencement of the third century of the Christian era, and that the prizes shall be awarded by competition every third year.

Mr. T. L. Watson (Treasurer) submitted the financial statement, which showed a balance in hand of 2677. 15s.

The President, in moving the adoption of the annual report, said, "They were still endeavour-

ing to convince the Imperial authorities, although with only moderate success, that building regulations should be the subject of a separate Act, instead of being mixed up with the Police Acts. The deputations and memorials had always been courteously received or acknowledged, and then apparently forgotten. The last time the general Bill was introduced by the late Lord Advocate it still contained the building regulations to which they so strongly objected as being in themselves inadequate and incomplete, and altogether out of place in a Police Bill. The recent changes in the Government had been in their favour. The legislators had had weightier matters to consider, and the Burgh Police and Health (Scotland) Bill had been brought up, only to be dropped again and again in past sessions of Parliament. The delay was a gain to the Institute, and they need not, however, be discouraged. For some years their local legislators were apparently quite indifferent to the Institute's representations on the subject, but recently they themselves memorialised the Government in favour of a separate Building Regulation and Health Act. Some further progress had been made during the year in the direction of improving the rules for the measurement of artificers' work. Their representatives, along with the representatives of the Institute of Measurers and the Master Wrights' Association, had been engaged on the new rules for measuring wrightwork, which were now nearing completion. The rules for other departments of work would soon be before them also, and probably during next year new and improved rules would be prepared for the measurement of every description of work connected with buildings. When that was done a good and useful work would have been accomplished. Another matter to which he would call their attention was the proposed revision of the articles of association and table of fees. Experience had shown them that both were in need of amendment, and he trusted the committee would proceed with their work energetically, and that the result of their labours would be to amend the articles of association in the required direction, and to arrange the table of fees on a more equitable basis than it was at present. There was just one other matter in the report to which he need refer, viz., the Institute prizes, competed for at the School of Art, and the Alexander Thomson Memorial Travelling Studentship. Architectural students in Glasgow had no great facilities for training in their profession outside of their offices. They deserved the utmost credit for the work they did in their own association, but they needed both encouragement and help in their studies, and they were entitled to look to the Institute for aid. He was quite sure the Institute would be willing to continue and increase the prizes offered at the School of Art, and thus co-operate with the committee of that admirable institution in their desire to raise the status of architectural education in Glasgow. The Alexander Thomson Memorial Travelling Studentship should do much for the encouragement of architectural students in Glasgow and elsewhere, for the competition was open to every student in the United Kingdom. The sum available every third year would be about 751., and it would be paid to the successful competitor to enable him to study the best architectural work in this country or abroad. The terms of the competition would be issued very soon, and the benefits would be enjoyed by the successful competitor during the summer of next year. Glasgow hardly knew the artistic treasures it possessed in Mr. Thomson's works. It was to a great extent true of Alexander Thomson that a prophet was not honoured in his own country, and that a man was seldom known till he was dead.

The report was adopted.

On the motion of Mr. A. G. Thomson, the following gentlemen were appointed members of Council:—Messrs. Alex. Skirving, Wm. F. McGibbon, Jas. Sellars, J. J. Burnet, Hugh Barclay, Wm. F. Salmon, John Gordon, T. L. Watson, David Thomson, Jas. Thomson, and H. H. McClure.

At a meeting of the newly-elected Council held immediately afterwards, the following office-bearers were elected:—President, Mr. David Thomson; vice-president, Mr. H. H. McClure; auditor, Mr. John Burnett; treasurer, Mr. T. L. Watson; and secretary, Mr. Wm. Maclean.

PRACTICAL CLASS OF MASONRY.

ON Tuesday evening last the new class for the study of practical masonry and the science of stonecutting, recently formed under the auspices of the Architectural Association, assembled for the first time at the Central Technical Institute at South Kensington.

Mr. Lawrence Harvey, a former student of the Zurich Polytechnikum and the Ecole des Beaux-Arts at Paris, has kindly undertaken to give the benefit of his knowledge and experience to the class gratuitously as instructor, and in his introductory lecture he explained the objects and importance to architects of this branch of study, for which there has hitherto been no opportunity in this country, though it forms an integral part of the curriculum of most Continental schools.

The *modus operandi* which he proposed was to select a small number of the senior students, —say ten,—to form the first class, whom he would instruct himself; and they in turn would act as teachers to the subsidiary classes (though he promised to attend these also), which would meet on alternate Tuesdays with the senior class, and they might again act as teachers to others if the numbers increased sufficiently; the object being to make every man a teacher as well as a learner.

Mr. Harvey further explained that the usual method adopted in the study of this subject was to begin with a course of descriptive geometry; but he preferred to start with the more practical and useful part, viz., the method commonly employed by masons at all times in setting out and cutting the variously-shaped stones in a building, and he argued that by beginning at the more interesting stage of the question many would thereby be attracted who might otherwise "fight shy" of the dry bones of abstract definitions. This part of the subject might be studied with advantage privately.

The class would begin by making drawings of the various stones in a given design, and they would then be instructed as to the manner in which a mason would set out his work preparatory to cutting it, after which they would proceed to cut the stones themselves (a special composition being provided for the purpose), and finally a model would be built up of the various pieces to ascertain that they all fitted accurately in their places. This process would be repeated for plain ashlar, arches of various descriptions, capitals, &c.

The lecturer concluded by assuring his audience that after a practical course of this description many difficulties which they might have hitherto experienced in the scientific projection of mouldings, the forms taken by vaults in various positions and the intersections of the same, the jointing and bonding of masonry, and numberless other small matters too numerous to mention, would disappear; and he confidently anticipated in the future that the foundation of such a class as this would show itself in the more workmanlike manner of preparing working drawings by those who had been members of it.

A few words from Mr. Arthur Cates and Mr. Robins, on the importance of the subject to students, and urging them to take advantage of the facilities now offered for the first time, brought the proceedings to a close.

BUILDERS' CLERKS' BENEVOLENT INSTITUTION.

THE election of two pensioners and one orphan took place on Tuesday evening last, the 26th inst., at the offices of the Institution, 21, New Bridge-street, Mr. George Haward Trollope, the President, in the chair. There were three candidates for the pension, and the following was the result of the polling, viz.:—Edward Leconte, 586 votes; Eliza Mackness, 334 votes; and Louisa Hadri, 108 votes. For the benefits of the orphan fund there were likewise three candidates, the voting being, for Lizzie Chapman, 569 votes; Alice Rhoda Friend, 349 votes; and James Alfred Kelly, 88 votes. The chairman therefore declared that Edward Leconte and Eliza Mackness had been duly elected pensioners on the Relief Fund (the pension in the former case being 25s. per annum, and in the latter 20s. per annum); and that Lizzie Chapman had been duly elected to the benefit of the Orphan Fund, this consisting of admission to the Orphan Working School per presentation of the Builders' Clerks' Benevolent Institution.

At the close of the election the services of the scrutineers, Messrs. Thos. Stirling, T. F. Rider, and B. C. Fox were warmly acknowledged.

A cordial vote of thanks was also given to the President, who spoke of the gratification it had afforded him to be present and to take part in the work of so useful a charity.

CARLYLE MANSIONS
CHEYNE WALK, S.W.
for
Messrs. Sandon Brothers



— THIRD FLOOR PLAN —

Illustrations.

ST. SAVIOUR'S CHURCH, HANLEY ROAD, HOLLOWAY.

THESE are the exterior and interior perspectives of the design selected in competition, under motto "Easter Eve, 1886," a note of which appeared in our number of July 3rd, p. 37.

An iron temporary church covers the ground at the west end (up to the west wall of the nave), which is not to be interfered with at present, so that the ground available to seat the number required, i.e., 700, is confined. The narthex, tower and spire, and parish room are to be added at some future time.

The church is to be faced on the exterior with red bricks, with bands, strings, window-cills, tracery, and labels of Bath stone. The interior will be plastered, with arches, strings, quoins, &c., of red brick. The pillars will be of Portland stone, and the remainder of the stonework of Bath. The roof will be boarded above the rafters and covered with slates. The seating will be of oak, and the passages will be tiled. The church abuts at the east end on houses, so it is intended to put blank arcading, in place of a window, to be filled in with colour decoration.

The church committee have sanctioned sundry additions and improvements (suggested by the architect) to the original design, making the estimate for the first portion of the church, viz., nave, chancel, aisles, and vestries, — 5,500l.

The building is to be commenced in the spring. Mr. J. P. Cutts (Messrs. J. E. K. & J. P. Cutts) is the architect.

CARLYLE MANSIONS, CHEYNE WALK, CHELSEA EMBANKMENT.

UPON a site in Cheyne-walk, Chelsea, overlooking the gardens of the Chelsea Embank-

ment, there has just been erected a pile of residential chambers to be known as Carlyle Mansions. They are within a stone's throw of the residence of the late philosopher, and overlook the statue erected to his memory.

The buildings, of which we give an illustration, are fireproofed on all floors.

The fronts are of red brick with Portland stone dressings, and freely treated with stone and brick carving, of good execution.

On the flank wall the blank windows have been treated as panel pictures in stone relief, with various selections from Æsop, and other designs.

Each flat, of which there will be twenty-four, consists of two sitting-rooms, five bedrooms, kitchen, scullery, stores, bath-room, &c., and tradesmen's lift.

In the staircase, in which a feature has been made of a wrought-iron grille railing, by Messrs. Starkie Gardner, & Co., a passenger lift, by the American Elevator Company, is fitted, which will give access to all floors.

The premises have been erected by the proprietors, Messrs. Sandon Brothers, of Mark-lane, from the designs and under the superintendence of Mr. W. Seckham Witherington.

"GREAT ASSEMBLY HALL," MILE END-ROAD, E.

THIS forms part of the buildings which have been designed and erected for the purposes of the "Tower Hamlets Mission."

It joins, and is in conjunction with the front buildings to the Mile End-road, which were opened in November, 1884.

It is arranged to accommodate nearly 5,000 people, having two large galleries above the ground-floor space.

The hall, including the platforms and orchestra space beyond, is 130 ft. long by 70 ft. wide in the clear, and of an interior height of 44 ft. The galleries are of a good height, and

the method of seating is such as to enable the furthestmost sitters to obtain a view of the speaker. These galleries are approached by four spacious staircases of fireproof construction, and the exits throughout are numerous and convenient.

The three entrances from the Mile-End-road lead into the octagonal entrance-hall, which is designed to be used for small meetings, or as a lecture-room. It is lighted from above, and is 44 ft. each way, by 34 ft. high. There are doorways into the "coffee palace" and "book saloon," and three large entrances into the great hall.

The building is lighted by day from windows ranging on each side, with clearstory windows over the galleries, beneath the flat ceiling, breaking the line of the coved sides. The ventilation throughout has been well considered, and is very satisfactory.

The heating is by an improved system of hot air by Messrs. Constantine, of Manchester.

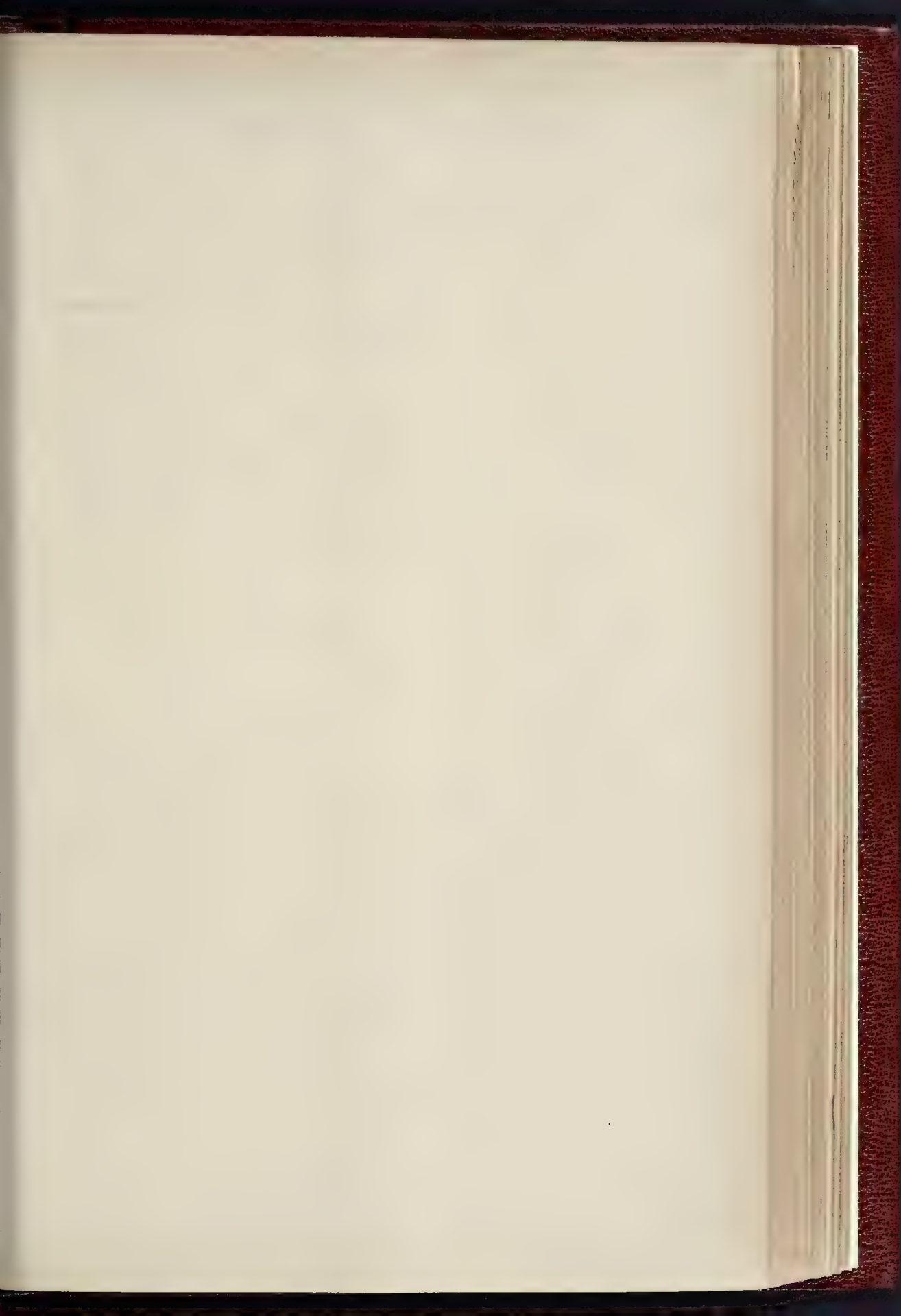
The lower and upper platforms with the choir space behind terminate with a great organ by Messrs. Bevington & Sons, and there is a large class or committee room beneath. Groups of angels in the act of praise form a bas relief over the great arch which encloses the orchestra, and a curtain with a representation of the "Sea of Galilee" and the "Feeding of the Multitude" is an appropriate finish when the organ is not in use.

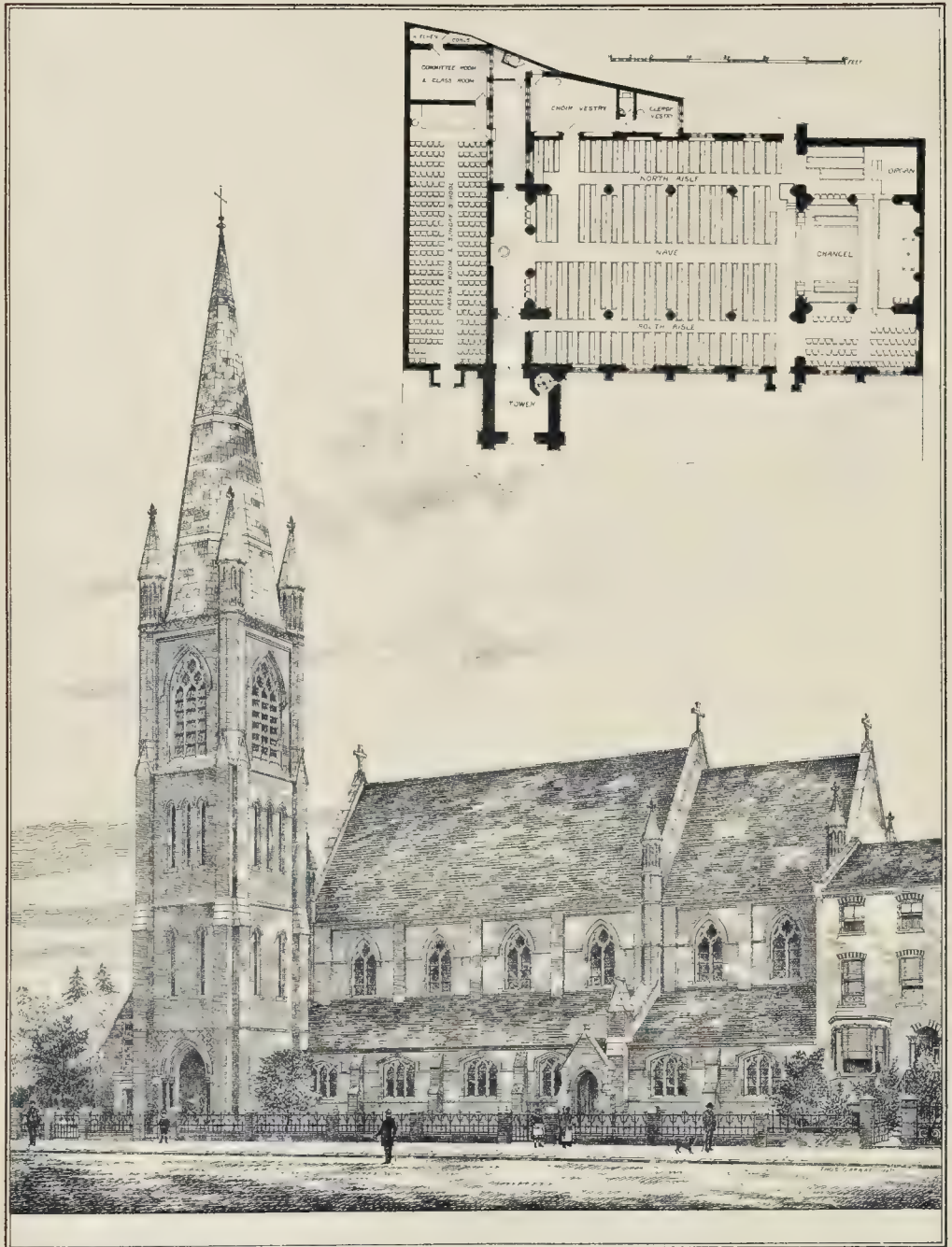
The architecture has been purposely kept very simple, utility being the object, yet it is an effective building well adapted to its purpose. The decoration in warm orange and browns imparts an impression of comfort with grateful relief to the eyes.

The contractors were Messrs. Lawrance & Sons, of City-road. The clerk of the works was Mr. W. Stanley.

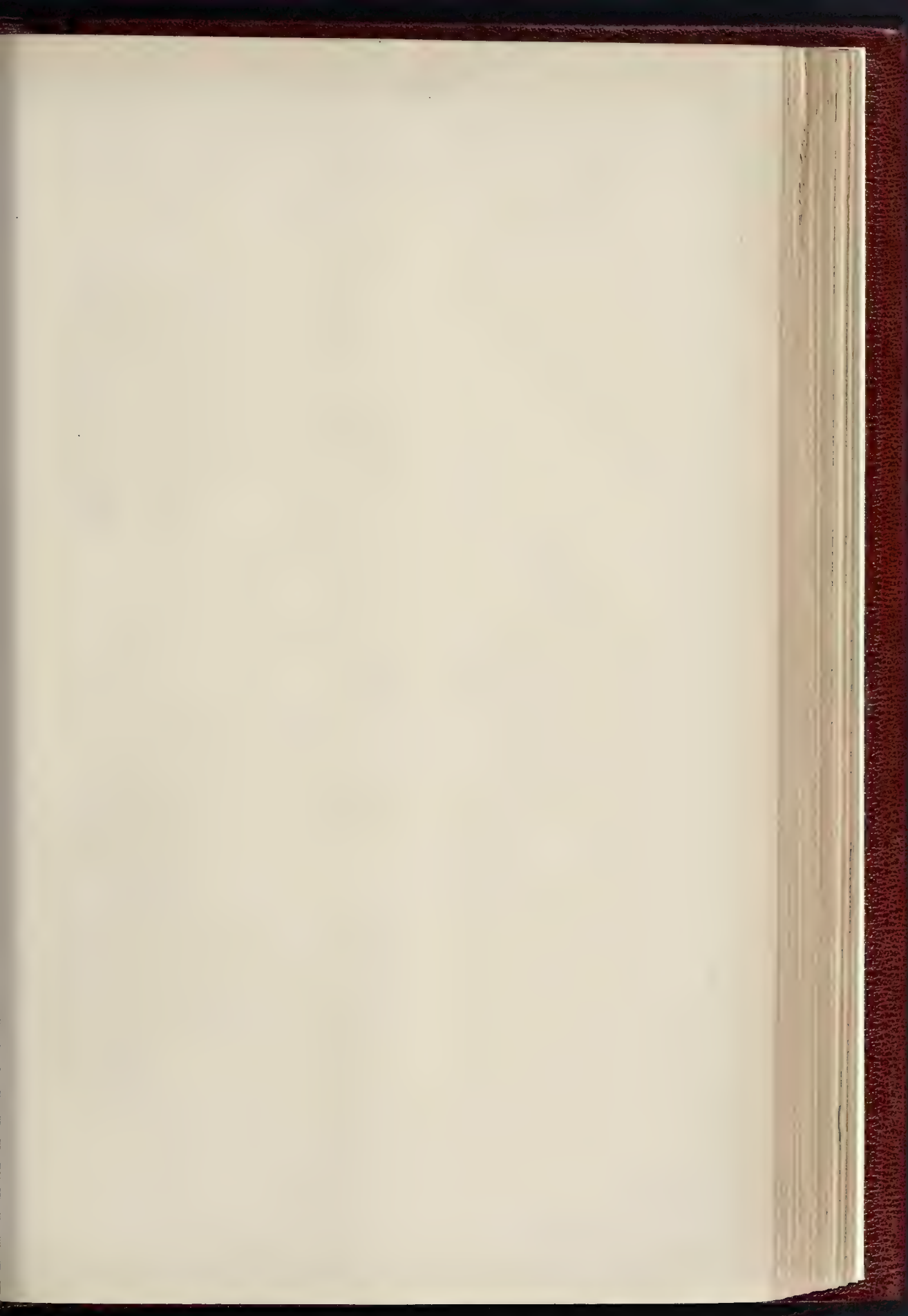
The architects were Messrs. Boulnois & Warner.

The building was erected between May, 1885, and February, 1886.

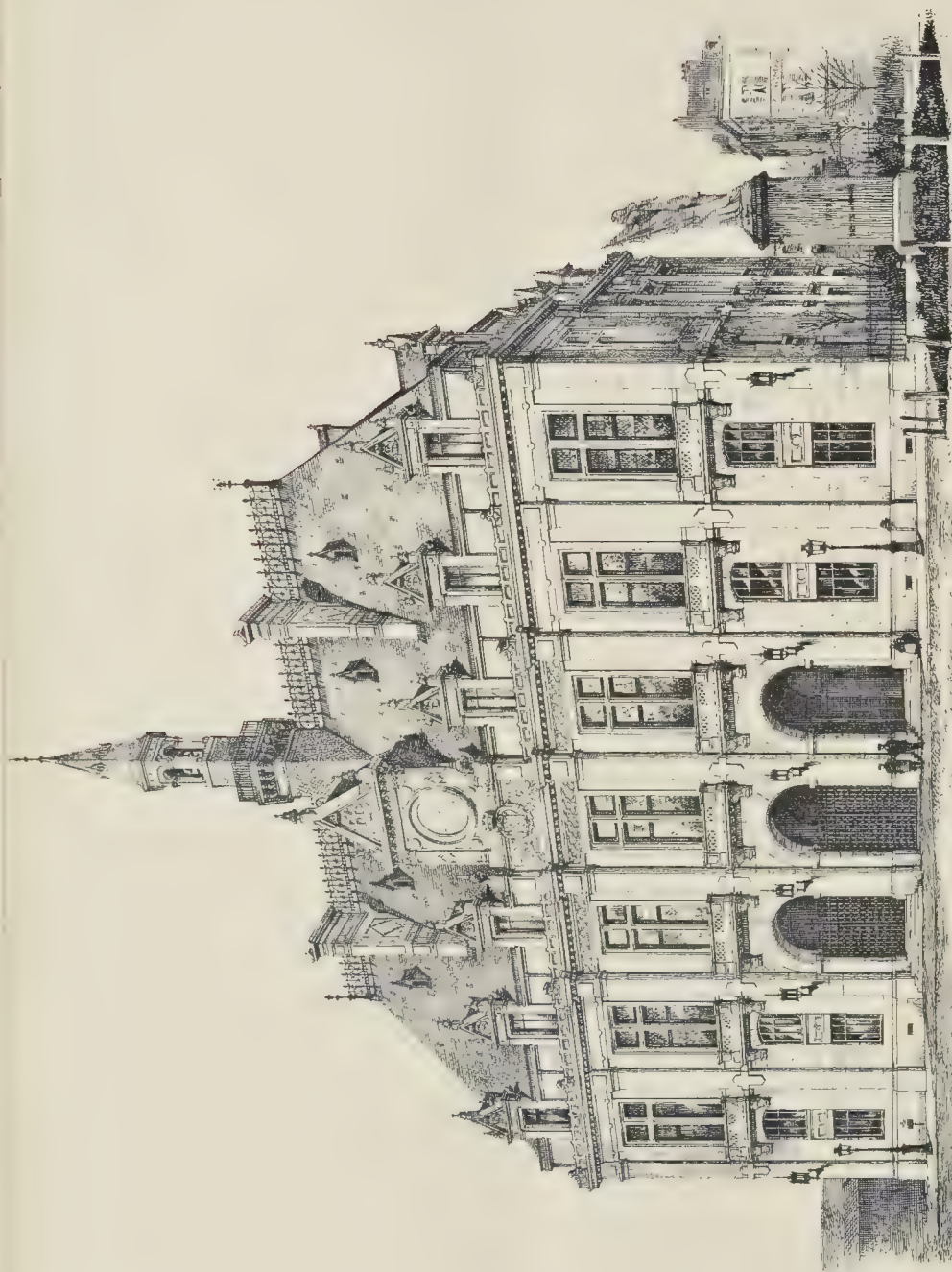




SAINT SAVIOUR'S CHURCH, HOLLOWAY.—MR. JOHN P. CUTTS, A.R.I.B.A., ARCHITECT.

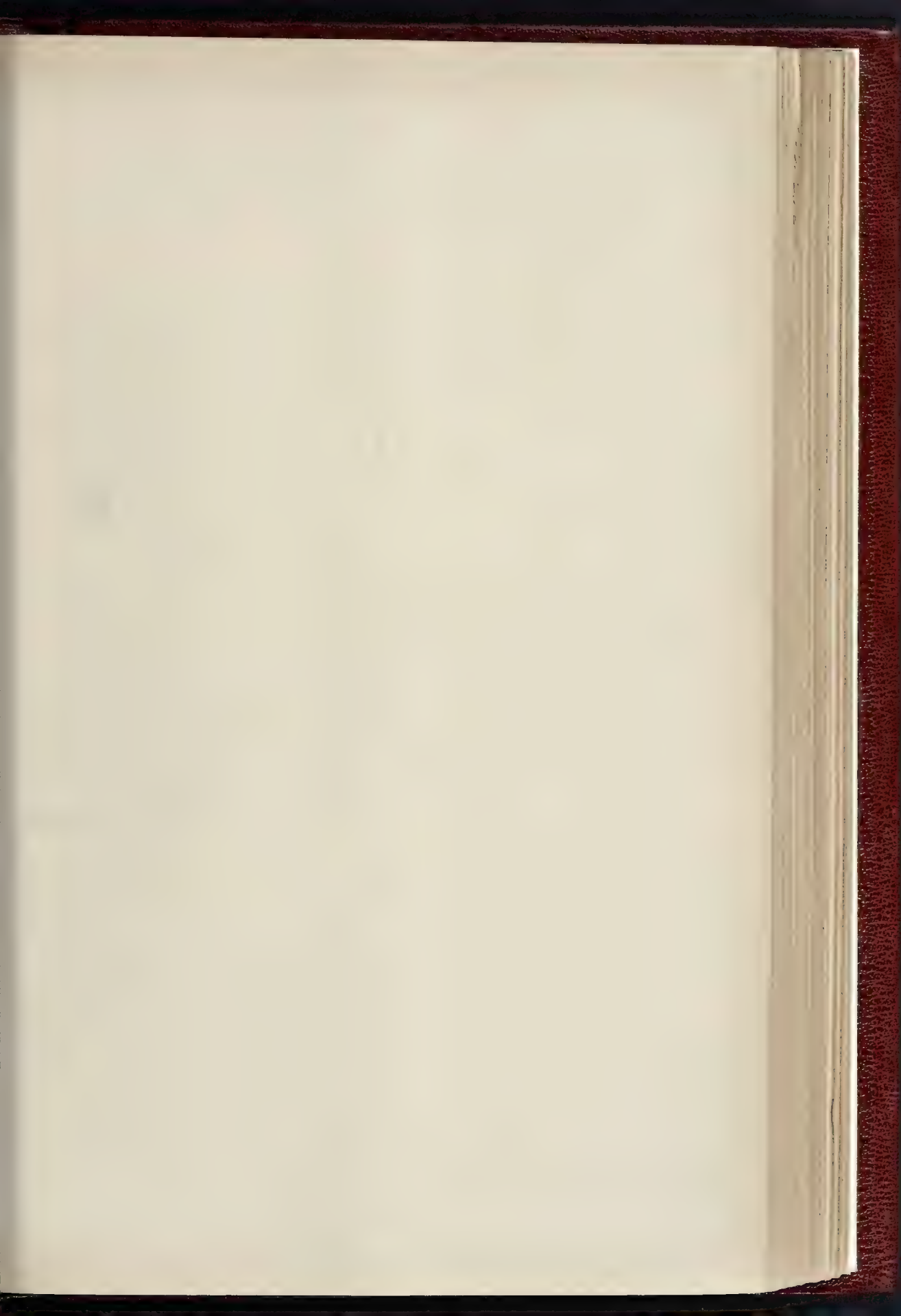


THE BUILDER, OCTOBER 30, 1886



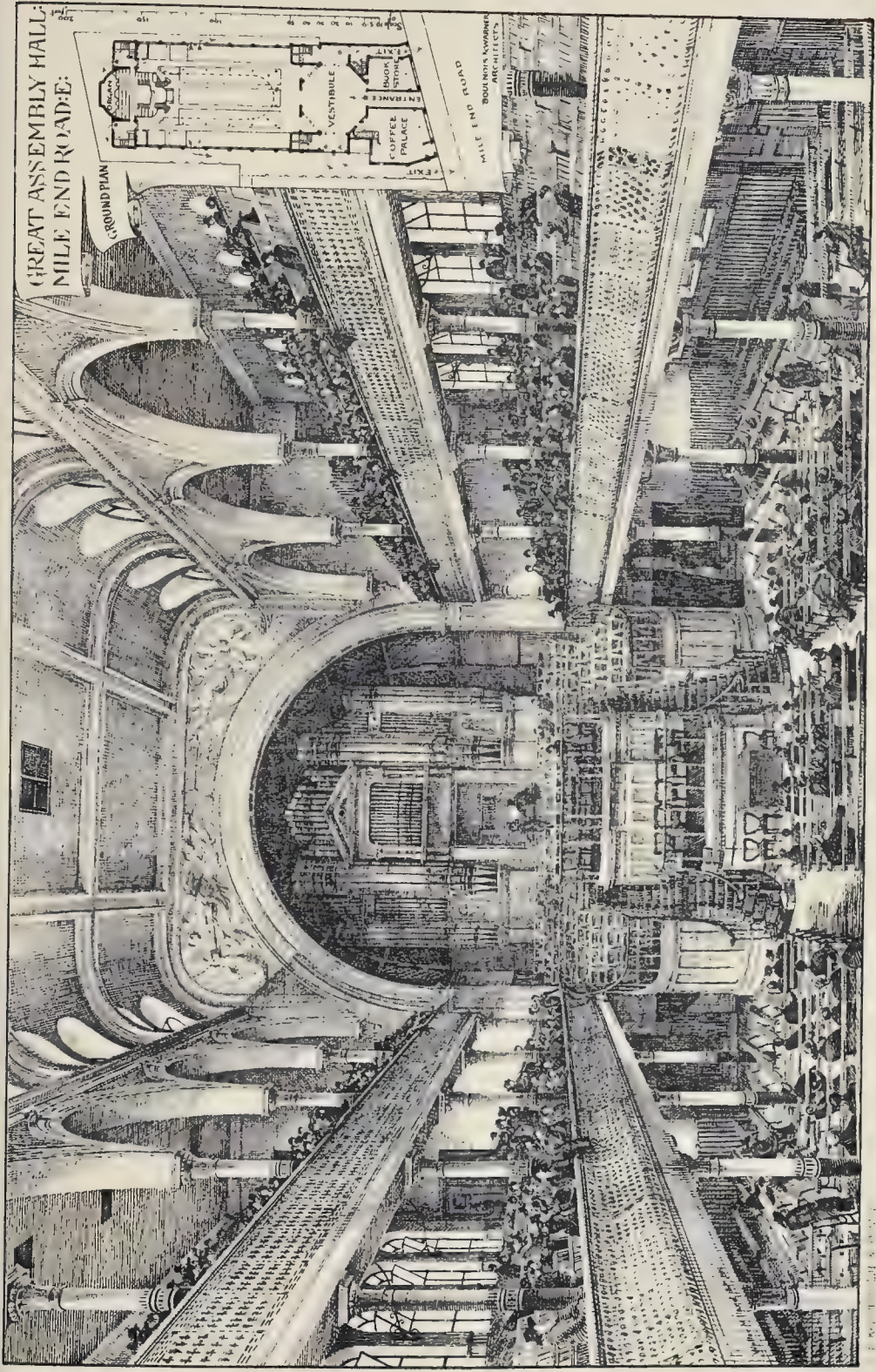
PROJ. ET ARCHT. M. PAUL LANNAUD. PARIS. 1886.

NEW MADEIRA ST. DENIS — M. PAUL LANNAUD ARCHT.



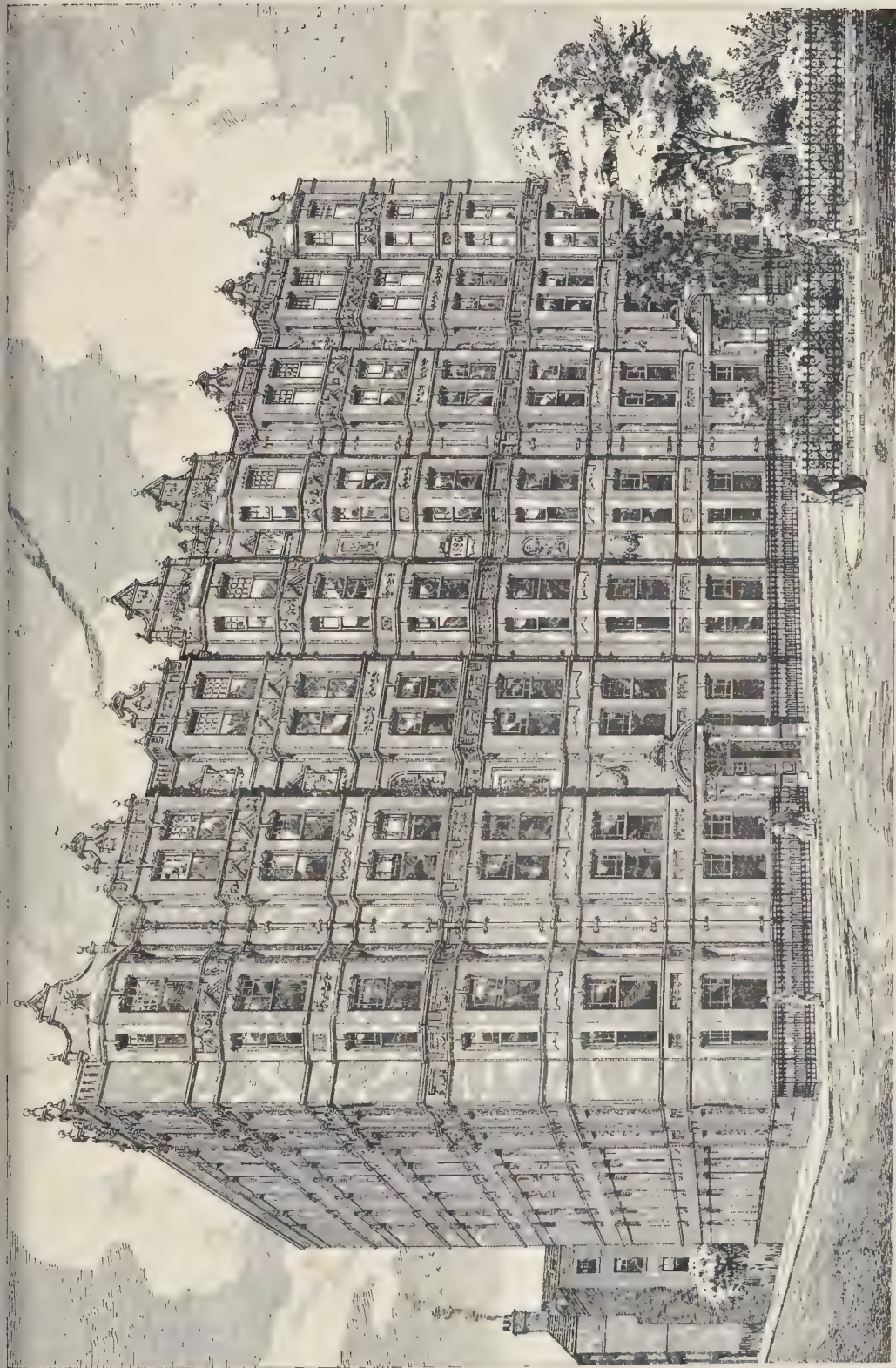
This is a detailed black and white architectural line drawing of the exterior of the National Congress Building in Chicago. The drawing is oriented vertically on the page. It depicts a grand, multi-story classical building. The central feature is a large, prominent dome topped with a lantern. To the left of this main dome is a smaller, similar dome. The facade is characterized by numerous windows, many of which are arched and grouped together. There are several entrances with ornate pediments and columns. The building's design is highly detailed, showing architectural elements like cornices, balustrades, and decorative carvings. The drawing is a technical representation, likely used for architectural documentation or publication.

COMPETITIVE DESIGN FOR THE BIRMINGHAM LAW COURTS.—MR. R. STARK WILKINSON, A.R.I.B.A., ARCHITECT.



THE GREAT ASSEMBLY HALL, NILE END ROAD.

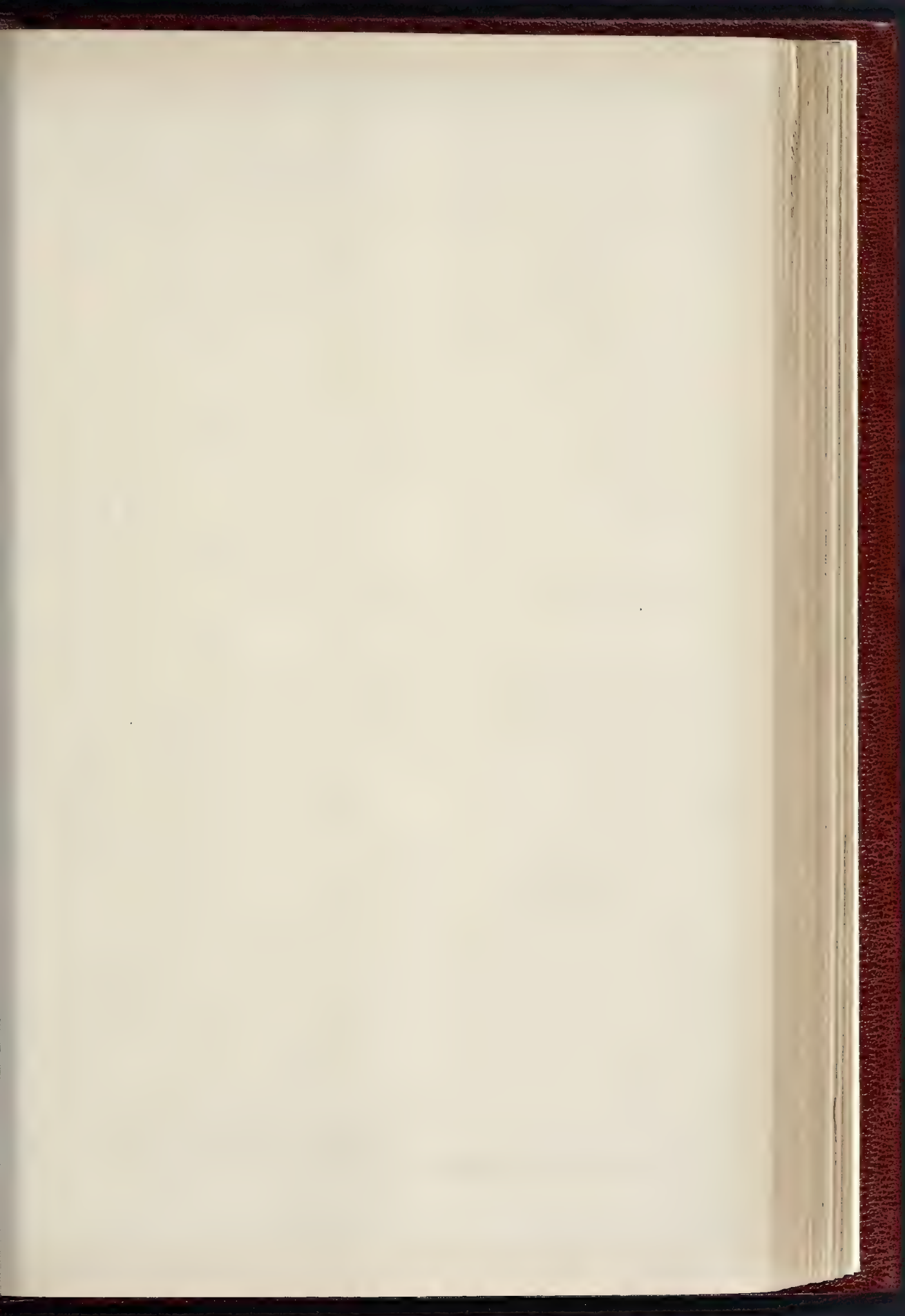
THE BUILDER, OCTOBER 30, 1886.

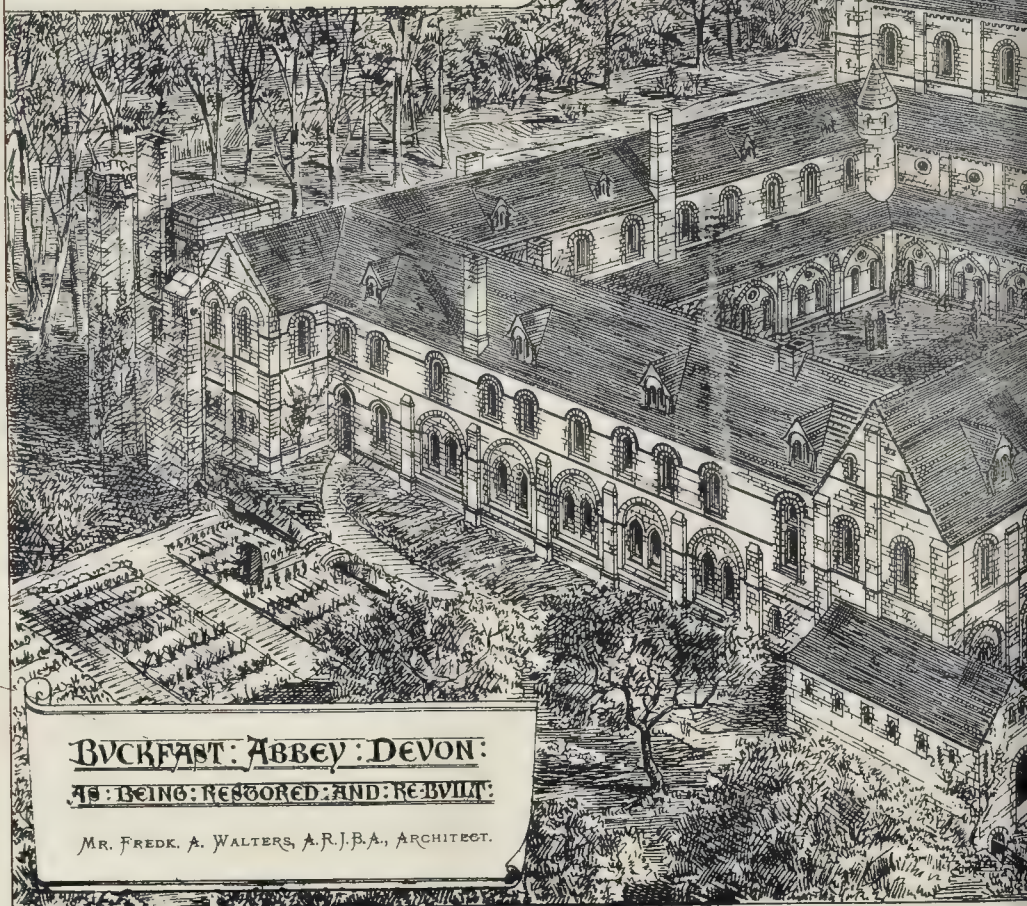
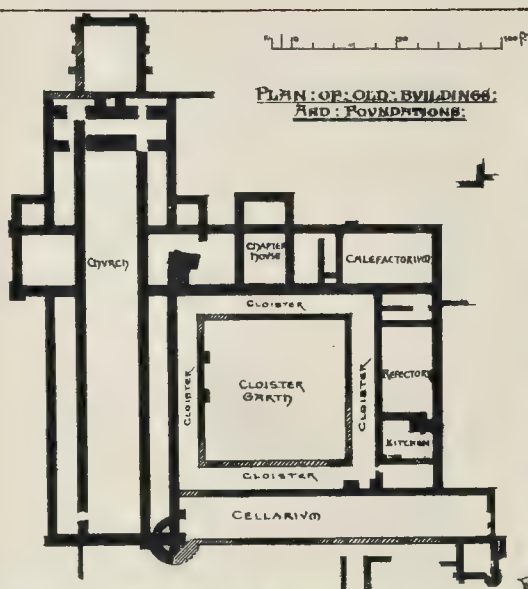


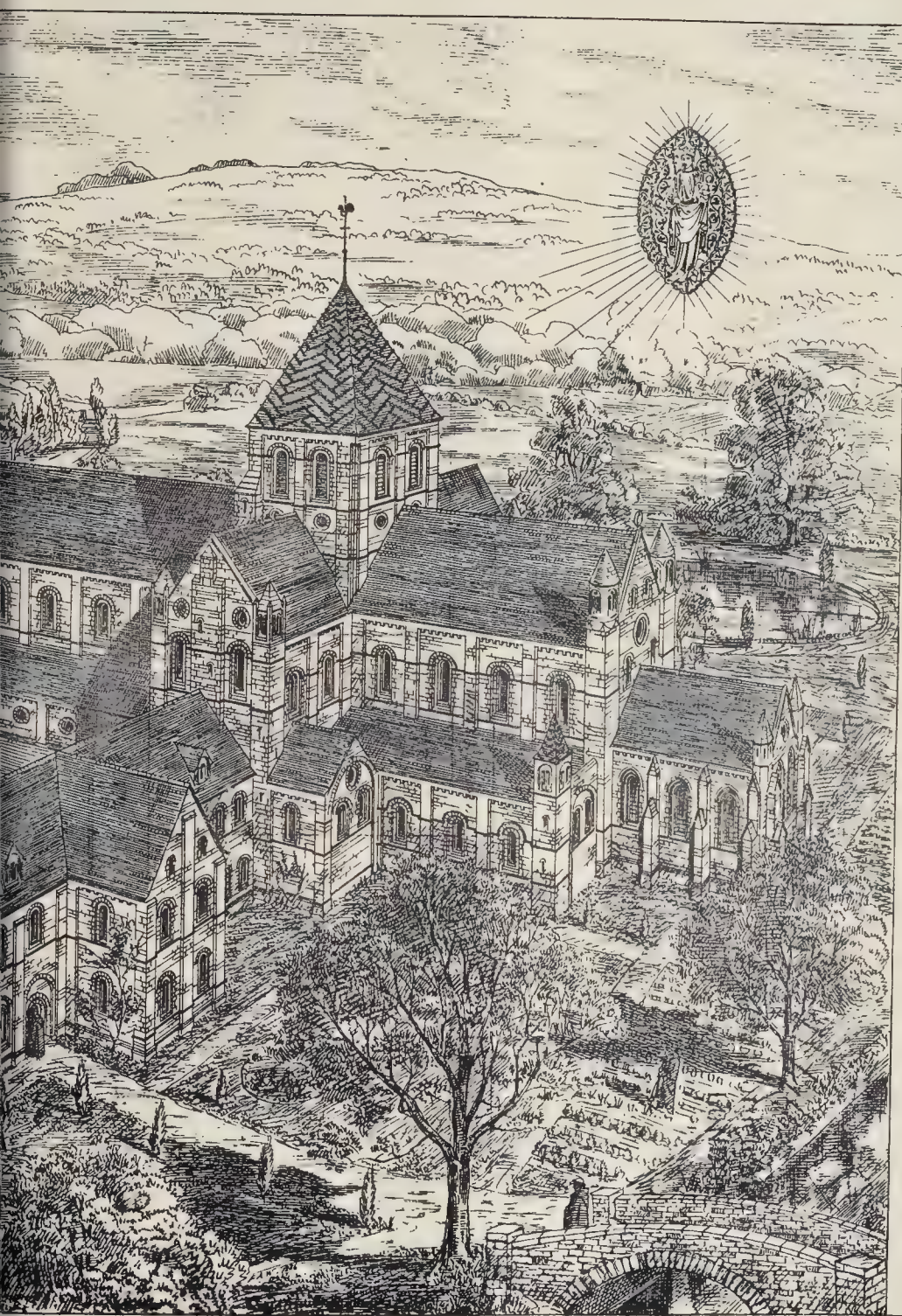
CARLYLE MANSIONS, CHEYNE WALK, CHELSEA EMBANKMENT.—MR. W. SECKHAM WITHERINGTON, F.R.I.B.A., ARCHITECT.

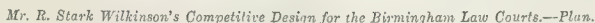


SAINT SAVIOUR'S CHURCH, HOLLOWAY.—MR. JOHN P. CUTTS, A.R.I.B.A., ARCHITECT.









SOME four years since, the site of this once important Cistercian abbey was purchased by a community of Benedictine monks from France. Almost the whole of the old monastic buildings had disappeared, with the exception of the four-storied tower at the south-west corner of the cellarium, supposed to have been the residence of the master of the lay brethren, while a modern residence had in 1806 been built on part

of the site, out of materials from the ruins. With the assistance of a restoration committee, under the presidency of Lord Clifford of Chudleigh, the monks, shortly after their arrival, took in hand the gradual reconstruction of the abbey strictly upon the old lines. The foundations of the whole were traced and opened out, and up to the present time the portions completed consist of the whole of the south side and part of the west side of the quadrangle, including the restoration of the old tower. The latter is of Perpendicular character, and is remarkable for having three latrines, one above another, in very perfect order. The other buildings appear from the remains to have been of Transition Norman character, and the new work has all been carried out in this style. The abbey is one of the most ancient foundations in Devonshire, and existed as a Benedictine house in the time of King Edgar, while in the time of Edward I. the monks boasted of holding some of their lands by grant of King Canute. In 1138 the house became Cistercian, and appears then to have been almost, if not entirely, rebuilt, through the munificence of Ethelweard de Pomeroy.

The uncovering of the foundations and the works of rebuilding and restoration have been under the care of Mr. Frederick A. Walters, F.S.A., architect, of Westminster, and the new buildings have been carried out by Mr. J. G. Stephens, builder, of Exeter.

THE VICTORIA HOSPITAL, BURNLEY:

(CIRCULAR WARDS.)

THIS hospital, opened the other day by H.R.H. Prince Albert Victor, as mentioned in our last, is of special interest on account of its circular wards. The following description of the building appeared in the *Burnley Express*—

"The site, which is to the south of Briercliffe-road, surrounded by broad streets, is of an area sufficient to allow of the erection of complete administrative department, out-patients' department, six ward blocks of equal area, and a smaller block intended to be used as a children's ward. The administrative block occupies the centre of the site. The front portion of the central block contains on the ground floor secretary's room, house-surgeon's sitting-room and bed-room, matron's sitting-room, nurses' dining-room, linen-room, matron's store-room, and the operating-room. On the first floor are matron's bed-room, twelve nurses' rooms, bath room, &c., and the second-floor has four dormitories for servants. Connected with the block by means of a ventilating corridor are buildings of one story, comprising kitchen, scullery, pantry, wash-house, laundry, drying-closet, &c. There is a basement story almost throughout, with rooms for patients' clothing, store-rooms, larder, dairy, heating-chambers, storage for coals, &c., with a central communication to the upper rooms by means of a double lift. Spacious corridors connect the administrative and ward blocks. These corridors are glazed throughout, and it is possible to remove portions of the frames entirely in the summer months. The main wards are circular in plan, having an internal diameter of 60 ft., and accommodating twenty patients each. Overlooking each ward is a nurse's room and a scullery, and to the rear of these apartments are two separation wards for single patients. The bath-room, closets, lavatories, &c., are detached by cross-ventilated corridors. The general principle of the circular ward has so far been adopted in but two or three instances, the most notable being that of the Civil Hospital at Antwerp. None of these buildings have as yet been opened, and the actual results of the working of these institutions are looked for with the keenest interest. It is confidently expected that many of the difficulties and dangers arising from the known defects in even the later types of hospital construction will be avoided, that more perfect sanitary conditions will be attainable, along with more cheery surroundings for both patients and nurses. Those who have given most study to the subject are able to predict with tolerable certainty that there will be great improvements as regards the aération of the several blocks, the softening of the internal draughts, and the maintenance of an equable temperature and the facilities for the regular admission of fresh air and the extraction of foul, the free admission of sunshine, and along with this a comparatively

greater floor space and cubic area for each patient. In these wards, however, certain novelties of arrangement and construction, based upon the suggestions of Professor Marshall and others, will find their first expression in actual building. Of these features the sun-rooms are probably the most important. They are designed on the roof of each ward, being approached by a spiral staircase of easy gradient, constructed in the centre of each block. They are glazed all round, and outside the sun-room is a promenade some 12 ft. wide, making a circuit of the block. The roof of the ward is formed in wrought iron and concrete, with surface of rock asphalt. The wards, bath-rooms, closets, &c., are lined with glazed bricks, the joints being carefully made tight in Keene's cement. This material has been selected as offering the most impervious surface, and the ward floors for like reason are laid in Austrian oak, waxed and polished. The windows of the wards are glazed with British plate-glass, and are hung at the level of the impost. In the centre of each ward is a smoke-flue, jacketed with outer extraction flue. Access is gained to the soot-chambers at the foot of this flue by a subway running under the corridors. The subway contains all pipes for hot and cold water, steam, gas, &c., which are placed in a manner admitting of easy inspection. Facilities are afforded for cleaning out soot-flues, fresh-air funnels, &c., and the examination of sanitary fittings, without entering the wards. Calorifices are placed in convenient positions in these corridors, heated by coils, from which circulation-pipes are carried to baths and lavatories. Lifts and shoots are provided from the wards, so that coal, ashes, foul linen, &c., can be carried underground. The wards are heated by Snel's thermohydric stoves, by means of which warmed fresh air is introduced. This arrangement is supplemented by a method of steam heating. Radiators are placed in the small wards and corridors. Fresh air is admitted at two heights in the outer walls by Ellison's air-diffusers and Sheringham's ventilators, under control, as well as near the centre through the stoves, and the extraction takes place from the ceiling level next the staircase, trunks being connected with the central extraction flue. The ceiling is coved at the wall line and rises towards the centre to render the extraction appliances more effectual. The administrative block is heated in the main by open fireplaces, and is ventilated by means of Boyle's air-pump ventilators, one of considerable power being situated in the turret which surmounts the central block. The whole of the staircases is in stone. Having due regard to the soundness of the construction, the internal details throughout are of the simplest possible character, though in every particular ample provision is made for the efficient and economical working of the institution. The out-patients' department (consisting of dispensary, surgeon's room, ophthalmic room, and drug store) is situated to the rear of the western block to the north of the corridor, the corresponding portion on the east being reserved for the children's ward. The entrance lodge and mortuary are arranged to the street line on the north side, the former building being in two stories. All the buildings are substantially erected in stone, upon a bed of concrete covering the entire building site, and to a distance of 3 ft. beyond the walls. The works have been mainly carried out by local builders, namely, masonry, Messrs. Smith & Kippax; joinery, Mr. R. Brown; slating, Mr. Wm. Stanworth; plastering, Mr. J. Shuttleworth; painting, Mr. Wm. Aspinall; steam-heating, Messrs. Thomas Birtwistle & Co. The plumbing work has been executed by Mr. Richard Heyworth, Manchester. The cost of the building will be about 15,000l."

The architects are Messrs. Waddington & Sons, of Burnley.

On the occasion of the opening, Professor John Marshall, F.R.S., ex-President of the Royal College of Surgeons, gave an address on the advantages of circular wards, and said it was one of the proudest moments of his life to see in bricks and mortar, wood and machinery, an idea which had been floating in his mind for many years. Professor Marshall's views will be found in the *Builder* for Jan. 3, 1885. The subject was also very fully discussed at the Sanitary Congress at Leicester last year, and for a résumé of its *pros* and *cons*, we may refer our readers to Mr. Saxon Snell's paper and the discussion thereupon (see *Builder* for Sept. 26, 1885, p. 443, and Oct. 17, p. 549).

THE ARCHITECTURAL ASSOCIATION.

The first meeting of the present session was held at the Rooms, 9, Conduit-street, on the 22nd inst., Mr. J. A. Gotch, President, in the chair.

In connexion with the opening *conversazione*, held on October 8th, votes of thanks were accorded as follows, viz.: to the Royal Institute of British Architects for the use of their rooms to the ladies and gentlemen taking part in the concert; and to the exhibitors, Miss Chaplin, Messrs. Robinson, Eley Smith, Vacher, R. P. Spiers, M. Scott, Shuffrey, Morris & Co., Longden & Co., G. Jackson & Sons, Woodlams & Co., Knowles & Co.; Scott, Richmond, & Co.; Verity & Son; Laing, Wharton, & Down; Farmer & Brindley; A. Newman; Hart, Son, & Peard; Doulton & Co.; Jeffrey & Co., Salvati & Co., and De Morgan.

Mr. E. C. Hanson was elected a member, and a list of fifty-eight other gentlemen were nominated for election at the next meeting. The President next distributed the prizes to the successful competitors, a list of whom has already appeared in the *Builder*.* It was stated in the course of the distribution that a decision had not yet been come to in regard to the Sketch Book competition.

It was announced that in consequence of many corrections having been made in the "Brown Book" this year, besides the insertion of an additional amount of letter-press, it had not yet been sent to the whole of the members. Thereupon Mr. J. Douglass Mathews proposed that the consideration of the report should be postponed until the next meeting. Mr. C. R. Pink seconded the motion, which was agreed to.

The President then delivered his address, which we print on another page.

Mr. C. R. Pink, in proposing a vote of thanks to Mr. Gotch, congratulated him very warmly on occupying the honourable position to which he had been elected. They had all been prepared, by Mr. Gotch's previous utterances, to expect in his address literary grace and the power of a strong imagination, and in that hope they had not been disappointed. Indeed, he made bold to say that not only would the address be read with pleasure by the members of the profession, but that few of the preceding Presidents had written an address which would be read with so much interest by those outside their ranks. He believed it would be eminently readable by the general public, whose support and interest they were at all times anxious to enlist. With the remarks on architectural education, which was the most serious part of the address, he entirely agreed; but he would not discuss the matter, as his own views had comparatively lately been placed somewhat fully before the members.

Professor Kerr said it was nearly forty years since he occupied the presidential chair of the Association, and since then he had never failed to feel an interest in attending their prominent meetings, for old association's sake, and it was with extreme satisfaction that he saw the prosperity of the society so well continued and sustained. The chairman had given them an account of the young architect's prospects which might indeed discourage many, but he hoped this would not be the case. He proposed, therefore, to allude to the same subject from a different point of view, and that thoroughly practical one. It was a remarkable thing that the building industry in England was in point of magnitude, the second industry in the kingdom, agriculture alone being in front of it. The consequence was that no one with head on his shoulders, and who had learned his business in an architect's office, need apprehend failure if he were prepared to do his work in some sphere or other in connexion with buildings and in the interest of the public. In the course of his life he had observed very great changes in the architectural profession, as within the last twenty years these changes have been almost as great as had been the important social changes which were astonishing even one. The outcome, he fancied, was that there were being rapidly Americanised, and though this might be a disagreeable reflection to some yet it could not be helped. Nature would have its way, and that which was old-fashioned, severe, and exclusive was rapidly becoming extinct. Young men must therefore face the new ideas, and not look back to the old ones. These ideas were ideas of business,—commercial

* See p. 554, ante.

ideas. He was not a commercialising man, nor one who was in the habit of advising a disregard of the sentimental considerations of their noble profession, but he liked to look matters in the face, and to ask them to provide for the circumstances in which they would find themselves when they were older. As the building industry was so large and important, there were a great many quarters in which the young architect might direct his efforts, if one particular line of business did not happen to suit him or his connexion, not only in the arts, but in the sciences, and in the administration of affairs. The excellency of English architecture, in its peculiar lines, was attained and had been attained in the past by what some of them were disposed to sneer at, viz., the rough-and-ready discipline of an architect's office, even of those offices in which there was not much to do. English architects were thoroughly practical, as distinguished from those of France, who were more notable for exquisite grace in every touch of the pencil. The architect in this country combined, in a way no other professional man did, certain elements of practice which were, to some extent, antagonistic. He was an artist, a scientist, and a man of business. Art and science were just as antagonistic as, in their extreme forms, poetry and mathematics generally were. In the study of their profession they found art and science combined with business, which was an antagonistic element; but if they studied well these three branches,—art, science, and administration,—in the coming decade, when there would perhaps be difficulty in obtaining employment in a particular line, they would find half a dozen other lines open to them. The subsidiary arts were, at the present moment, rising to a position of marvellous prominence. Then with regard to science, it rested with the members of the Association and those whom they represented, to cut out the engineers in all their building work in the next generation. The engineers had plenty to do without interfering with the business of the architects. Why should not the latter, therefore, build the bridges and the great station roofs? It should be the aim of every cultured community to build in beauty. If this were so, why should such unsightly edifices be raised? The engineer could never accomplish an architectural design of grace, because he was not trained as architects were. In the next generation, too, they would find a variety of fields of administration in connexion with building matters, and into these channels many of them might be perfectly content to pass.

Mr. W. M. Fawcett (Cambridge) regretted that, although a member, he had never until then been able to attend a meeting of the Architectural Association. It had always been essentially an educational society, running on parallel lines to the Institute, of which it seemed to be the handmaid. Turning to the question of "Federation," he had never quite understood what was wanted, because, whenever he asked what it meant, he invariably received different answers to his questions. Some people spoke of federation as being simply unity and touch of the several societies, such as exchanging publications and the like, while others talked of it as going to the very depths of the matter, affirming that every society should be a branch of the Institute. The question was being well discussed, however, and he hoped that some practical outcome would be the result. The President's address struck him as saying exactly the right thing at the right time.

Mr. H. L. Florence said that when Mr. Gotch spoke of the means of instruction afforded by the different societies and institutions, it occurred to him that it might be possible to apply to "the veiled figure of the Academy" the practice of the Architectural Association, when the members combined and represented their wishes to the committee. Possibly, if the architectural students of the Academy were very much larger in numbers, they would be more powerful, and be able ultimately to make their influence felt. Professor Kerr seemed to speak somewhat disparagingly of the practical outcome of the foreign system of education, but he had just returned from a tour in France and Italy, where he had seen many new public buildings which had been carried out with the greatest success in practical matters as well as in point of design.

Mr. J. Douglass Mathews remarked that it was gratifying to find the presidential chair again filled by a gentleman living away from

London. Though, of course, the members chiefly lived in the metropolis, the Association was now exercising its influence in the provinces, and the more its members were spread all over the country, the better for them in London. He was much pleased with the manner in which the address commenced, pointing out, as it did, to the young men the necessity of first finding out what they had to do, and then doing it. That was the great secret of the matter, and the more it was followed out the better they would acquit themselves, both to their own satisfaction and to that of their clients.

Mr. E. J. Tarver, in supporting the vote of thanks, made a few remarks on the prize awarded for notes on his lectures on the history of architecture. In awarding the prize for such a set of notes as those which had gained it this year, and also in former years, one saw what an immense advantage the student must have derived from the preparation of the notes, and from the selection of the numerous prints and tracings which illustrated them. He always recommended that the notes should rather be made from the books to which he referred his audience, than from the few words he had barely time to say on each of the vast subjects forming the entire course. Naturally these voluminous notes occupied more time than many students could afford to devote to the task, and, in future, it would be better to award the second and third prizes for the best notes taken at the lectures, and the first prize for the more laborious notes and illustrations taken from books.

Mr. Pink then put the vote of thanks to the meeting, when it was carried by acclamation.

The Chairman, in replying, said that he considered his election to the office he now held as a very great distinction, and hoped that in his hands the high record which the former Presidents had left would not be deteriorated. As to the discussion on the address, they must not suppose that he in any way counselled a relaxation of work on the part of those who were going to be architects. Nor was it his desire to abolish pupillage, and the present system of roughing it; but rather to supplement it, and in such a manner that human exertion would be called to the supplementary work as well as to that which already existed. With respect to the Institute and the Association going hand-in-hand, that was the desire of all concerned with the Association, to a certain extent. He believed it would always be their policy not to be in any way formally connected with the Institute, but to regard the Examination as an essential point, and to frame their work so as to meet it.

OBITUARY.

Mr. John Prichard.—We hear with much regret of the death of Mr. John Prichard, of Llandaff, a most painstaking and meritorious architect. He was in his sixty-ninth year, and unmarried. He was the twelfth son of the late Rev. R. Prichard, B.D., vicar-choral of Llandaff, and a pupil of Pugin. The *Western Mail* says he had held the position of Diocesan Architect for Llandaff for nearly forty years. In that capacity he superintended the restoration of many churches throughout the diocese, as well as the restoration of the cathedral church of the diocese, which he commenced in conjunction with his late partner, Mr. J. P. Seddon. The work was begun by restoring the east window of the Lady-chapel. When, afterwards, the general restoration was undertaken, Mr. T. H. Wyatt and Mr. Prichard were appointed joint architects, on equal terms. At the end of nine years the work was placed entirely in the hands of the latter. With some trifling exceptions, Mr. Prichard was responsible for the whole of the new work, including the design of the south-west tower. He remodelled the country residence of Mr. E. P. Shirley, Eatonington Hall, Warwickshire, and this work, which was done in 1855, is considered of great merit, being referred to in Eastlake's "History of the Gothic Revival in England." His skill in re-modelling is there spoken of thus:—"This is at all times a difficult task, especially when the building to be altered has either no architectural character of its own or possesses one at variance with the style it is expected to assume. Mr. Prichard, however, after making sundry alterations of a substantial kind, proceeded to

clothe the whole structure with what Mr. Ruskin would call 'the new walled veil,' and perhaps it is not too much to say it is a walled veil Mr. Ruskin would have approved." Mr. Prichard was also the architect of the mausoleum of the Bute family at Cardiff Castle.

"FEDERATION OF ARCHITECTS."

SIR,—The list which you published last week [p. 612] has, so far as I am aware, made known for the first time the names of the gentlemen composing the "Architectural Federation Committee." This is the Committee who last April and again quite recently, issued to architects a circular headed "Federation of Architects" with a document attached for which signatures were solicited on the ground that they "represent all existing societies." In view of this definite statement of the circular, the list which you have published is, to say the least, remarkable, for the one flatly contradicts the other. I look in vain to this tardily-published list for the names of the Representative Members of the Royal Institute of British Architects, of the Architectural Association, and of the provincial societies. They are for the most part conspicuous by their absence.

As regards the Institute the facts are these:—

The President, the Vice-Presidents, and the members of the Special Federation Committee were on the 6th of April nominated as representative members of the "Architectural Federation Committee" without their consent or knowledge, and they were informed of such nomination by letters dated April 12th, signed by Mr. G. A. T. Middleton. The President, Mr. Christian, declined to accept the nomination in a letter addressed to Mr. Middleton, dated April 16th; the Vice-Presidents declined, I believe, on or about the same date; and the Federation Committee of the Institution declined by letter, dated May 5th; and yet I have in my possession a letter signed by the same Mr. G. A. T. Middleton, dated April 28th, consequently subsequent to the receipt of Mr. Christian's letter of the 16th,—in which it is stated that the Architectural Federation Committee "consists of the President and Vice-Presidents R.I.B.A.; President A. A.; Presidents of all existing provincial societies; the R.I.B.A. Federation Committee; and Messrs. R. Norman Shaw;" and other names which it is not necessary I should specify. This letter was written by Mr. Middleton to a member of the Institute in reply to an application for further information as to the constitution and work of the Committee, and it was on the positive assurance contained in Mr. Middleton's letter that the President, Vice-Presidents, and Federation Committee of the Institute were members of the "Architectural Federation Committee" that he consented to become a member of it.

In the face of the declinations to which I have referred from the representative members of the Institute, it has seemed to me very strange that the misleading statements published by the "Architectural Federation Committee" should never have been withdrawn or corrected, but it is incredible that this same committee should have quite recently re-issued their original circular, thereby reiterating and perpetuating the statement,—the accuracy of which you can now judge of,—that they "represent all existing societies."

Comment on such procedure is superfluous, but I may add, what is within my knowledge, that many of the signatures which have been obtained by virtue of the circular referred to were given in the belief, derived from its terms, that it had been issued with the sanction of the Royal Institute; and it may, I suppose, be assumed that all who so signed under a delusion will lose no time in extricating themselves from a false position by cancelling their signatures, and thus withdrawing their support from a committee who propose to use it in taking action antagonistic to the best interests of the Institute.

You are aware that the subject of architectural federation is now being considered by a committee of the Institute specially constituted for the purpose, and in order that the really representative character of this com-

mittee may be apparent, I venture to append, and to ask you to reprint, the names of the members.
J. MACVILAR ANDERSON.
9, Conduit-street, W., October 27, 1886.

Royal Institute of British Architects' Special Federation Committee.

Edward T. Anson, F.G.S., President.
Alfred Waterhouse, (Vice-Presidents.
Thomas Worthington,)
Arthur W. Blomfield, M.A.)
J. Macvillar Anderson, Hon. Secretary.
William H. White, Secretary.
Charles Barry, F.S.A., Past-President.
Albert N. Bromley, President Nottingham Architectural Association.
Robert J. Goodacre, Leicester and Leicestershire Society of Architects.
John Honeyman, Glasgow Institute of Architects.
J. C. Moncrieff, Bristol Society of Architects.
Wm. Parslow, Liverpool Architectural Society.
George T. Redmayne, President Manchester Society of Architects.
Cole A. Adams, Past-President Architectural Association.
Charles Aldridge, Liverpool.
J. Wreghitt Connon, Leeds.
H. R. Gough.
Edwin T. Hall.
George T. Hine, Nottingham.
John Holden, Past-President Manchester Society of Architects.
J. Douglas Mathews.
Ralph Nevill, F.S.A.
C. Richard Pink, Winchester, President Architectural Association.
Thomas M. Rickman, F.S.A.
Professor T. Roger Smith.
G. Gordon Hoskins, President Northern Architectural Association (recently added by request of the Northern Architectural Association).

SIR,—We are instructed by the Committee of the Architectural Association to state, in reference to a circular issued by Messrs. H. R. Gough and Edgar Farman, that the Architectural Association is not represented or connected in any way with the Architectural Federation Committee.

HERBERT D. APPLETON, } Hon. Secs.
THOS. EDWARD PRYCE, }
9, Conduit-street, W., Oct. 25.

SEWER VENTILATION AND STORM OUTFLOW.

SIR,—Will you allow me to call attention to a practical method, in full operation, of dealing with the two very serious sources of danger to which reference is made in the second leading article, and the twelfth note, in last week's *Builder*?

As to the first, there can be no doubt that, as you justly remark, "the air in sewers, in contact with sewage, tends to rise into the atmosphere loaded with vapours and those gases from the sewage which are lighter than atmospheric air." And it may be added that, apart from the slight effect of barometric change, the intensity of the poison thus poured forth depends on the three elements of the foulness of the liquid, the temperature, and the time allowed for fermentation. But the product, whether emitted by one vent or by many, is mixed with the atmospheric air of a town, and more or less of it, in proportion to the size of the town, makes its way to the lungs of the inhabitants.

This great source of nuisance and of sanitary danger, to say nothing of cost, is quite removed by the iron process. When I set this process at work at Chichester Barracks, at the commencement of July, the smell arising from the ventilators and from the outfall of the barrack sewer was dangerously offensive. Within six hours of commencing the treatment, the smell was gone, and has not since been perceptible, by day or by night.

The difficulty as to the varying proportion of sewage, in dry and in wet weather, is met in the same way. The proportion of metallic iron employed is determined by the quantity of putrescible matter contained in the sewage. Whether a given quantity be diluted by ten or by a hundred gallons of water makes little difference. The treatment of a dry-weather flow is adequate for a storm flow, unless the latter bring down with it more foul matter. In any case, the dose of iron per minute may be doubled, trebled, or decupled, by the turning of a screw.

I do not propose, sir, to take up your columns by entering into any chemical or mechanical details. The question has advanced beyond the

stage at which it is at all needful to do so. A pure effluent may be seen at this moment issuing from the barrack sewer at Chichester by any one who takes the trouble to visit the spot. The modest little apparatus which effects a transformation that looks little short of magic is not, of course, shown without proper introductions. But the only difficulty that will be experienced by the visitor as to the nature of the change effected will be in realising how foul the smell and the effluent were up to the end of last June.

FRANCIS H. CONDLER, M. Inst. C.E.

ST. MARK'S PAVEMENT.

SIR,—As you have allowed my sketch-book diagram, referring to the pavement of St. Mark's, to appear in your last issue (p. 588), I will beg you to allow me briefly to refer to it,—this especially because the controversy on the subject survives in the columns of the *Times*.

The twelve immense slabs represented in my diagram are of Greek grey marble. They, or the blocks from which they were cut, were brought, at prodigious labour and cost, from Greece to Venice, obviously that, on the floor of St. Mark's, the precious material might lie intact,—a central feature of monolithic splendour. Their present crushed and wrecked condition proves incontrovertibly that they were laid flat, and intended to remain so. That they were brought from Greece to be deliberately wrecked into fragments for undulation's sake is a proposition that passes the bounds of reason. Yet the late Mr. Street, speaking of these very slabs in the *Pall Mall Gazette*, March 27, 1880, said:—"Some of these are still unbroken and distinctly waved on the surface, while the whole mass has a regularly arranged undulation." The fact is, that none of the slabs remain unbroken, and that the undulation is not regular in these slabs nor in any other portion of the floor.

In his "Brick and Marble Architecture" he stated that "it can hardly be thought that this undulating surface is accidental or unintentional, for, had it been the consequence only of a settlement of the ground, we should have seen some marks, too, in the walls, and some tokens of disruption in the pavement itself, some of which, however, could I detect." In face of the plain facts the words I have italicised are simply amazing.

The conclusion is past dispute, viz., that the twelve slabs were intended to preserve a flat surface, and this fact carries with it the whole question of the undulations. In connection with this level panel of the designs, containing some 780 square feet, any idea of representing a wavy sea would have been ridiculous,—to say nothing of the geometrical patterns of the *Opus Alexandrinum*, surrounding the slabs, which alone are fatal to all idea of sea surface. As regards the confident reference to St. Sophia's, it is difficult to conceive anything more fatal to the contention made for the doctrine of symbolic undulation.

The floor of St. Sophia's is perfectly flat. It is throughout laid with marble flags, parallel-gram in form, and placed in regular order. The floor has not a trace of symbolism of any kind whatever, save that the joints of the slabs,—the flooring being of Mahomedan origin,—are in lines aslant to those of the building, and are in the direction of Mecca.

If Mr. A. Street claims that his reference is to a pre-Christian pavement of St. Sophia, and one of Christian times, some valid authority for his alleged wavy symbolism is due at his hands. Up to the present nothing but a bare assertion has been made, on this point of evidence, upon which the whole question has been virtually staked. The silence is very remarkable.

Oct. 27, 1886.

EDINBURGH MUNICIPAL BUILDINGS.

SIR,—The issue of another alteration to the site of the above, after two months have elapsed since the publication of the competition,—and competitors have not only had time to mature their designs, but also to commence the finished drawings,—is indeed an injustice, and one that should be withstood unanimously by all who are competing.

Speaking of my own design, the proposed alteration of site involves complete re-scheming; neither plans nor elevations can be modified to suit such a sweeping alteration.

It is the duty of competitors to place this matter before the Council, who, doubtless, are not aware of the amount of time and labour their new alteration will impose, and, like myself, to suggest the plans should be sent in to suit the original site, and the premiums awarded accordingly; and, as all competition plans are more or less modified, the successful competitor could re-arrange his design. It is more in justice that one should have this trouble than fifty or sixty, as will be the case, if all have to alter their plans.

ALFRED BROAD.

* * It appears to us an unardonable thoughtlessness to issue instructions for such a competition without having finally arranged the site. From a report of a meeting of the Council, given in the *Scotsman*, however, we gather that the time is to be extended.

RE COOPER'S COAL-LIMING PROCESS.

SIR,—My attention having this morning been directed to your review of Professor Wanklyn's book (p. 576, *ante*), "The Gas Engineer's Chemical Manual," I venture to send you copies of two papers which deal with the above subject, containing, as they do, statements concerning it which are based upon my practical experience in working the process continuously from October 31st, 1883, to the present time. The first settled home of the process was at Tunbridge Wells, and its decided success there had led recently to its adoption in other places; among others, Folkestone, concerning which important and modern gaswork I enclose a copy of an extract from the report of the directors to the shareholders, made at a general meeting of the company, after four months' experience of coal-liming. The quantity of gas made at Folkestone in about five months may in round numbers be stated as being above 50 million cubic feet, and at Tunbridge Wells in the three years about 35 millions.

In both cases and in every case where it is being worked its success is decided, and there are none of the drawbacks which have appeared to you to be possible or probable. You are quite right in your statement as to increase of ash from limed coke, but this objection does not diminish the demand for it; the great bulk of the consumption of coke being for purposes not affected practically by a little additional dust resulting from ash, but, on the contrary, to a vastly greater extent a benefit is experienced by the coke consumer in the increased brilliancy of combustion, rendering its use in open grates practicable and pleasant where ordinary coke could only be used by the aid of a little coal being mixed with it, or by a few jets of gas in the lower part of the grate; and, as a fact, it has been proved that the sale of coke has been favourably affected by its being made from limed coal.

Of course, if a large proportion of lime be used the objection to its use would be fatal, but the proportion being only about 2½ per cent., instead of being a drawback it improves its value.

The financial result is also decidedly favourable, inasmuch as the profits are increased practically to the extent of nearly a shilling per ton on the coke carbonised.

From a sanitary point of view, the process is a benefit which cannot be exaggerated, by the abolishing of the common nuisance occasioned by the frequent opening of the purifiers, and the exposure of their foul contents. Experience has proved that once a year is often enough to open a purifier, once at Tunbridge Wells having been opened only three times in three years, and is now being set to work again with the same material, which has been in daily use throughout that period, 350 million feet of gas having passed through it; and the average quantity of sulphur compounds found in the gas from Midsummer last to the 20th of this month was only 8.12 grains per 100 ft., although the public gas examiner, using another apparatus, about a mile from the works, reports the results obtained by him to be 10.24,—a quite unimportant discrepancy; and when these results were obtained, the oxide of iron in the first purifier contained 77 per cent. of sulphur.

I make no comment upon these facts, but have pleasure in furnishing them to you for your information.

R. P. SEICE.
21, Parliament-street, S.W.

SIR,—In the course of your kind notice of my book, "The Gas Engineer's Chemical Manual," you inquire whether coal-liming does not increase the proportion of carbonic oxide in the gas.

My experiments appear to show that the carbonic oxide is diminished rather than increased. Thus, at Tunbridge Wells I found 5.0, 4.1, and 4.3 per cent. of carbonic oxide in the gas from the limed coal, in January, 1885. These figures are considerably below that which is generally found in coal gas.

J. ALFRED WANKLYN.

THE BLOCK SYSTEM FOR WORKHOUSE PLANS.

SIR,—In the description of the new Workhouse for the Able-bodied Poor for the Holborn Union published in your last issue (p. 588), it is stated that this is the first attempt to apply the "block system" to a workhouse.

I beg leave to inform you that the Lambeth Workhouse, designed by me, in conjunction with Mr. R. Parris, in 1869, and the new Workhouse for the Wandsworth and Clapham Union, designed by me in 1883, are both upon the "block system."

THOS. W. ALFWIN ALE.

Institute of Auctioneers and Surveyors of the United Kingdom.—A meeting of the provisional committee of this Institute was held at the offices, 57, Moorgate-street, E.C., on Wednesday last. Among other things it was resolved that the draft set of rules submitted should be printed and distributed among the members of the committee for discussion at their next meeting.

DRAIN-PIPE JOINTS.

SIR,—It may be interesting to your readers to know that the "Hassall's Patent Pipes," which have been used so extensively in the Bexhill-on-Sea sewerage works, have proved very satisfactory, and really are everything to be desired in the way of a safe joint for pipe sewers.

I had always a doubt in my mind that the Portland cement run into the joints would, in consequence of the liquid state in which it is used, shrink in course of setting and endanger the safety of the joint.

On receiving instructions from the engineer to the works, Mr. H. Bertram Nichols, C.E., of Birmingham, to cut out a length or two of the patent pipes (which had been laid six months) in order to fix a syphon, I looked forward with interest to the cutting of the joint, and was pleased to find that the Portland cement entirely filled the cavity, and the cement was found to be quite as hard as the pipes, forming one mass. The cement used was supplied by Messrs. Lee & Son, and answered well for running the patent joints.

JULIAN DOWNSBOROUGH,
Resident Engineer.

Bexhill-on-Sea, Oct. 25.

* * * These pipe joints were fully described in our notice of the Sanitary Exhibition at Leicester last year (see *Builder*, Sept. 26, 1885, p. 417).

The Student's Column.

STONE QUARRIES.—XVIII.
LIMESTONES.

WE shall now proceed to describe the principal limestone quarries in Great Britain, dealing more especially with those which send the material into the home counties in large quantities for building purposes. The freestones have been very extensively employed in the metropolis ever since large buildings began to be erected; and even to-day, in spite of so much opposition, important edifices are being constructed mainly of limestone or sandstone. We have repeatedly had occasion to remark that there is no particular objection to this, provided the material be carefully selected by persons competent to do the work; but we feel sure that this point is so often neglected that we are compelled to seek a material which, generally speaking, is of a much more durable nature, and which presents much less difficulty in the selection, and so we have advocated the more extensive use of granite for the most exposed parts of large buildings. At the same time, we are perfectly well aware that the elaborate mouldings and tracery executed with freestone could not be made of granite very economically. There can be no doubt that fine carvings and the like, no matter where they are to be placed, must still be in freestone, whether the money is forthcoming to enable them to be executed in the more durable material or not. Moreover, almost every one must agree that if fine carvings are made of granite they present a dull appearance, as a rule,—at any rate, they lack that lightness and elegance which is so characteristic of the white and cream-coloured freestones. Again, even if it be urged that the last-mentioned argument is a matter of taste, it cannot be denied that the black or white spots and streaks that will occasionally come to light in some prominent feature in a carving made of granite, are very serious drawbacks to its use for this purpose, and he who thinks otherwise must surely be devoid of all artistic sense and feeling. Such ornaments must always be made of freestone.

But, when we come to a question as to the material to be used in a large public building in the metropolis, we should feel inclined to advocate the use of granite for the foundations, walls, and the skeleton of the structure generally, especially on the exterior; freestones to be used for interior work, and minor embellishments on the exterior, care, of course, always being taken to blend the different tints of stone, so that they may harmonise with each other and with the whole. It will be obvious, however, that after all, a great deal depends on the kind of structure to be erected, as to the portions of the building that should respectively be made of granite and freestone, each case depending on its own merits, so that it must be left in a great measure to the judicial mind of the architect concerned.

Portland Stone.

The Isle of Portland unquestionably furnishes some of the best kinds of limestone we have in the market. About the beginning of the seven-

teenth century Portland Stone began to attract public attention, and we find that in 1660 it was used to some extent in London. Inigo Jones restored a portion of old St. Paul's with it.

The present St. Paul's Cathedral and many of the London churches erected in the reign of Queen Anne were constructed with stone very superior to that now generally employed as far as regards durability. The quarries from which Sir Christopher Wren obtained the Portland stone which he employed have long since been deserted, the only reason assigned being that the merchants find that they cannot sell that stone on account of its being a little harder and thereby more expensive to work.* If this is actually the case it clearly shows the unwholesomeness of the competition. We suspect, however, that in addition to this, Sir Christopher had the stone carefully selected, and from a certain horizon, whilst at the present day the good name which the stone generally bears is a sufficient cloak to hide many inferior blocks of stone that are built up under the impression that all Portland stone is only of one quality.

As a matter of fact, there are at least four different kinds of Portland stone in the island. Of these, two are quite indistinguishable from each other to the ordinary observer, although one will last for ages and the other merely a short time in the London atmosphere. The better quality is called "Whitbed" and the other the "Basebed," which has, unfortunately, been corrupted into "best-bed." The other two kinds of stone are known as "Bastard Roach" (Basebed Roach or Curf) and "Roach" (or true Roach).

The quarries are all worked with an open face, and all the stones are included in the upper oolite, with the following sequence (the newest bed being the first mentioned):—

1. *Roach*. The colour of this stone is a very light brown. It is made up of a mass of fossils, cemented together with carbonate of lime. The original shells of the fossils have, in most instances, disappeared, leaving numerous cracks and cavities between the casts of the interior of the missing shells. This renders the stone quite unfit for delicate carvings and the like, though its toughness, strength, and weathering qualities make it useful for rougher kinds of work. We may mention that the roach is largely made of a fossil called by the quarrymen "screws" (*Cerithium Portlandicum*), which may be useful in distinguishing it from the inferior bastard roach, which it closely resembles. The latter stone does not contain this fossil. The roach is from 2 ft. to 3 ft. thick.

2. *Whitbed*.—This stone is almost white, but occasionally very light brown. This fact at once shows that it differs a little in composition, which receives further confirmation in that the grain is not uniform. Some of the blocks are too hard for carving, though others will take the most elaborate work. The stone is made up of fine oolitic grains (see the *Builder*, vol. I., pp. 695, 784), with very little shelly matter, cemented together with hard, crystalline calcite. If sections of the Whitbed and Basebed are cut, and examined under the microscope, the oolitic grains of the former are found to be more regular in outline, and to exhibit the onion-like structure much more characteristically than those of the latter. As might be imagined, the cementing material of the latter will also be found to be more earthy. The Whitbed is from 8 ft. to 10 ft. thick, and, taken as a whole, is decidedly the best Portland stone for general purposes.

3. *Bastard Roach*.—The bed known under this heading very much resembles Roach in appearance, in being a mass of fossil casts and cavities. The matrix, however, is earthy, and thus the stone is used principally for rough work in the locality. The dominant fossil is a little oyster. The thickness of the Bastard Roach varies considerably in the different quarries. In some it is represented by a thin band only an inch or two in thickness, whilst in others it is nearly 3 ft. It might be economically used for rough interior work in places not subjected to much wear and tear.

4. *Basebed*.—The tint of this stone varies from almost white to dark cream colour. It is well known in the market, especially amongst masons, who prefer it to the other kinds, because it is more uniform in texture, and does not contain so much shelly matter, being therefore worked with great facility. As we have

* Guide to Museum of Practical Geology, 4th edition, p. 38.

pointed out, however, its weathering qualities are inferior, as a rule, to the Whitbed, and for this reason it should on no account be utilised for the exterior of city buildings, though we are afraid it is often so used. For country purposes it might be made use of externally, provided it is well seasoned. Its thickness varies from 5 ft. to 6 ft.

According to Professors Daniell and Wheatstone, the chemical composition of the different varieties of Portland stone is almost the same. It contains about 95 per cent. of carbonate of lime, 1·20 each of silica and carbonate of magnesia, and very small proportions of iron, alumina, and bitumen. Now, from this it would appear that no reliance can be placed in the selection of stone from its chemical composition alone; for, as we have seen, the different kinds of Portland stone weather in a diversity of manners, and yet are of nearly identical chemical composition. The secret of the stone lies in its structure principally, the best kind having a crystalline matrix, the inferior ones being more or less earthy. In selecting this stone attention should therefore be directed to the character of the matrix. It is not sufficient to ascertain that the stone contains crystalline matter, for this may occur, apart from the matrix, in the shape of shell fragments.

We have previously described the results of experiments on Portland stone in relation to its resistance to thrusting stress (see the *Builder*, vol. I., p. 560).

This material is largely used in England, and in some parts of Ireland. Examples in London, in addition to those already mentioned, are at the Horse Guards, the General Post Office, the Reform Club, Foreign Offices, and Somerset House. Examples in Dublin are,—the columns and portico of the Bank of Ireland, Custom House, founded in 1781, Royal Exchange, and the General Post Office.

Chilmark and Wardour Quarries.—These are situated about two miles and a half north-east of Tisbury, and one mile and a half west of Dinton stations, in Wiltshire. Geologically, the stone is obtained from the same horizon as that lastly described, namely, the Upper or Portland Oolites. The Chilmark are mostly underground workings, and the quarries are very old. The copper coins found amongst the debris date back 1,700 years. There are five different kinds of stone raised. The first of these is called the *trough* or *hard* bed, being of a light yellowish brown colour, with numerous crystalline fragments of shells. The stone is hard to work, and is used principally for steps, copings, sills, &c. Its hardness renders it peculiarly useful for resistance to wear, and it is very durable. The same characteristics, however, which cause it to be so durable are hindrances to its more extensive use from a pecuniary point of view,—the cost of working. The second is called the *pinney*, *green*, or *Scott* bed, and is the stone mostly employed for all kinds of building purposes, being known in London as *Tisbury stone*. It is of a light brown colour, tinged with green, and is a true oolite. When properly selected, according to position, it is a very durable limestone, easily worked. It has been extensively employed in recent years in Westminster Abbey in the chapter-house, south transept front, with all the pinnacles, the north porch and eastern recess of it, the western doorway, and several large pinnacles at the east end. The third is called the *white oolite* bed, which is of a cream colour, and coarser in texture. The fourth is the *Chantrey* bed, and the fifth the *garden* bed, of a very fine texture, is homogeneous in appearance, and of a cream colour. Its principal use is for carvings, &c., for which it seems well adapted.

The stone is cut with a wet saw, and works much easier when just quarried, as do most limestones of this class.

In chemical composition it unquestionably varies considerably. The following is the published analysis:—

Carbonate of lime	79·0
" magnesia	3·7
Silica	10·4
Iron and alumina	2·0
Water and loss	4·2

The first thing that strikes one in looking at this analysis is the high percentage of silica. A microscopic examination shows that a considerable proportion of the *trough* bed is made of silica, both in the form of grains of sand, which form the nuclei of the oolitic spherules, and as chalcedony in the matrix. The dura-

bility of the stone is largely dependent on this last character. A similar examination of the pinney bed shows that silica is not so predominant, but nevertheless is in considerable abundance for a limestone, and the name chosen, —siliciferous limestone,—is an appropriate one.

The absorbing power of water attributed to the Chilmark stone is very low. The "Commissioners' Report," p. 47, states that one of the specimens did not absorb 1-36th of its bulk.

Mr. David Kirkaldy's experiments, on March 2nd, 1879, showed that the weight required to crush one-foot cubes was as follows:—

	Tons.
Chilmark, trough bed	411.4
" pinney bed	136.6
" white oolite bed	125.5
Wardour, Chantry bed	139.0
" garden bed	280.9

The stone has also been used in Salisbury, Chichester, Truro, and Rochester cathedrals; Hampstead and Lambeth post-offices; Old Wardour Castle and Longford Castle, Wilts; and many other large edifices.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,805, Securing Knobs to Spindles for Door-locks. W. Green.

Instead of the screw as is generally used to fasten the spindle to the knob of the door, a peg or pin is inserted, and the top end of it is secured to a narrow spring, which fits into a recess in the knob. The spring closes around the neck, and the peg or pin passes through the hole in the neck into the hole in the spindle, and the knob is thereby made secure.

13,775, Smoky Chimneys. J. Cochrane, jun. The friction of the spindle is reduced to a minimum, and a self-locking lubricator is also attached, which is silent in action. Increased wind bearing is provided, and also a socket and lubricator, cast in one piece. The cowl has simply to have the spindle entered into the socket, and it descends until the iron plate comes to rest on the screw, and it will then be turned round in any direction of the wind, and will then lock itself securely. When occasion arises for the cleaning of the chimney, the top part has simply to be raised slightly upwards, and by turning it round in the opposite direction it is unlocked.

14,023, Door-Knobs, &c. T. R. Paxton. One end of the spindle is passed through the door, the fixed knob being on the other end; then two roses are put on at either end, and a clutch washer is fixed up close to the rose. The rose is then turned one-third round, which causes it to be propelled outward, and at the same time moves the clutch washer until it is engaged with the recess in the knob. Three screws are then inserted through the two roses and into the door, which secures all together. By this construction the knobs can be securely attached to the door without the aid of set screws and the adjustment obtained is very fine.

14,227, Joints for Pipes, Tubes, &c. P. Hoppe.

In this the joints have more flexibility, yielding to the inequalities of the ground without leakage, than by the ordinary system. One part of the joint is made externally in the form of a segment of a sphere and is attached to a flange on the adjacent pipe by means of a loose flange in the form of a ring, and by screw-bolts or studs.

15,570, Fire-Escape for High Buildings. W. Cooper.

A small crane is so arranged at the side of the window that the arm may be put out through the open window at the top. When not in use the crane, with the folding seat, folds back into a cupboard. Two pulleys, one at the end of the arm, and one over the folding chair or seat, serve for raising and lowering the apparatus. The chair is made with a back and seat hinged so that when not in use it folds up compactly, and immediately on being lowered the seat falls into position and the back is also fixed, so that the person lowered is not likely to fall out. It is especially useful in hospitals, asylums, and such institutions.

12,014, Gilding for Decoration, &c. J. Pratt. This invention recently made public, is claimed to be a marked advance on the manner and method of gilding on glass. The glass is gilt with a solution at the back, then silvered and afterwards coated with a preservative composition. Any pattern may be cut on the glass by a sand blast, and the effect, though less costly than the old method, is said to be much finer. Lettering and patterns may be worked, and the gilding may be used in conjunction with any kind of painting, and can be applied to ecclesiastical and fine-art decorative work generally.

10,012, Decorative Woodwork. F. Mankey, U.S.A.

This relates to a machine for cross cutting the surface of the wood, for the purpose of producing

an ornamental configuration. Rotary cutters are employed, by which means patterns in relief are cut upon the solid wood. Before this it was customary to affix the portions forming the relief separately securing them to the surface. The invention is adapted to the production of decorative or ornamental woodwork for walls, ceilings, furniture, &c.

NEW APPLICATIONS FOR PATENTS.

Oct. 15.—13,142, E. Eaton and Others, Electric Bell Indicator, &c.—13,148, T. Armstrong, House Drainage.—13,159, H. Price, Sanitary Dustbin.—13,165, C. Grinnett and J. Cook, Fastener for Windows, Casements, &c.
Oct. 16.—13,205, J. Denny, Terra Cotta.—13,209, W. Lutwyche, Mosaic.—13,215, H. Dalgety, Screws.

Oct. 18.—13,242, F. Eldring and K. Mayer, Fire-proof Ceilings, Partition Walls, Buildings, &c.—13,278, C. Straub, Composition or Building Material.—13,284, F. Lyte, Pigments.

Oct. 19.—13,297, R. Greene, Hot Air Pipes for Fireplaces.—13,300, W. Bagshaw, Fasteners for Folding Doors, &c.—13,306, R. Scrivener, Brick and Tile Facing.—13,313, H. Harvey, Ventilating Drains or Sewers.—13,332, W. Brown and Others, Automatic Cut-off for Water Pipes.—13,348, H. Lake, Door Locks and Latches.

Oct. 20.—13,358, E. Murgatroyd, Bolts and Bars for Doors, &c.—13,364, R. Pardoe, Chimney Cowl.—13,385, F. Sage, Guards for Shop Windows, &c.
Oct. 21.—13,426, F. Baker, Chandeliers and Gasaliers.—13,432, J. Shortland, Stoves and Fire grates.—13,436, J. Harrington, Spirit Levels.—13,440, J. Parr and T. Kendrick, Fastenings for Windows.—13,451, J. Clark, Door Fasteners.—13,452, J. Hunt, Fitting, Ornamenting, and Decorating Shops, &c.—13,468, G. Wickham, Siphon Cisterns.

PROVISIONAL SPECIFICATIONS ACCEPTED.

7,568, J. Hookham, Locks and Latches.—8,697, S. Johnson, Preventing the Entry of Sewer Gas into Dwellings, &c.—10,329, H. Cunningham, Drying Chambers for Bricks, Tiles, Portland Cement, &c.—11,004, F. Wilson, Mounting Valves for Lavatories, Baths, &c.—11,151, E. Harris, Casement Windows, and Metal Frames for same.—11,250, S. Sparkes, Stoneware Socket Pipes, &c.—11,266, J. Jones, Hanging Sash Windows.—11,486, F. Shipton and J. Thorne, Washable and Sanitary Wall-hangings.—11,590, E. Banfield, Indicator for Water-closets, &c.—11,809, H. Wright, Regulating Water Waste Preventers.—11,877, W. Baughan, Electric Indicating Apparatus.—11,968, D. Taylor, Hangers.—12,359, J. Nichols, Fencing Posts.—12,526, B. Baird, Step Ladders.—11,062, W. Johnson, Hanging, Raising, or Lowering Window Sashes.—11,184, D. Saunders, Hinging Guard-beds to Window Sashes.—11,637, M. Macleod, Fret Glazing.—11,843, A. Moore and J. Lawes, Sheet Metal Roofing.—11,873, S. Jefferys, Chimney Tops.—12,746, F. Buchanan, Lift.—12,774, T. Hind and R. Lund, Grinding Plates, &c.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

15,557, F. Howcroft, Supporting Window Sashes.—15,605, D. & E. Glaister, Movable Partitions, Doors, Windows, Sashes, &c.—15,870, W. Lees, Hot Air Heating and Ventilating Stove.—15,997, E. Laporte, Ornamentation of Varied Surfaces.—7,897, J. & B. Craven, Moulding Bricks, Tiles, &c.—0,149, H. Lake, Fastening and Securing Window Sashes, and Alarm Apparatus for same.—10,527, W. Alwood, Locks.—11,377, W. Bull, Roofing Tiles, &c.—173, R. Evered, Connecting Door-knobs to the Rose of same.—13,928, T. Smith, Cement.—15,185, T. Carder, Kilns.—15,436, R. Oates and J. Green, Gullies and Traps.—15,741, J. Buchanan, Locks.—15,751, W. Joy, Charging Cement Kilns.—11,371, H. Haddon, Veneering.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 14.	
By DEBENHAM, TEWSON, & Co.	
Southampton—Eighteen plots of freehold land	£1,083
OCTOBER 15.	
By DEBENHAM, TEWSON, & Co.	
Woking, near—Seven plots of freehold land	2,260
OCTOBER 16.	
By DOWSETT & WOOD.	
Mill Hill, Hendon—Coppold houses, cottage, and nursery ground	1,220
By DEBENHAM, TEWSON, & Co.	
Rotherhithe—Ground-rents of 171. 10s., reversion in seven years	1,603
OCTOBER 17.	
By H. BUCHANAN.	
Kentish Town—63 and 65, Carence-road, 52 years, ground-rent 10l.	738
Homerton—1 to 9, Durham-grove, 74 years, ground-rent 100. 1s.	200
Regent's Park—8, Cumberland Market, 36 years, ground-rent 2 l.	365
23, Munster-square, 36 years, ground-rent 22 l. 1s.	310
Kenington—10 and 10 1/2, T. Smith, Cement, 90 years, ground-rent 100.	810
Camberwell—10 to 10, Brisbane-street, 77 years, ground-rent 16l.	350
OCTOBER 18.	
By H. BUCHANAN.	
Leyton—1 to 12, Fifth-terrace, 95 years, ground-rent 120l.	1,025
Leytonstone—9, 10, and 11, Grove-terrace, 95 years, ground-rent 12l.	270
336 to 355 even, Leytonstone-road, 95 years, ground-rent 110s.	3,425

Leyton—1 to 19 odd, Goodall-road, 95 years, ground-rent 67s.	23,270
43 to 62 even, Calderon-road, 95 years, ground-rent 43s.	1,885
1 to 7, 17 to 23 and 35 and 36, Fifth-terrace, 95 years, ground-rent 62l. 10s.	2,236

By A. RICHARDS.	
City—75, Bishopsgate-street Without, freehold	2,050
Harrow, London-road—1, 2, and 3, Woodside, freehold	2,395
Tottenham—Four plots of freehold land	610
Southgate—Two plots of freehold land	175
Two plots of freehold land	175
Enfield—1, Annandale-villas, and a plot of land, freehold	470

OCTOBER 20.	
By NEWBERRY & Co.	
South Norwood, Station-road—The freehold erection known as the Public Hall	1,890
Sehurst-road—The residence Florence-cottage, 84 years, ground-rent 20l.	660

By ROBINSON & SONS.	
Limehouse—50, Blount-street, freehold	230
Kingston, near—1 to 5, Hornsey-cottages, 89 years, ground-rent 18l.	110

By PHILLIPS, LEE, & DAVIES.	
Southwark—11, Gladstone-street, 42 years, ground-rent 8s.	370
13, 15, and 17, Gladstone-street, 42 years, ground-rent 12s.	1,200
Caledonian-road—32A, Stock Orchard-crescent, 65 years, ground-rent 7s.	600

OCTOBER 21.	
By HARDS & JENKINSON.	
Mill End—137, 139, and 141, Globe-road, and the erection called the Tabernacle, freehold	1,400

By A. YACOB.	
Chelsea—28, Upper Cheyne-row, freehold	305
Camberwell—51 and 53, Lothian-road, and a plot of land, freehold	2,480
Plumstead, Conway-road—A plot of freehold land ..	1,265

By TEMPLE & MOORE.	
Bow-road—3, Avenue-road, 46 years, ground-rent 3l.	240
Bromley-by-Bow—22 to 39 even, Empson-street, freehold	1,636
27, 29, 31, and 33, Market-street, freehold	686

By FAREBROTHER, ELLIS, CLARK, & Co.	
Soho, Greek-street—The lease of the Three Grey-bounds, term 21 years	860
Haymarket—56, Rupert-street, freehold	1,500
Moorgate-street—No. 24, term 24 years, ground-rent 75s. 10s.	10,000

OCTOBER 22.	
By BAKER & SONS.	
Barnet—Brook Hill Farm, and 31 acres, freehold ...	1,510

MEETINGS.

MONDAY, NOVEMBER 1.
Royal Institute of British Architects.—Opening Address by the President, Mr. A. J. Mason, 8 p.m.
Society of Engineers.—Mr. Percy Tarbutt on "Liquid Fuel." 7.30 p.m.
Clerks of Works Association.—Mr. W. Lee on "Waterloo Bridge." 7.30 p.m.
Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. V. By Professor David Masson. (Masonic Hall, Edinburgh, 8 p.m.)

TUESDAY, NOVEMBER 2.
Society of Biblical Archaeology.—8 p.m.
Birmingham Architectural Association.—Annual Convention. Address by the President, Mr. F. B. Osborn, F.R.I.B.A. 7.30 p.m.
Liverpool Architectural Society.—Mr. Francis Fox C.E. on "The Mersey Tunnel." (Royal Institution Colquhoun-street, 7 p.m.)

WEDNESDAY, NOVEMBER 3.
Society of Antiquaries of Scotland.—Rhind Lectures in Archaeology. VI. By Professor David Masson, 8 p.m.

THURSDAY, NOVEMBER 4.
Builders' Benevolent Institution.—Thirty-ninth Annual Dinner. Carpenters' Hall, London-wall, Mr. Basil E. Peto, President, in the Chair. 8.30 for 8 p.m.
Royal Archaeological Institute.—(1) Mr. W. Flinders Petrie on "The Discovery of Daphne." (2) Mr. A. Baker on "Architecture and Archaeology." (3) Mr. E. Baskin on "Roman Amphitheatres." 4 p.m.

FRIDAY, NOVEMBER 5.
Architectural Association.—Mr. Aston Webb on "Papiago." 7.30 p.m.

SATURDAY, NOVEMBER 6.
Association of Public Sanitary Inspectors.—Address by the Chairman of Council, Mr. G. B. Jerrett. 7 p.m.

Miscellaneous.

"The London Central Winter Fund of House Decorators and Painters."—By permission of Mr. Augustus Harris, the first ticket benefit in aid of this fund will take place at Drury-lane Theatre on Monday, Tuesday, and Wednesday next, Nov. 1, 2, and 3. We are informed that the Fund was established in 1877 for the purpose of paying a benefit to its members when out of employment during the three months of winter, but owing to the severe strain upon its resources during the last two winters, the Committee find that even with the levy on the members they cannot meet their liabilities in the coming winter without making this their first appeal to the public. Ticket only will benefit the fund. They may be had of Mr. H. R. Swain, Secretary, and Mr. Price, Steward of the Decorators' Club, Howland-street, Fitzroy-square; and of the Secretary of the Committee, Mr. Edwin Walter Blades, 21 Longford-street, N.W.

South Kensington Sketching Club.

On Thursday, the 21st inst., the holiday sketches made by the members of this club (established in connexion with the National Art Training School) were exhibited at the South Kensington Museum, and the prizes were awarded and distributed by Mr. J. C. L. Sparkes, the principal, who delivered an address to the students. The club prizes were supplemented by others offered by Mr. Sparkes, Mr. Armstrong (Director for Art), and the masters, and were productive of a very large number of sketches, landscape and coast scenery forming the strongest section of the display. The first prizes were awarded as under:—Section A (past winners only),—landscape in oil, F. Stead; ditto in water-colour, Miss Hull; ditto foreground, H. Rider; figure subject, Miss M. Clarkson; set of sketches in colour, H. Allport; ditto in black and white, F. Woodhouse. Section B (Students not in Section A),—landscape in oil, Mrs. Pearce; ditto in water-colour, H. Godfrey; ditto, foreground, H. Poulter; figure-subject, Miss Sybil Robinson; set of sketches in colour, Miss Janet Lewis; ditto in black and white, Miss Julia Haywood; still life, &c., in oil, W. Falkner; ditto in water-colour, Miss M. Woodward; architectural sketches, A. M. Poynter. Section C (past Students only),—set of sketches, Nelson Dawson. Special prizes:—figures, John; shrub, Miss K. Beard; foreground plant, Miss A. Woodward; animals, Miss E. M. Ritchie; landscape, F. Suddards; architectural landscape, Miss K. Woodward; modelling, Tonelli; etching, H. Poulter; design, A. Fisher. A design for a frieze subject, "Music," executed by Mr. Weatherston, and which gained the prize in a competition amongst the students last July, was also exhibited on this occasion.

A New Dispensary and Relief Station at Battersea.

On a large piece of land adjoining the Latchmere Estate, in Battersea, covering an area of about 12,000 ft., a new dispensary and relief station are at present in course of erection for the Guardians of the Wandsworth and Clapham Union. The buildings are intended for the relief of the poor belonging to the Union, residing in East and West Battersea. The Flemish style of architecture has been adopted. The west and principal frontage faces Home-road. It is nearly 90 ft. in length, and 40 ft. in height, containing one lofty floor, with dormers in the roof of a large central hall, the roof having hammer-beam principals and moulded ribs. The roof in the centre is surmounted by an ornamental turret, octagonal in form, rising to a height of nearly 70 ft. above the ground level. The turret encloses one of Boyle's air-pump ventilators, 30 in. in diameter. The elevation is faced with Lawrence's cut and moulded red brick, the window heads and sills being in red Corsehill stone. The entrance in the centre is surmounted by step gable, the north and south ends of the frontage containing the relieving and medical officer's business apartments, being also surmounted by step gables. The roof is covered in with Broseley tiles. The buildings are carried to a depth of 150 ft. eastward, the east frontage being in Latchmere-road. This portion of the structure contains the medical and relieving officers' residences. Mr. T. W. Aldwinckle, of East India-avenue, is the architect; and Messrs. W. G. Wyatt & Co., of South Norwood, are the contractors. Mr. Edmund T. Larkin is clerk of the works.

The Preservation of Ancient Monuments.

On Monday last the annual meeting of the Shropshire Archaeological and Natural History Society was held. Mr. Stanley Leighton, M.P., occupied the chair, and read an interesting paper on "The Preservation of Ancient Monuments." He stated that the ignorance of people as to their own hereditary books, pictures, manuscripts, and buildings of interest was extraordinary. Many of the most polished, and in some instances educated, men were surprisingly confused in their ideas of antiquities. He was walking through Westminster Hall the other day with one of the most distinguished leaders of the Liberal party, when he looked up to the great roof and stated that it was the work of William Rufus; but he was quite unaware that Richard I. rebuilt it. He was, therefore, just three centuries wrong.

The Surveyors' Institution.—The first ordinary general meeting of the session will be held on Monday, November 8th, 1886, when the President, Mr. W. J. Beadel, M.P., will open the session with an address.

Proposed International Exhibition of Art, Science, and Industry, at Saltaire.

This exhibition is to be opened on the 3rd of May next, and is being promoted by the Governors of the Salt Schools in order to raise a portion of the funds required to defray the cost (12,000*l.*) of the new Schools of Art and Science now being erected as a memorial to the late Sir Titus Salt, Bart., the founder of Saltaire. The originators of the movement for a public memorial at Saltaire contemplated the erection of a statue of the deceased baronet, but in October, 1885, on the occasion of the delivery by Professor Seeley of his address as President of the Salt Schools, Mr. Titus Salt threw out a suggestion for a more useful form of preserving his father's memory. It was explained that the accommodation for the teaching of science and art in the present buildings had become inadequate to the growing needs of the surrounding population, and Mr. Salt advised that the memorial should take the form of new Schools of Art and Science, to be erected on a site adjoining the Institute. This suggestion at once found favour. The building of the schools was begun directly, and it was intended that they should have been completed during last winter, and that an Exhibition or "Palace of Delight" should have been opened early in the past summer. But the unusual severity of the winter seriously retarded the erection, and the project had to be put off for a year. But, taking advantage of opportunities gained by the delay, the Exhibition will be larger in scope and more international in character than was at first intended; while even the new Schools of Art and Science themselves have undergone extensive alterations. The school buildings themselves will provide part of the accommodation for the Exhibition, and ranges of temporary buildings will be provided in addition. Rapid progress is being made with the school buildings, and the roof is now nearly finished. Messrs. W. & R. Mawson (Bradford) are the architects; and the contractors are Messrs. Wm. Ives & Co. (Shipley), masons' work; Messrs. T. Obank & Sons (Idle), wood work; Mr. S. Rushworth (Shipley), plumbers' work; Messrs. Hill & Nelson (Bradford), slaters' work; Mr. Dixon (Bradford), plasterers' work; and Messrs. Bagnall & Quarumby (Shipley), painters' work. Mr. William Fry, Saltaire, is the secretary and general manager of the Exhibition.

Patent Law.—The inaugural meeting of the present session of the Inventors' Institute was held on Monday evening last at their offices, Lonsdale Chambers, Chancery-lane, when Admiral Selwyn read an address on "The Practical Results of the Present Patent Law, and the Changes to be pressed for in future Legislation," in the course of which he pointed out that there has been no real change in the total fees to be paid for a patent, which still remain at the unreasonable sum of 150*l.* He maintained that a 10*l.* fee, paid once for all, or 5*l.* on grant of provisional specification and 5*l.* on completion, would be amply sufficient for all the expenses of the Patent Office, and, indeed, that with patents multiplied to the extent of threefold their present number, as he believed they would be, the Office would have a revenue of half a million a year, instead of 73,000*l.* But the main point to which the Institute had been devoting its attention was to secure a basis on which a patent would become an actual property. One essential requirement in the direction of reform was that the disgraceful clauses in the present Act providing that the State might rob the patentee should be at once struck out; and a second requirement was that the examination before granting the patent should be as complete as possible, so that the title established by a patent should, as far as could reasonably be expected, be equal to that of any other property. A discussion followed, in which several of the speakers pointed out that the previous examination was much more efficient in the United States and in Germany than in this country, and that the cost of a patent in the United States lasting seventeen years was only 7*l.* 10*s.*, whereas in this country the inventor was charged 150*l.* for what amounted to little more than permission to go to law.

Surveyorship Appointment.—The Hove Commissioners have appointed Mr. H. H. Scott as Town Surveyor in the place of Mr. Ellice-Clark, who has resigned. Mr. Scott has filled the office of Assistant-Surveyor for upwards of two years.

The Builders' Benevolent Institution.

As will be seen by reference to our list of meetings, the annual dinner of the Builders' Benevolent Institution takes place next Thursday at Carpenters' Hall, London-wall. We trust that it will be the occasion of a considerable addition to the funds of the Institution.

Manchester Sewage Scheme.—We are informed that at a meeting of the Manchester City Council, held on the 27th inst., Mr. Bailey Denton, of the firm of Messrs. Bailey Denton, Son, & North, Palace-chambers, Westminster, was selected as consulting engineer to advise upon the scheme about to be carried out for the sewerage and sewage disposal of the city.

The Mining and Engineering Exhibition at Newcastle-upon-Tyne.—As will be seen by an advertisement in another column, the Executive Council, at the request of several large exhibitors, has consented to enlarge the buildings of the Exhibition. The time for making applications for space has been finally extended to November 30th.

Turners' Company Exhibition.—The eighteenth annual exhibition of specimens of hand-turning, held under the auspices of the Turners' Company, has been open the last two or three days in the Ball-room of the Mauston House. The exhibits were divided three sections, viz., wood, ivory, and pottery. The judges in the wood and ivory sections awarded the silver medal and freedom of the company, and four volumes of Holtzapffel's "Turning and Mechanical Manipulation," to T. Lee, Denzell-street, Lincoln's Inn-fields; and the bronze medal, 4*l.* 1*s.*, and vols. iv. and v. of Holtzapffel's works, to George Adams Alderton, of Clifton-street, Brighton. The first prize in the apprentices' section was given to James Hoggood, of Maidstone, Kent; and in the amateur section a certificate of merit was given to James E. Galliford (Inland Revenue), of Walthamstow, Essex. Other prizes were given for the best piece of pottery thrown on the wheel in one piece without joints, and not afterwards shaved, turned, or glazed, for pottery thrown and turned by one person, and for the best piece of turned or shaved pottery ornamented by the runner or hand tool.

The Proposed New Law Courts at Birmingham.—A deputation from the operative bricklayers' societies of Birmingham waited upon the Mayor at the Council House last week. The deputation consisted of Messrs. W. Nash (secretary), J. Freeman, W. Bevan, and W. James. They stated that, while they were glad to hear it had been decided to build the new Law Courts in terra-cotta, they thought it desirable to bring before the Mayor the views of those they represented on the question of the material. They strongly urged, from their personal experience, the advantage of terra-cotta as a building material, stating that it was as desirable as stone, and possessed many advantages over that material. They urged that several of the statements made by the stonemasons, who had previously seen the Mayor, were greatly exaggerated, and specially instanced the allegation that as much as 30,000*l.* would be lost to the labour of the town if stone were not used. With reference to this subject they represented that the stone was quarried outside the borough just as terra-cotta was manufactured, and that stone was generally brought to the site of the building more or less worked. They considered that the argument as to labour was in favour of the use of terra-cotta rather than stone, the bricklaying class being much larger than that of the stonemasons, and stated that there were at least four bricklayers in Birmingham to one stonemason, and that each bricklayer was served by a labourer, while one labourer served as many as nine masons. The Mayor, in reply to the deputation, said that the question of material had been settled, not in the interests of any one class, but in that of the ratepayers at large, and with the view of obtaining the best building at the least cost. [In reference to the statements made by the spokesman of the bricklayers, Mr. Joshua Farr writes to the *Birmingham Gazette* to say that the Master Builders' Association of Birmingham "find it much better to have the stone worked in the town; at least in all the buildings done by them in the town the stone has been worked in the town." As to the statement that one labourer was sufficient to supply nine masons when fixing stone, Mr. Farr says, "there is always one labourer to every mason fixing stone, and in most instances two or more labourers."]

Wallsend (Northumberland).—The new Church of St. Luke, Wallsend, was consecrated on the 18th inst. by the Bishop of Newcastle. The church occupies a site in Station-road, and when completed will comprise a nave 72 ft. long by 25 ft. wide; a chancel, 37 ft. 6 in. long by 20 ft. wide; a north aisle, 12 ft. wide; a south aisle, 14 ft. wide; a tower and spire about 140 ft. high; and the total cost, excluding the site, will be about 6,000l. Owing to the lack of funds only a portion of the work has been executed, at a cost of a little over 3,500l. The nave and aisles, with western porch, and the base of the tower, are the portions which have been first built. The style of architecture adopted is Early English. The church is built of local stone, and is plastered inside and relieved with stone dressings. Neat open benches are provided sufficient to seat 480 people. The pathways of the nave and aisles are paved with red and grey blocks of spar-cement, a new form of pavement, which has been made by Messrs. W. B. Wilkinson & Co., of Newcastle; and this pavement is the gift of Mr. Wilkinson to St. Luke's Church. The architects of the church are Messrs. Oliver & Leeson, Newcastle. Messrs. N. & R. Reed, Newcastle, have been the contractors for the masonry and joiner work; Messrs. Sowerby, Gateshead, for the glazing; Messrs. Emley & Son, Newcastle, for the heating apparatus; and Mr. Laidler, Durham, for the chandeliers and other gas fittings; and all the works have been executed under the supervision of Mr. George Relp, clerk of the works.

Public Conveniences.—On Friday, the 22nd inst. the underground water-closets and urinals at Ludgate-circus and Eastcheap were opened by the Chairman and Members of the Corporation of London. Both urinals are built underground, Eastcheap having four water-closets, Ludgate-circus five, and each nine urinals. The brickwork is lined with Wortley glazed brick, having a coloured dado; the doors and frames are of pitch-pine, sized and varnished. The water-closets are lighted up with a lamp over each door fixed on an ornamental iron scroll. The structure at ceiling line is also lighted by a Sugg's sunlight. This is intended for ventilation as much as for lighting purposes. The roofs are formed with wrought-iron girders, the spaces filled in with Hyatt's lights with cast-iron open grating on the outside which answers two purposes, first for ventilation and secondly to take off the water from the roof into gutters underneath. The urinal at Ludgate-circus is built between the two Fleet sewers and discharges itself into them by means of a penstock and tide flap. There is also a tide gauge fixed in a reservoir which is underneath the building, and which will act as a store chamber at any time the sewers are charged. The plans were designed by Col. H. Haywood, the engineer, and the work was erected under the superintendence of Mr. F. Nicholson, the clerk of works.

Bombay Railway Terminus Buildings. In connexion with these buildings, which we illustrated last week, it may be mentioned that Messrs. Lund & Blockley, the makers of the large clock and carillons at Bombay University, have just manufactured and shipped three clocks for the Bombay Terminus of the Great Indian Peninsular Railway. The first clock shows the time on two skeleton iron dials 10 ft. 6 in. in diameter, glazed with flashed opal glass. These dials, which are fixed on the south screens in the station so that the time can be plainly seen over the whole of the platforms, are 116 ft. apart, and the two sets of hands are driven by one movement placed midway between the dials. The second clock, which shows the time on one dial 3 ft. 6 in. in diameter, is fixed in the first and second-class booking-office and waiting-hall. The third shows time on a similar dial 8 ft. 1 in. in diameter fixed in the court-yard under the large dome.

Architectural Antiquities of Winchester. The Hampshire Field Club finished its second season on the 20th inst. by a visit to Winchester, where they visited the County Hall (the ancient hall of Winchester Castle), upon the architectural history of which Mr. C. R. Pink, F.R.I.B.A., read an interesting paper. The party afterwards visited St. John's Church, in the Sake, which was described by Mr. Pink as the most interesting church in Winchester. St. Peter's Cheeseshill and the Cathedral were also visited.

Liverpool Engineering Society.—A paper, entitled "Dredging at Whitehaven Harbour," by Mr. John S. Brodie, engineer to the Town and Harbour Trustees of Whitehaven, was read by the hon. secretary (in the author's absence), on the 20th inst. A short description of the harbour of Whitehaven, as regards the silting of the entrance to the harbour and the means adopted to keep the silt down, was given, and the opinion of the original engineer of the harbour works, the late Sir John Rennie, P.P. Inst. C.E., as stated in his book on "Harbours," was quoted, as showing that that eminent harbour engineer fully foresaw the difficulty of preventing deposit of silt in harbours such as Whitehaven. The three systems of "ladder" dredging, "grab" dredging, and lifting sand from the harbour by means of steam cranes and manual labour were then described in detail as carried out at Whitehaven, analysed, and compared; and the method of improving the fairway to the harbour by means of induced tidal currents and the resulting advantages pointed out. The paper concluded with a few general remarks as to the most efficacious and economical means of preventing deposits in close harbours situated on exposed alluvial coasts.

The Atmosphere of the Underground Railway.—Our readers will remember what happened years ago when attention was directed to the dangerously impure state of the atmosphere in the tunnels of the Underground Railway. The condition of matters has been considerably improved since then, but it is still far from being satisfactory. The complaints of travellers who suffer in various ways from the highly carbonised condition of the air are very numerous, and, in some instances, the effects produced have been serious. Surely the time must come when steps will be taken to effect a thorough reform. We have more than once urged that a proper trial should be made of Dr. Neale's "Chemical Lung." It is beyond question a very valuable agent for the purification of air, and we cannot doubt that if the trains were provided with this apparatus there would be a great diminution of the evil to which we refer. Dr. Neale has, we understand, expressed his willingness to superintend experiments with a view to demonstrate the efficacy of his invention. We counsel the companies to embrace the opportunity before matters reach a pass which will revive the very damaging controversy of years ago, when a contemporary raised a storm which, while happily it blew away the worst of the foul gases, was found very difficult to quiet down.—*Lancet.*

The Kennedy Building Estate at Barking.—On Monday evening Messrs. Baker & Sons offered for sale, at the Bull Hotel, Barking, the second portion of the Kennedy estate, containing about 28 acres, and which has been laid out for the erection of about 300 houses and shops. The property is situated about a quarter of a mile from the Barking railway station, on the main road to Rainham, and is intersected near its northern boundary by the London, Tilbury, and Southend Railway. The number of lots submitted was eighty, of which about twenty were shop lots. Mr. Baker, in offering the property, referred to the great demand for houses in the vicinity of all the suburban stations of the London and Tilbury and the Great Eastern Railways. All the plots offered were sold, those in a newly-formed thoroughfare called Sparsholt-road, having frontages of 18 ft. and a depth of 100 ft. each, realising from 12l. to 15l. each, whilst those facing Mora's-road, the main high road between Barking and Rainham, and several shop plots in the same road, were sold at prices varying from 18l. to 24l. each. The total proceeds of the sale amounted to about 1,100l.

English Paintings Abroad.—Herr G. C. Schwabe, who for a number of years resided in England, has just presented his native town, Hamburg, with a collection of oil paintings, 128 in all. The collection includes numerous works by several leading English artists, amongst whom may be mentioned Sir Frederick Leighton, Turner, Landseer, Henry Woods, Philip H. Calderon, and W. C. Orchardson. Five large rooms have been allotted for the paintings in the Art Hall of the above-mentioned city, where they are now being arranged, under the direction of English artists. In acknowledgment of the gift the Hamburg Municipal Council have passed a resolution conferring upon Herr Schwabe the distinction of honorary citizen of that free town.

An Improved Saw Guard.—The *Aberdeen Free Press* states that Mr. Ralph Willoughby, Superintendent of the Industrial Schools, Newcastle-on-Tyne, has patented an improved saw-guard, in which the part of the saw projecting above the table of the bench is covered by a hood, which is supported by a rigid frame attached to the bench, or in any other convenient way, so as to allow of the height of the hood above the bench being adjusted to suit the material to be operated on. From the hood hang, by hangers or suspenders, a shield consisting of two plates, one on each side, and of sufficient depth, when resting on the bench, to conceal the part of the saw above the bench which is not covered by the hood. The under edges of these plates at the entry side are slightly curved in order to facilitate the insertion, under the shield, of the material to be sawn. The shield is suspended from the hood in such a way that it is raised when the material is pressed against the ends, and thereafter is allowed to fall back to its original position when the material is withdrawn. The shield plates are not connected, so that, if the work to be done allows it, one plate only is lifted, and therefore the saw is exposed only on one side. When the operator moves the material to be sawn along the bench, it first comes into contact with the shield, which it moves forward and upwards upon its suspenders. The operating part of the saw is thus exposed, and the material is allowed to pass along, under the shield and hood, to be sawn. When the material is removed, the shield returns automatically by its weight to its normal position of covering the saw.

A New Method with Cement.—M. Vallin, the Managing Director of a French Cement Works (the Gypserie de la Gare), has adopted, we learn, a new process of manufacturing cement. In order to avoid the disadvantages arising from the unequal burning of clay or stone, M. Vallin crushes the material before placing it in the kiln instead of after. By the ordinary method it is very difficult to obtain a thorough burning of every piece of clay or stone; sometimes the surface is burned too much, and the centre too little, or not at all. In the process as carried out at M. Vallin's works, a crushing-mill breaks the material into small pieces, which are automatically conveyed to a vertical cylinder mill, whence they issue ground to powder. This is in turn again automatically placed on sieves which sift it into pans or kilns heated by gas. A series of inclined plates, having a gyratory motion, agitate the powder in each of the pans, and thus submit every particle to the action of the heat. A mechanical arrangement conveys it to sacks, which a man fills as the powder arrives. The whole operation is thus continuous and automatic. The new material is known as Paris cement, and its price in France is from 2s. 6d. to 5s. per cwt.

The Proposed Cathedral at Liverpool.—The *Liverpool Daily Post* of Tuesday last says that the Bishop of Liverpool has received a communication from Mr. Ewan Christian explaining the delay that has occurred in reporting upon the three designs sent in to the committee who have charge of the matter. The letter ends as follows:—"I am happy and very thankful to be now able to say that I have got back into my usual condition of health, and shall lose no more time than is absolutely unavoidable in bringing my labours on the plans to a termination."

Freehold Building Land at Walthamstow.—On Thursday evening, Oct. 21, Messrs. E. E. Croucher & Co. sold by auction, at the Coach and Horses Tavern, St. James's-street, Walthamstow, a number of plots of freehold building land, with frontages to Markhouse-road and South Grove-road, the whole forming part of the Camden House Estate. There was a very large attendance, and the lots realised from 40l. to 90l. per plot, according to size and situation.

The Superintending Architect, Metropolitan Board of Works.—The Works and General Purposes Committee of the Board have resolved to present a report stating that the Committee have, in accordance with the resolution of the Board of the 2nd of July last (No. 5), considered the applications for the office of Superintending Architect, and seen all the candidates who have presented themselves, are not prepared to select and submit to the Board six candidates whom they consider suitable.

BRIXTON.—For new shop front at 1 and 3, Dorrell.

<i>Engineer's Work.</i>			
W. Fraser & Co. ..	1,491	0	0
Berry & Co.	1,375	0	0
Bradford & Co.	1,313	0	0

LEYTONSTONE (Essex).—For the erection of five dwelling-houses at Cobbold-road, Cann Hall-road, for Mr. Thomas Burrows, of Beulah Villa, Woodford. Mr. W. C. Livermore, architect and surveyor:—

A. Nicholls, Harrow-road £960 0 0

LONDON.—For works required in the erection of premises in Fenchurch and Gracechurch streets. Mr. J. S. Edmonstone, architect. Mr. C. M. W. Brooks, surveyor:—

Patman & Fotheringham £31,150 0 0
Patrick & Son 30,819 0 0
Colls & Son 30,698 0 0
T. Boyce 31,967 0 0
Higgs & Hill 29,530 0 0
Hollard & Hansen 29,607 0 0
F. Conier 29,540 0 0
Mowlem & Co. 29,479 0 0
Peto Bros. 29,305 0 0
Nightingale 28,919 0 0
Kynoh 28,735 0 0
Howell & Son 28,569 0 0
Woodward 28,479 0 0
Lawrence & Sons 28,302 0 0
J. T. Chappell 28,140 0 0
Ewatts 27,873 0 0
W. Sheppard 27,465 0 0

LONDON.—For the erection of the Ship Tavern, 18A, Upper Marylebone-street, and the house adjoining, 23, Saville-street, W., for Mr. James Pryer. Mr. Alfred J. Hopkins, architect, Mortimer-street. Quantities by the architect:—

Ashwell £4,457 0 0
J. T. Chappell 4,238 0 0
Matlock Bros. 4,167 0 0
Scott 4,147 0 0
Fairchild & Co. 4,089 0 0
Adams 3,987 0 0
Toms 3,859 0 0
Marks 3,870 0 0
Beale 3,450 0 0

LONDON.—For sundry alterations and repairs, new bar fittings, &c., at 10, Pentonville-road, for Mr. C. Pasbach:—

S. S. Hardwick £398 10 0
C. Dearing & Son 375 0 0
Heath & Quincy 354 0 0
Sabau, Rubens, & Co. (accepted) 275 0 0

LONDON.—For building new warehouses in Gray's Inn-road, for Mr. S. Trenner. Quantities by Mr. F. Thomson. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—

F. Marks £4,909 0 0
W. J. Smith 4,550 0 0
Prestage & Co. 4,470 0 0
Lambie 4,467 0 0
Sabey & Son 4,456 0 0
Perry & Co. 4,449 0 0
Kilby & Gayford 4,424 0 0
Grover & Son 4,288 0 0
S. Godden 4,285 0 0
J. L. Green 4,282 0 0
H. Burman & Sons 4,227 0 0
Jackson & Todd 4,195 0 0

LONDON.—For rebuilding the Rose and Crown public-house, Collingwood-street, Blackfriars-road, S.E., for Mr. E. W. Gabbie. Mr. W. W. Gwyther, architect, Lincoln's Inn-fields. Quantities by Mr. J. W. Stevens, New Bridge-street:—

Ashby & Horner £2,794 0 0
Patrick 2,698 0 0
Nightingale 2,680 0 0
A. B. Clark 2,480 0 0
Worsley 2,410 0 0
Prestage & Co. 2,342 0 0
Kilby & Gayford 2,340 0 0
Oldrey & Co. 2,087 0 0

LONDON.—For sundry works in paving court-yard, excavating for and erecting urinals, &c., at 59, Eastcheap, for Mr. Thos. Adams, Messrs. Drury & Lovejoy, architects:—

	Paving.	W.C.'s
Clarke & Bracey	£133 0 0	£384 0 0
Williams & Son	139 0 0	315 0 0
Ashby Bros.	124 0 0	285 0 0

ROMFORD (Essex).—For forming new road, for the Rev. H. A. Goodwin. Mr. Henry B. Mitchell, surveyor:—

Wilson, Walthamstow £420 0 0

Jackson, Leyton 418 0 0

Pell, Bromley, Kent 405 0 0

Pizzey, Horney (accepted) 397 10 0

SOUTHEND.—For additions to the Alexandra Yacht Club, Southend. Mr. H. J. Wood, architect:—

Darke & Son, Southend £135 0 0

Baker & Wiseman, "Southend" 122 18 0

* Accepted.

SITTON SCOTNEY (Hants).—For the erection of a new house, with stabling, for Mrs. W. Snailepoole. Messrs. H. E. Raybird & Sons, architects, Basingstoke. Quantities supplied:—

J. Thurnwood, Basingstoke £1,261 5 0

Carter & Son, Winchester 1,186 0 0

Pike Bros., Basingstoke 1,093 10 0

W. Wilkes, Basingstoke 1,090 0 0

Grace, Winchester 1,062 17 6

J. A. Sims, Basingstoke (accepted) 973 0 0

WATFORD.—For stables at Croxley Mills, near Watford, Herts, for Messrs. Dickenson & Co., Limited. Mr. G. Hubbard, architect. Quantities by Mr. J. Sargeant:—

Chappell £1,368 0 0

Macey 1,353 0 0

Makin 1,277 0 0

A. & B. Hanson 1,277 0 0

Waterman 1,243 0 0

Clifford & Goff 1,210 0 0

A Roof tiled. B Roof slated.

SPECIAL NOTICE. Lists of tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

Venture (below our mark)—H. & Co.—A. B.—W. G.—S. & Co.—P. E. T. (while assenting to many of the opinions expressed in your letter, we regret that it is not in a style suitable for our columns.) G. & E. (results should have been forwarded to us in the first instance, if publication or "silence" was desired. We cannot give space for them second-hand.)—S. S.—L. & B.—J. H. (we have not your letter).—H. & Co. (we do not publish accepted tenders unless the amounts are given).—F. N. (we are not suitable for our column).—M. J. A.—H. G. (thanks).—H. H. B. (amount should be given).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors. We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been published for other journals, or NOT BEEN PUBLISHED. All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines about fifty words, or under 4s. 6d.

Each additional line (about ten words) 6s. 6d.

Terms for Series of Trade Advertisements, also for special advertisements on front pages, Contract, Stocks, Sales by Auction, &c., may be obtained on application to the Publisher.

SITUATIONS WANTED.

Four Lines (about THIRTY words) or under 2s. 6d.

Each additional line (about ten words) 2s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

* * * Stamp must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent-garden, W.C. to

DOUGLAS FOURDRINER, Publisher.

Addressed to No. 48, Catherine-street, W.C.

Advertisers for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

AN EDITION printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same, must reach this OFFICE at least TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Replies addressed to the office, 48, Catherine-street, Covent-garden, W.C. Free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 15s. per annum. Foreign, to all parts of Europe, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c., 30s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 48, Catherine-street, W.C.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone.
CORSHAM DOWN, } SUMMER DRIED.
FARLEIGH DOWN, }

BOX GROUND. COMBE DOWN.
WESTWOOD GROUND.
RANDELL, SAUNDERS, & CO., LD.,
CORSHAM, WILTS.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
Box, WILTS. [ADVT.]

Doubling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Doubling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADVT.]

Doubling Free Stone For prices, &c., address S. & J. STAPLE,
HAM HILL STONE, Quarry Owners, Stone
BLUE LIAS LIME and Lime Merchants,
(Ground or Lump), Ilminster. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 83, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.]

Asphalte.
Seyssel, Patent Metallic Lava, and
White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADVT.]

MICHELMORE & REAP,
Manufacturers of

CHARLES COLLINGE'S PATENT.

COLLINGE'S PATENT HINGES
LEVER, SCREW, & BARREL BOLTS
Self-Acting "FALL DOWN" GATE STOPS,
and IMPROVED GATE FITTINGS of every Description
36A, BOURGHO ROAD
DISCOUNT TO BUILDERS. LONDON, S.E.

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.
ZINC ROOFING.
F. BRABY & CO.
LONDON. ** LIVERPOOL. ** GLASGOW
VIEILLE MONTAGNE SOLE MANUFACTURING AGENTS.
NO SOLDER. NO EXTERNAL FASTENINGS

Particulars on Application. Chief Offices:—352 to 364, EUSTON ROAD, LONDON, N.W.

The Builder.

VOL. LI. No. 2223.

SATURDAY, NOVEMBER 6, 1886.

ILLUSTRATIONS.

Shrines, St. Marie's (R. C.) Church, Sheffield.—Designed by Mr. Hadfield, Architect	664, 665
The "New Work," Old St. Paul's	668-669
Residence near Montreal, Canada.—Messrs. Taylor & Gordon, Architects	673
Church of Our Lady of the Sacred Heart, Wellingborough.—Mr. S. J. Nicholl, Architect	673
Carvings, Main Entrance Arch, Northumberland-avenue Hotel.—Messrs. Isaacs & Florence, Architects; Mr. J. Bookbinder, Sculptor	676
The Royal Colonial Institute, Northumberland-avenue.—Messrs. Habershon & Fawcner, Architects	677

CONTENTS.

Building Records in the Domesday Book	683	St. Marie's (R.C.) Church, Sheffield	692	"Interpretation of By-Laws"	682
Notes	684	The "New Work," Old St. Paul's Cathedral	692	Holborn Union Workhouse, Mitcham	68
Letter from Paris	686	House, Montreal	692	Windsor Town-hall Windows	682
Progress of the Works at St. Bartholomew's Church, Smith-		Church of Our Lady of the Sacred Heart, Wellingborough	692	Paint for Roofs	682
Said	687	Royal Colonial Institute	692	The Student's Column: Stone Quarries.—XIX	683
Fire and Dangerous Party Walls	687	Carving, Northumberland-avenue Hotel	692	Recent Patents	683
Haus Holbein's Decorative Work	689	The Registration of Fumblers	692	Recent Sales of Property	683
The President's Address: Royal Institute of British Archi-		Royal Institute of British Architects	692	Meetings	684
tecs	689	Mosaic Pavements, and their Teachings	692	Masochism	684
Dust of Place	692	Sculptured Stones at St. Nicholas Church, Ipswich	692	Prices Current of Building Materials	685

Building Records in the Domesday Book.



THE recent commemoration of the Domesday Book, an original record of undisputed authority and truth, to which we may turn, on this the eight hundredth anniversary of its compilation, for vivid

pictures of English arts and sciences, manners, and customs "when King Edward was alive and dead," and when King William "passed over into England," may perhaps induce our readers to ask what information may be gleaned from its pages respecting constructive and artificial handiwork which may properly be discussed in the columns of the *Builder*. Nor is the answer to such an inquiry disappointing. There are numerous entries which incidentally enable us to reconstruct in our ideas a very faithful retrospect of the manner in which the surveyor, the architect, and the artificer brought his respective mystery,—to use the word in its Mediaeval sense,—to bear upon necessities of Anglo-Saxon life. There are many invaluable manuscripts of the period of Domesday which, fortunately for the profitable delectation of all who take an interest in these things, still preserve exceedingly beautiful, yet simple representations of churches, houses, the process of building, the tools and appliances in use, and the whole apparatus of domestic economy, agricultural operations, and religious or secular ceremonial. These are illustrated by numberless entries in Domesday Book, which they also, in turn, explain and elucidate. The church (*ecclesia*) is frequently mentioned, yet there are many churches which possess archaeological evidence of an existence before Domesday that have not been mentioned in it, and some antiquaries incline to conjecture that the mention of a priest or *presbyter* in any locality implies the existence of a church there, as a means for accounting for the apparent fewness of churches in some counties. For example, one church only is mentioned in Cambridge, two in Staffordshire, and three in each county of Buckingham and Hertford. On the other hand, Suffolk is credited with as many as 364, and Norfolk, Lincoln, York, and Hants have a comparatively large number of churches. The probability is, that as Domesday was not a survey of the condition of the church, but of those places whereto the king had to look for a payment of some kind, either in money, produce, or service, those churches only are mentioned which fall under this category. It is curious that the

diminutive form, *ecclesiola*, "a little church," is found occasionally in the Domesday for Kent, Dorset, Hants, and Sussex. Of what dimensions could these little churches have been, when none of the Saxon churches of which we have any knowledge have any pretensions to size? Take, for instance, the well-known Church of St. Lawrence at Bradford-on-Avon, with a nave length of 25 ft. 6 in., and width of 13 ft. 4 in., a church specially called "a little church" by William of Malmesbury, writing in A.D. 1125; or the Saxon Chapel at Escombe, in Durham, near Bishop Auckland, measuring 43 ft. 6 in. nave length, with a width of 14 ft., and chancel only 10 ft. square, inside measures. The recently-discovered Saxon chapel at Deerhurst, near Tewkesbury, of which we gave a description at the time, measures, for nave, 25 ft. 6 in. by 15 ft. 10 in.; the chancel, 14 ft. by 11 ft. 2 in. In one county in the South it has been computed that seventy male adults were the proportionate number to a church. This will give some tangible idea of dimensions of churches in times before the Domesday.

Of secular buildings, Domesday notices the castles, numbering in all about twenty, a total which would seem to have been far below the real number, most of which had arisen on sites originally appropriated to similar uses in far earlier ages. These were called *castella*, but the *castrum*, a word perhaps employed with the same signification, is only found in six localities,—Dunhevet (now Launceston), Tremon, Harundel (or Arundel) in Sussex, Hunteodon (or Huntingdon), Montgumeri, and Stamford. The stone-built house, or *aula*, sometimes *halla* or *hauke*, for an aspirate more or less was not of much worth in Mediaeval Latin (nor is it now in European languages, except for orthographical and philological purposes, but the Domesday scribe depended to some extent on phonetics), represented the mansion of the superior lord or squire, and was the usual appendage of a manor, but not invariably, and we read of "horses in the hall" in the Domesday, very much as we might to-day read of, say, the stables at Wynnstey. The ordinary house, or *domus*, has many interesting points which cluster around it. It was probably of rectangular ground-plan, of wattle and dab, or strengthened with timber corners, simple in design, and of material ready to hand, with round-headed doorway and windows of very modest dimensions. The roof was thatched, and the whole edifice could but have been primitive in fabric when churches frequently resembled barns. In some cases the use of the word "house" is distinguished with an epithet such as "new," "very good," "able to defend itself," or "fit to be assessed," and so forth; and house repairs are distinctly alluded to on one

occasion as "*domorum emendationes*." There was also the hospice, perhaps a tavern or inn, which occasionally occurs as *domus hospitata*. Some consider with Sir Henry Ellis, a great Domesday scholar, the term *haga*, which also occurs in Domesday, to have represented a house or dwelling, but the term also denotes land inclosed with hays or hedges.

Monasteries were not infrequent in England in Anglo-Saxon days, and some of the most influential and powerful religious establishments (when the monastery was the centre of all real progress, the free library, the public hospital, the ever-open refuge and ready sanctuary, the school of art and design, the bank and the bazaar, the college and the club), such as Glastonbury, Malmesbury, Bath, Chertsey, Bury St. Edmund's, St. Alban's, Evesham, Pershore, Canterbury, Burton-on-Trent, Worcester, Gloucester, and many others, had risen to a great pitch of reputation long before King William passed over from France to take possession of his kingdom. For all that, seven times only are monasteries mentioned in the book, and this probably for the same reason which we suggested in our notice of the Domesday Church. There was also the grange, or monastic farm, a term strangely perverted nowadays into a meaningless synonym for a dwelling-house, but, in the days of the Domesday, strictly applied only to the farmstead belonging to and at such a distance from its owner, a rich monastery in a distant shire, as to require a systematic and subordinate rule, where the monks, whose daily round consisted of alternate spells of work and prayer, bodily and mental exercises, practised and elaborated the arts of husbandry under the eyes of a peasantry not slow to perceive their lessons of practical utility. The houses of the villains, who occupied the condition of the present peasantry, were termed *mansura* or *masura*. The terms seem to imply that these persons remained on the estate without power of removal, at any rate against the consent of the lord. But freedom in this respect is sometimes particularised. The migration of a labouring population from district to district was in Domesday times sternly prohibited, and even in comparatively recent days there were legal formalities to be undergone by the workman or labourer before he could wander very far from the limits of the "hundred" in which his proper parochial domicile was situated. One class of artisan, the smith (*faber*), presumably the blacksmith, received, perhaps, more encouragement than any other except the privileged goldsmith, who seems always to have enjoyed much consideration throughout the ancient world. In the Herefordshire Domesday there is an interesting notice of six smiths, each of whom had his own *forgia*, or

forge, paying a tax to the king of a penny annually for it, as well as making 120 horse-shoes with the king's iron. For this service the workman received a customary payment of threepence. To the blacksmith the agriculturist looked for the construction and repair of his ploughs and implements, and no doubt the miller and knight had frequent need of his important services for repairing the water-mills and the armour in use at the period.

The manor or *manerium*, as the estate was intitled, was divided by hedges and ditches very much in the same way as country property is now laid out, and we know from the evidence of documents varying from two to three hundred years older than Domesday, how carefully these artificial boundaries were perambulated on a change of ownership taking place; for almost all grants of land contain elaborate statements relating to the situation of the bounds of the land. The parks, a term of remote origin, also were favourite kinds of property with the noblemen and rich landowners. They are distinguished sometimes as parks of wild animals, of beasts, or of beasts of the wood, and the laws relating to the park and the chase called into existence a large class of hunsmen, verderers, and other dependents. Notwithstanding this conservative tendency, the felling of the forests went on extensively, and wood was in constant demand for fuel, for building purposes, and especially for palisading and enclosures. The fishery, again, was a property highly appreciated and constantly mentioned as an item of taxable value in the survey. It generally was described as a fishery of eels, and in the Domesday of the Abbey of Ely, the "Island of Eels," a large number of such fisheries, chiefly *weres* or weirs, and ponds are entered as rendering to the abbey many thousand eels yearly for the support of the inmates to whom these creatures doubtless formed a staple article of food. They were calculated by *stikes* of twenty-five each, so called because they were strung together on a *stic* or withy. Besides the eel fishery, the salmon fishery and the herring fishery occur, but far less often. The vineyard, the orchard, the garden, the common pasture for the village animals, the fish-pond, the coppice, the sheep-fold, the wood, and the marsh were all rural features quite familiar to the eyes of those who lived in Domesday times, and their mention casually introduced into the formal entries in which the estate of the principal owner in the parish was described for assessment, plainly indicates that after all, in a very great measure, the aspect of the country has undergone but little modification during the last eight hundred years, notwithstanding the development of special agricultural principles such as drainage, levelling, hedge-clipping, wire-fencing, and the more universal adoption of rectilinear limits of enclosures. The mill was an important element in property, and it is interesting to know that wherever a mill is mentioned in Domesday Book we generally find one still existing,—another instance of the long duration of rural employments. These mills anciently belonged to the chief tenants, the Lords of the Manors, and it was not permitted that an under-tenant should grind his corn at any other than his lord's mill. To this circumstance, Mr. Parish, who has recently and ably edited the Sussex Domesday, points, as sufficiently accounting not only for the great number of mills noticed in the survey as objects of profit to the landowner, but for the large returns which they are continually stated to yield. Sometimes even the site of a mill which had formerly existed is entered, evidently as a detail of commercial and taxable value. The produce of mills is variously stated,—sometimes in money, sometimes partly in money and partly in grain, and occasionally a revenue arises from the fishery incidental to the mill-stream. The keeper of the mill is a functionary especially indicated in one passage. The custom of paying the miller in kind, that is, with the bran, known as *multura*, survived until a much later period. It is, perhaps, still extant in some parts of the country.

The terms employed to designate Domesday measures of capacity and weight are of the highest interest, but it would demand more

space than can be here given for their investigation. They all seem to point to a remote age, when every separate commodity was divided and reckoned by measures peculiar to itself. Thus we have, in addition to the *stike* of eels already mentioned, the *plumba*, the *cuttus*, the *carrelle*, and the *fetinel* of lead; the *sextarius* of honey; the *ambra* or *amphora*, the *summa* or seam, and the *mitla* of salt; the *hida*, *carucate*, *fording*, and *virgate* of land; the *arpent* of vineyard; the *hoccus*, the *mensura*, the *libra* or pound, the *ora*; and many terms denoting square and linear measure of land. The moneyers, and the shipping interest were not forgotten, and numerous other entries might be selected to show how far had our Domesday forefathers advanced in the paths of constructive and manufacturing arts. Arcadian simplicity was universal, in the church, in the house and home, in the field and forest; it was a battle with the iron hand of nature in the wood and on the plain, and with implements such as we should now deem inferior to their task the indomitable spirit of the Anglo-Saxon rustic cleared untrampled forests, filled tracts of virgin land, and tamed the country, and thus developed by degrees the arts and methods of the husbandman, the artificer, the surveyor, and the architect which have to-day become so extensively ramified and so elaborately and distinctly subdivided. The mere study of the plough alone, its derivation and signification, its varied form and size, the method of its use (and here we may be faithfully guided by the illuminated MSS. in the Royal and Harley Collections at the British Museum, recently exhibited to the members of the Domesday Commemoration)—the peculiar curvature of the furrow on old arable land as distinguished from the modern furrow geometrically straight,—the number of oxen required to work it profitably, and the regulated amount of their day's work, are all points which may be examined with interest and advantageous result.

NOTES.



BEYELER, a Swiss engineer, formerly engaged on the Panama Canal, has recently drawn up, under the title "The Truth about the Panama Canal," a paper which is attracting serious attention. M. Beyeler carries into further detail those facts of which we gave some abstract on the 10th July and the 14th of August last. He gives the cubic contents, as now estimated, of each of the twelve sections into which the site of the Canal is divided, and the quantities actually excavated in each. The total of the estimate is 131 millions, and that of work done 16 millions, of cubic metres. But to the gross amount have to be added 20 million cubic metres for auxiliary works and construction of dams, and an estimated outlay of four millions sterling for the great weir at Gamboa. M. Beyeler adds that his figures may be taken as coming down to the present time, as, since the spring of the present year, hardly any work has been executed along the line, "whether the cause be want of workmen, bad weather, or the crisis that appears to have temporarily overtaken the undertaking." M. Charles de Lesseps stated, in March last:—"I am quite sure that for the whole of 1886 the average per month will be over a million cubic metres, and that at first there were only 100 million cubic metres to excavate." M. Beyeler states the expenditure to date "for excavations, amounting to 16,000,000 cubic metres," at 542,516,440 fr.; the cost required for completion at 1,625,000,000 fr., and the interest and burden on shares and obligations, assuming the progress of the work to be at the rate of 7,000,000 cubic metres per annum, or 1,230,000,000 fr., giving a total of hard upon one hundred and thirty-six millions sterling (3,397,516,440 fr.).

THE accounts of the working of the Grand Trunk Railway of Canada, for the half-year ending June 30, 1886, are highly instructive. The gross receipts for the half-year have been rather more than nine and a half per cent. higher than that of the corresponding

period of 1885. But the working expenditure has been increased by less than three-quarters per cent. Otherwise stated, the co-efficient of working cost has been reduced from 76.60 to 70.50 per cent., or in a much higher proportion than the increase of train mileage, which is about 0.9 per cent. As to freight, which forms two-thirds of the income of the company, 13.5 per cent. more money has been earned by a rather reduced amount of train mileage, viz., 4.92 million train miles in 1885, and 4.88 million train miles in 1886. In other words, each train mile in 1886, while run at a fractionally less expense, has earned \$4.31, against \$3.76 in 1885. On the other hand, the gross earning of the passenger trains has been fractionally less, \$4.78 per mile in 1886 against \$4.85 per mile in 1885, with an increase of 5 per cent. in mileage. The total capital expended amounts to 50,421,235. The total mileage of owned and leased lines is 2,924 miles. Thus, the gross revenue for the half-year amounts to only 6.2 per cent., and the net revenue to only 1.8 per cent., on gross capital. Still, the movement of the half-year is encouraging.

THE Metropolitan Board of Works deserve the thanks of the millions who throng the streets of London for calling the attention of the Government to the danger of the ever-thickening network of fair-stretched wire that is lining the canopy of smoke. Of course, we are behindhand with the United States in taking such a step, which is necessary for the safety of telegraphic communication, in certain very possible cases, as it is for that of the wayfarer. But it will be much if this is set in order without the stimulus of catastrophe. Of the value of the return ordered at the same meeting of the Board it is difficult to speak too highly. It is only to be hoped that it may be published. An official return of the daily quantity of sewage delivered at Barking and at Crossness, showing the daily rainfall and temperature, will in itself be an important statistical document. And when to this is added a return of the stations at which disinfectants were put into the sewers during the summer, and the quantity of chemicals used each day, the information will be yet more useful. It would be well, in order to give full value to the return, to add analyses of the sewage after the attempted disinfection, as well as the cost of labour involved in applying the chemicals.

THAT property belonging to A should be taken by B in respect of a debt owing to him by C is certainly an anomalous state of things. But this is the law. For a landlord may distrain things on his tenant's premises which do not belong to the latter, unless they have been delivered on the premises for the purpose of being wrought upon in the way of trade. One would suppose that the manner in which the articles came on the premises was immaterial so long as they were on them to be worked on and did not belong to the tenant. But the erroneous character of this idea will be seen by reference to a single sentence of the judgment of Lord Herschell in the recent case of *Clarke v. The Millwall Dock Company*:—"Looking at the terms of the exception, it is as much a necessary part of it that the goods should be delivered for the purpose of being wrought, worked up, or managed in the way of the trade, as that they should be on the demised premises for those purposes." The subject of the action was a ship which had been built for the plaintiff, and which had therefore not been delivered. We do not doubt the correctness of the judgment of so sound a lawyer as Lord Herschell. But the practical result of the present state of the law might often lead to very ridiculous results. Thus, A may buy a picture which is on B's premises and allowed to remain to be varnished, and he may, on the same day, send another from his house to these premises to be varnished. It is clear that though a week hence both pictures are the undoubted property of A, yet that B's landlord may seize the first one in respect of rent due from him, but not the second. Of course, when the law gets

into this state, the Legislature only can alter it.

IT is extremely satisfactory to note that a universal consensus of opinion has existed for the last week or two as to the steady rise in manufacturing affairs, and especially the iron and steel trades, which are usually the first to feel the ascent and descent of prices, and which may be called the weathercock of the industrial world. Wherever iron and steel are produced comes the same cheering record, not only from England, Wales, and Scotland, but also from the Continental and American markets. From the latter we hear that all kinds of iron and steel continue in very urgent demand, that Bessemer iron is all sold up, and that active preparations are being made to develop fresh iron properties. In Germany the whole of the accumulated stocks have been contracted for up to April next, while in Belgium the market is firm, a good export trade having been secured. In Staffordshire, pig iron is steady, with an advance in most of the brands, the sheet iron trade particularly showing a marked improvement. In North Staffordshire the makers see work in hand for several weeks, several orders having come to hand on Indian railway account. In the Furness district hematite is very firm, large orders being more frequent than small ones. Accompanying these favourable symptoms, the shipbuilders and coal trades are showing equal signs of revival, and with such a good start it is to be hoped that much of the anticipated distress will disappear. If a really good time were to come, it would do more to knock the doctrines of the idle and discontented Socialists on the head, than all the legislation and police supervision.

ACCORDING to some particulars quoted in the "Transactions of the Institution of Civil Engineers" (vol. lxxxvi, p. 9), Professor Poleck has discovered that some timber he had procured, and which was supposed to be winter-felled wood, was, actually, raft-timber floated down the river, and he has ascertained that timber which has been thus immersed is no longer liable to the attacks of *Merulius lacrymans*, or dry-rot fungus. The water slowly dissolves out the albumen and salts and thus deprives the fungus of the nutriment needful for its development. In confirmation of this it has been found by experiments made in France that if fresh sawdust be buried in damp earth, it will rot away in a few years, whereas sawdust that has been well soaked in water will remain in the ground wholly unchanged. The subject of dry-rot is extensively treated of in the *Gesundheits-Ingenieur*, 1886, pp. 359 and 471; and in the "Proceedings of the Institution of Civil Engineers," vol. lxxx, p. 419.

TO the last number of the "Monuments Grecs," published by the "Association for the Encouragement of Greek Studies in France," M. Héron de Villefosse contributes an interesting paper on the Laphth head recently recognised by Dr. Waldstein as belonging to Metope 6 in the British Museum. The story of the identification is well known, but M. Villefosse adds to this a very ingenious theory as to how and when the head came to be separated from the Laphth body. It will be remembered that the head was found on the sea at the Piræus. It is much corroded and in the right side bears marks of having been eaten away by sea insects. An expert (M. Gaudry), after examining the head carefully, says that from the character of the marks it must have taken these creatures about two centuries to eat in so far. Two centuries take us back to Louis XIV. and Nointel's embassy in Constantinople, and the time memorable for the Parthenon when Carrey made his famous drawings. From these drawings we know that the head was then its place. If, therefore, it was in its place when Carrey drew, and if it has been taken away soon after Carrey left. This brings us close on to Morosini's famous siege

and the fatal explosion (1687). M. Villefosse conjectures that the head was either knocked down by the shock or broken off by some soldier who, following Morosini's example, wanted a *souvenir* of the Parthenon. It must have been shipped at the Piræus and by some accident have fallen into the sea, whence it has been secured after two centuries of corrosion.

WE are glad to see that, at last (in the *Bulletin de Correspondance Hellénique*, v., November 1886), the famous Mycena sword-blades are worthily reproduced in two exquisitely delicate chromo-lithographs. The sword-blades were facsimiled in 1884, by M. Blavette, in water-colour, and the paintings passed into the possession of M. Albert Dumont. A few days before his death he presented them to the Academy of Inscriptions, and at last, somewhat tardily, they were given to the public. The swords have since been reproduced in black and white,—once in the *Abhandl.*, once in the German *Mittheilungen*,—but as the extraordinary beauty of the colouring was their chief charm, they could up to the present time only be appreciated by the few who could see the originals at Athens. M. Perrot accompanies the plates with a short article. He agrees with the current opinion that the contents of the Mycena tombs date about the twelfth or eleventh century B.C. This coincides with the time of the Sidonian supremacy, when Phœnicia was the vassal of Egypt. Hence we need not be surprised that the sword-blades are Egyptian rather than Assyrian in inspiration. M. Perrot thinks that they must be regarded as *armes de luze*, and were either bought by some Mycena prince from a Phœnician merchant, or executed at Mycena as copies of Phœnician models.

AT the meeting of the Metropolitan Board of Works last week, the Works and General Purposes Committee presented a report which contained some remarkable statements as to the defective sewerage arrangements of an important part of the West End of London. We give the paragraph of the report in its entirety:—

"Your committee on 16th of July last (No. 6) reported on a letter from the Westminster District Board relative to occasional flooding of the basements of houses in certain parts of the district through the alleged insufficient capacity of the main sewer. Your committee stated in the report that they had learned from the Engineer that upon a recent examination it had been found that in the part of the sewer extending southward from Piccadilly to the river there were 152 drains and five local sewers which were untrapped, and that in the sewer north of the relief weir from Piccadilly to Curzon-street, by Half Moon-street, there were twenty-five untrapped drains and six untrapped sewers. Your committee recommended that the attention of the local authorities, the Vestry of St. George, Hanover-square, and the Westminster District Board, should be called to the matter, with the view to steps being taken to have the sewers and drains properly trapped. The matter was, however, referred back to your Committee, and the Engineer was on the same day instructed to report to your Committee as to the efficiency of the new relief sewer. Your Committee have now had before them a report by the Engineer stating that since the flooding in May last he has not heard that there has been any further complaint, and that until a similar storm to that of the 22nd of May takes place he is without the experience necessary to enable him to make a conclusive report as to the efficiency of the new relief sewer. Your Committee, under these circumstances, have again to submit their former recommendation as follows:—"That the attention of the Westminster District Board and the Vestry of St. George, Hanover-square, be called to the fact of there being many untrapped drains and local sewers in the locality referred to, and to the desirability of steps being taken to have them properly trapped."

We wonder how many other districts of the metropolis would, if thoroughly examined, reveal a like condition of things to that disclosed in this report? The report was adopted, and the Westminster District Board of Works and the Vestry of St. George, Hanover-square ought not to make any delay in carrying out the necessary works.

A FURTHER report of the same Committee, and one which was also adopted by the Board, deserves all the publicity we can give it:—

"Your Committee have further to report that they have considered the letter from the Vestry of Bermondsey, referred by the Board on the 1st inst. (No. 24), stating that their Inspector of Nuisances had reported that sewer sediment, bought from the Board's contractor, was being used in the materials for the construction of four houses, Nos. 190, 192, 194, and 196, Long-lane, and asking the Board to prevent the sale of such sediment for such a purpose. The Engineer reports that from inquiring into this matter he learns that, without the knowledge of the Board's contractors (Messrs. Williams, Son, & Wallington), one of their carmen sold to a builder named Fairhead, for 4s. 6d., three loads of sand which came out of a sewer, and that the District Surveyor took objection to the sand and refused to allow it to be used. The Engineer has requested the contractors to give their carmen strict orders on no account, and for no consideration, to sell or deliver to others or others any sand which they may get out of the main sewers, however inoffensive it may look, but 'to cart it away to unobjectionable places' in accordance with the provisions of the contract. Your committee recommend that the vestry be informed to the foregoing effect."

Those indignant people whose knowledge of building matters is usually in inverse ratio to their vehemence, and who, in season and out of season, cry out "Where is the District Surveyor?"—in utter ignorance that that official's duty mainly consists in seeing that new buildings, or alterations to old ones, are carried out in conformity with the structural requirements of the Building Acts,—will be gratified to find that, in this case at any rate, the District Surveyor has shown commendable vigilance. We need not enlarge on the evil results which might ensue to the occupants of dwelling-houses of which the brickwork was put together with mortar partly composed of "sewer-sediment."

THE President of the Institute, with the modesty which is so characteristic of him when making any reference to his own position and work, unduly undervalued himself, in the opinion of some of his hearers, in his opening address on Monday evening. The designer of such buildings as the British and Foreign Bible Society's House, Blackfriars; the new Museum, Bartholomew's Hospital; the Scottish Widows' Fund Offices, Cornhill; Merchant Taylors' School at Charterhouse; the new Corn Exchange, Mark-lane, and other large buildings, can be no mean architect, and he is besides a man of general culture, and has made considerable additions to our knowledge of geology. He is a valued member of the Geological Society, and a co-worker with Professor Prestwich.

SINCE the discovery of the Hermes of Praxiteles everything that can throw light on the vexed question of the restoration of the right hand of the statue is of interest. Dr. H. Heydemann has collected in the last "Hallisches Winckelmanns-Programm" (No. X.) all the monuments of ancient art that relate to the birth and childhood of the god Dionysos; he devotes a special chapter of his monograph to those works which deal with the special moment selected by Praxiteles in the carrying of the child to the nymphs of Nysa. From a careful consideration of the various bronzes, gems, vases, which fall under this head, he comes to the conclusion that all previously suggested restorations, e.g., bunch of grapes, purse, long caduceus, must be rejected. He proposes to place in the right-hand of the statue a short thyrsos, the property and the symbol of the little wine-god. It is quite consonant with the spirit of Greek art to represent the new-born child already carrying his distinguishing attribute. Dr. Heydemann supposes that Hermes, *en route*, has taken the thyrsos from the child, and that the little Dionysos stretches out his hand to reclaim his property. The motive is simple and natural, and, on the whole, we think the suggestion the best that has been offered.

SOME interesting details of important improvements recently made in the construction of retaining walls on the Southern Railway of France are given in *Le Génie*

Civil, vol. ix., p. 145. These walls have all been built on a specially economical plan. They have a sloping wall face, with nearly parallel faces, and are strengthened at the back by triangular counterforts extending out to or beyond the amount of overhang. The space between the counterforts is filled in with dry rubble walling, or with well-punned earth brought up in layers 8 in. thick. In this way a prism is formed behind the face-wall, exerting no thrust, and of which the weight and adhesion of the counterforts increases the stability of the wall in proportion as the batter of the face wall is increased; also the thrust of the soil is thrown against the side faces of the counterforts, and the cost of the masonry is reduced. In fact, as the batter of the face wall is increased, the resultant pressure of the earth is reduced. The necessary increase of the counterforts, and of the backing, is more than counterbalanced by the reduction in thickness of the face wall, so that eventually the thickness of the face-wall might be theoretically reduced to nothing, and serve only for protecting the surface at the back, resembling, in fact, the consolidation of cuttings by transverse buttresses.

IF there is one thing more than another which amazes the intelligent foreigner it is the distance to which London proper stretches out its octopus-grasp in every direction, absorbing all that comes within its reach. West Ham, which has just dissociated itself from London government, by being constituted a corporation, is a striking example of this. Half a century ago it was a straggling village of some five or six thousand inhabitants on the east bank of the Lea and near its mouth; and, as far as the attractiveness of the neighbourhood is concerned, it might have remained so but for the Act of 1854, which placed many salutary and necessary restrictions on the manufactories existing within the metropolis. Their owners naturally sought a retreat where nobody could interfere with them, and found at West Ham just what they wanted,—liberty to make smells and generally pollute the atmosphere, cheap land, and proximity to water carriage. So West Ham increased rapidly and became one of the busiest and dirtiest places in the kingdom, without regularity, without drainage, without lighting or scavenging, and a perfect playground for zymotic diseases. The rapidity of its growth was such that when a Local Board was established in 1856 the population was 27,000, whereas it is now (in round numbers) 200,000. Its rateable value was 79,000*l.*, whereas now it is 700,000*l.*; the inhabited houses were 4,500 in number, and now are about 28,000. The Local Board did its work well, though economically,—a conjunction of virtues that is not always found in Local Boards.

GIGANTIC as are the proportions of modern London, few cities are so well provided with open spaces within its area and its immediate neighbourhood. In this matter the Patres Conscripti have done their work nobly, and deserve well of their fellow citizens, as have also the Ecclesiastical Commissioners, whose generous views have resulted in the acquisition by the City of the Highgate Woods, a sylvan retreat of uncommon beauty, and easily accessible from every part of London. The Kilburn area of thirty acres, which the Commissioners have also presented to the City by arrangement, is as yet only an open space, the uncompromising character of which, those who visited the Agricultural Show of 1880 have good reason to remember, from its impassable morasses and quagmires. This, however, is easily remedied, and there is no reason why Kilburn Park should not become as diversified and agreeable as any other, though, of course, more or less overlooked by dwellings. When we remember, too, the West Ham Park, Epping Forest, Wanstead Flats, Culsdon Common, and Burnham Beeches, it will be obvious at a glance that the Corporation of London has not been unmindful of its duties, as the trustees for the enormous population around. While enumerating these spacious heritages for the people, we should

not forget the no less valuable work done by Lord Brabazon and his association in securing small open spaces as gardens and playgrounds within the most densely inhabited portions of the City, and we may fairly challenge any place in the world to show a finer series of public works.

THE ordinary meetings of the Institution of Civil Engineers, at eight p.m., commence on Tuesday, the 9th of November next, and will be held every Tuesday, with the exception of the 28th December, 1886, the 4th January, 1887, and the 6th March, 1887, to the 24th May, 1887, inclusive. The annual general meeting of corporate members only is fixed for the 7th June, at eight p.m. Supplemental meetings for students of the Inst. C.E. only will be held on the following Fridays, at 7.30 p.m.; November 19th, December 3rd and 17th, 1886, January 7th and 21st, February 4th and 18th, March 4th and 18th, April 1st, 15th, and 29th, 1887. By permission of the Council, the meetings of the Mechanical Engineers will be held at the Institution, at 7.30 p.m., on the 3rd and 4th of February, and on the 19th and 20th of May, 1887; those of the Telegraph Engineers on the second and fourth Thursdays in each month, between November and May, inclusive, at eight p.m.; those of the Meteorological Society on the third Wednesday in each month, between November and June inclusive, at seven p.m.; and the annual meeting of the Iron and Steel Institute on a day in May, hereafter to be determined.

IT is proposed to restore the figure of the lion of St. Mark, which formerly stood over the central balcony on the western front of the Ducal Palace at Venice. Commenting on this proposal, the *Venice News* remarks,—“By all means, but where is the lion? If it exists let it be put back into its place, but there is no doubt that the proposition will resolve itself into one for making a new lion which never stood there, and setting it up in the place once occupied by another. . . . The argument used on the present occasion in support of the proposal is worth noting. ‘It not being a question of a work of art in the strict sense of the word, but of decorative work, the expense ought not to be considerable.’ So that the exquisite sculpture of the Ducal Palace is not, forsooth, to be called a work of art.”

WE understand that a project is on foot to erect what is called a Victoria Jubilee Tower in the rear of the National Gallery, on ground belonging to the Marquis of Salisbury. The tower will be 420 ft. high and 60 ft. across at the base, and is estimated to cost 30,000*l.* The public will be admitted to ascend the tower by a lift placed in the centre of the building, and it is considered that a large revenue may be reckoned upon from the charge for admission. Mr. W. H. Radford, of Nottingham, is the architect of the building.

PROBABLY most people who have their wits about them are aware that the statement that the drainage of a house has been “thoroughly put in order according to modern sanitary principles” had better be taken *cum grano*,—at least, till a careful inspection has been made. But it is not often that one finds such an amusing example of the simplicity with which drainage improvements may be accepted “by rote,” and without the least notion of the why and wherefore of them, as fell under our notice the other day, in a house about which we received the usual conventional assurance as above quoted. True, the rain-spouts and bath-waste had all been duly disconnected and discharged over outside traps; but in the scullery was a sink waste-pipe which it was not thought convenient to carry to a trap outside, across the width of the room. But the pipe was duly and properly “cut off” just above the floor, and beneath it, in the middle of the floor, and of course right inside the house, a “bell-trap” had been placed for it to discharge over; the trap being, of course, in direct connexion with the sewer, and the water in it impregnated with foul odour. The worthy man who did this had

obviously learned that it was considered the correct thing to disconnect a waste from the trap; but as to the object of it he was evidently quite in the dark!

LETTER FROM PARIS.

The Government has done well in granting the Cross of the Legion of Honour to Madame Dioulafoy, the young and spirited consort of the avant who has just given France one of the most noteworthy archaeological discoveries of the day,—the remains of the palace of Darius. There are already a certain number of women decorated with the national order as a reward for warlike achievements or acts of humanity, but Madame Dioulafoy is only the second who has received this acknowledgment for success in the world of art,—Mlle. Rosa Bonheur being her only predecessor. A similar honour has also recently been awarded to M. Lenoir, the sculptor of the statue of Berlioz, of which an illustration has appeared in the *Builder*.

While we are awaiting the opening of the galleries dedicated to the Dioulafoy exhibits, the Louvre inaugurates its new “Salle de l’École Française Moderne”; where all the pictures of the modern French school are now distributed in three galleries on the principal floors, one reserved for the work of the seventeenth century, another for the eighteenth, and the third, the “Salle des États,” for the artists of the nineteenth century, among whom Ingres and Delacroix are seen at their best; and the “Marshal Prim” of Henri Regnault seems by no means out of place in this illustrious company.

Another new idea of the Direction du Beaux Arts is far more questionable,—that which proposes, under pretext of economy, to deprive our national palaces of their original character as royal residences, and turn them into State manufactories or Record Offices. Thus, according to the unfortunate idea of M. Turquet, Under-Secretary of the Fine Arts Department, the palace of Fontainebleau, so rich in historic memories, is to be despoiled of its furniture to receive a mass of papers and heterogeneous literature now encumbering the attics of the Bibliothèque Nationale, while the *ateliers* of Gobelins and Beauvais are to be installed at Compiègne; and even the Château de Pau, the nursery of Henri IV., is not to escape this administrative devastation, which is playing havoc with the most interesting remains of national history. Lucky that Versailles is spared, and not turned into a prison or a snuff manufactory. The Governmental economies fortunately do not go as far as that, and the abode of Louis XIV. is to become, it appears, the museum for all the furniture “lifted” from other palaces.

We protest strongly against these “utilisations” of buildings which are a heritage from the past. The actual state of the Château of Villars-Cotterets might serve as a warning to M. Turquet, to whom M. Boeswillwald, the “Inspecteur-Général des Monuments Historiques,” has recently pointed out the devastation made here, and first commented on in these columns; a representation which has at least led to some effort being made to preserve, as far as it is still possible, what is left of this ancient abode of Francis I. These observations apply equally, for the same reasons, to the sale of the Crown jewelry, which has been the subject of discussion in the Senate. On national grounds alone the Government should preserve intact this collection, one of the richest and most remarkable in the world, the sale of which at the present moment would realise nothing commensurate with its intrinsic value.

By a curious anomaly, while these things are passing in the Department of Fine Arts, the Minister of War appears as the artists’ friend. It is to General Boulanger that the painters might say, in the words of Horace:—

“Mucenas stavis edite regibus,
O et presidium et dulces deos meum!”

We have already spoken of the barrack decorations projected by the Minister of War. It is now proposed to offer to each regiment a painting of some one of its achievements since its creation,—a fair provision for painters for some years to come. Ten artists are already selected to enter on the task. M. Protais is to represent an African scene, the “Chasseurs à Pied,” whom no one is better acquainted with. M. Henri Dupray will paint “The 14th

• *Builder*, July 26th, 1885, “The Vicissitudes of a Royal Château in France.”

Dragoons at Weerts"; M. Aimé Morot, "The 3rd Cuirassiers at Reischaffen"; M. Berne Bellecourt, "The 1st Regiment of Engineers in the Crimea"; M. Le Blant, "The 9th of the Line at Moscovy"; M. Arus, "The 11th Artillery at Solferino"; M. Delahaye, "The 12th Hussars at Marengo"; M. Renard, "The Death of the Colonel of Sapeurs Pompiers, —M. Froidevaux,—at the burning of the Rue de Charonne"; and, lastly, M. J. Lewis Brown will record the heroic conduct of "The 12th Mounted Chasseurs at Hohenlinden." All these pictures, most of which will probably figure in the next *Salon*, will be reproduced in photogravure, to form a kind of *livre d'or* of the Army. The idea has been much applauded, as may be supposed, in artistic circles, and this new departure in official painting will at least have the advantage of drawing us a little out of that conventional "Classic" painting commenced in the *École des Beaux Arts*, and continued at Rome, which is the parent of a great deal of hopelessly mediocre art.

The Exhibition of the "Envois de Rome," which we have been to see in the *Hôtel on the Quai Malaquais*, does not tend to re-assure one in this respect, though we must add that its deficiencies are chiefly illustrated in painting. The sculpture is much better, and the architecture, which does not unfortunately interest the public so much, is of a very high order.

The Government has nominated a Committee of Management and Finance for the Universal Exhibition, composed of forty-three members, apparently because there are 43 millions (francs) embarked in the enterprise. This committee will have first to examine the plans and estimates; all questions of expenditure will be submitted to it, and its judgment on them will be final. At the present moment, the most fantastic rumours are circulated as to what passes in this committee, which has already held two meetings. We are in a position to say that all the details given recently in Paris papers are incorrect, and we shall probably be able to give shortly the actual plan as submitted by M. Alphand, and which has only just been definitely settled. The famous tower project of M. Eiffel, we may say at once, seems to be definitely adopted; at all events, a modification as to its position has been agreed upon. Instead of standing in the centre of the Champ du Mars, it will be built at its entrance, at the end of the Pont de Jena; two of its enormous piers will be founded in the garden of the Champ du Mars, which the Municipal Council gives up for the purpose, under the condition that after twenty years the Municipality is to become the owner of this unwieldy monument.

The number of public works now going on, or just about to be undertaken, is a sign that the times are mending; and the most important of all, the Metropolitan Railway, is at this moment under the consideration of a Parliamentary Committee. According to the project as recently modified by the Ministry of Public Works, the complete system (a plan of which we have published) will comprehend a length of 47 kilomètres, 839 mètres; the portion definitely settled on, 35 kilomètres, 860 mètres. This latter portion includes rather more than 6 kilomètres in open cuttings, over 20 in tunnels, and 9 on viaducts; and its cost is estimated at 285 million francs, in place of the 235 of the project as at first started.

The excavations on the site of the arena of the ancient Lutetia, in furtherance of which the Municipality voted a considerable sum at the outset for the purchase of property on the site, have turned out somewhat disappointing, at least in an artistic sense. Nevertheless, since the operations have been undertaken, there is a kind of necessity to come honourably out of the affair, to complete the work, and found on the site the projected "Musée des Arènes," in the middle of a square, the plan of which is prepared, and which will not be without its picturesque attractions. After having already given 200,000 francs to the work, the Council can hardly refuse an additional 50,000, necessary to complete the restoration so precious in the eyes of archaeologists, and which will, besides, give that portion of the left bank a new public promenade.

A word as to the magnificent gift of the Duc d'Anjou to the Institut. Thanks to his really royal munificence, the domain of Chantilly and the incomparable château, which Charles Yriarte described so ably in these columns, with its rich historic and artistic collections, its celebrated library and numerous works in sculpture, has

become the property of France. The estate represents a capital of 29 to 30 millions of francs, which the Institut is to administer with a view to further increasing the collection of *chefs d'œuvre*, which, in itself, already represents a value of at least 15 millions. The bequest may be considered one of the most true acts of patriotism of the kind of which we have any record.

M. Gaston Roulet, a marine painter, who has returned from a long excursion to Tonkin and Annam, is at present exhibiting at the Galerie Georges Petit, Rue de Sèze, a great number of water-colours and paintings, equally interesting in an ethnographic and an artistic sense. M. Roulet has studied with great care scenes little known to landscape-painters, and his collection, the three most important works in which have been purchased by the State, is commencement of the series of private exhibitions which take place every winter in Paris.

Each month brings its losses in the world of art. We have on this occasion to record the death of M. Ernest Eugene Hiolle, a sculptor of great talent, who has died at the age of fifty-two, just as he had received the commission to adorn the new Sorbonne with a statue in alto-relief symbolising "Philosophy." Hiolle was born at Valenciennes in 1834. He was a pupil of Joffroy and of Grandfils. He obtained the Prix de Rome in 1852, and medals at the *Salons* of 1867, 1869, and 1870, two medals of honour in 1870 and 1878, and the Cross of the Legion of Honour in 1873. Among his most remarkable works may be mentioned the commemorative monument, erected by the town of Cambrai, to soldiers killed during the war, the busts of Chenavard and of Viollet-le-Duc, and the statue of General Foy intended for the town of Ham. There is talk of appointing M. Longepied, the author of the group "Immortalité," which was illustrated in our pages, his successor in the work for the Sorbonne.

We should not omit to mention an interesting exhibition of stained glass, organised by M. Chas. Champigneulle, who has done so much to give new life and vigour to the art of glass-painting in its modern application. We have noted with pleasure, at this exhibition, two works already known to our readers, the "Fontaine d'Amour," and the "Retour d'Alsace Lorraine à la France." Besides a great number of cartoons and of windows executed for public buildings and private mansions, this exhibition contains a piece of stained glass intended for the Abbey Church of St. Vincent, at Metz, which measures no less than 90 square mètres. The subject of this portion is the Resurrection. We notice also a window, representing the Life of Christ, in the style of the Louis XIII. period, executed after tracings taken from the Cathedral of Bourges, and a very fine window, in the same style, executed for the nave of Notre Dame at Paris.

PROGRESS OF THE WORKS

AT ST. BARTHOLOMEW'S CHURCH, SMITHFIELD.

On Tuesday last, November 2nd, the Executive Committee met to inspect the progress of the restorations and reparations in this ancient church. The fringe factory which overhung the altar has been removed: a new altar, the gift of Miss Overbury, is in the course of erection, and new altar-steps, and a marble and mosaic pavement in the apse have been given by the patron, the Rev. J. P. Phillips, in memory of the late rector, the Rev. J. Abbess. The position of this altar has been fixed by the new sanctuary arch, which for this purpose has been taken as the chord of the apse. A new lectern has also been provided. It is the gift of Mrs. J. H. Evans, in memory of her husband. The apse itself has been completed according to the plan described in our columns at the time of its adoption. This work, which has been provided for by the patron, is very effective, and represents in all probability the original appearance of the east end of the church. The details are all derived from existing details, which are abundant in the ancient parts of the fabric. The discovery of the tracery of the great east window is an interesting feature of the progress of the restorations. Portions of the arceding of the original Norman apse are also found, many of the stones of which still retain their colour, and some of them have been reinserted in the centre arch of the new arcade.

The entire church has been re-roofed with oak to keep out the weather; only the principal beams, which are of massive dimensions, proved on examination to be sufficiently sound to warrant their being retained. The remains of the Lady-chapel and of the crypt forming parts of the fringe factory have been secured against further dilapidation until the committee determine to what uses these parts of the church shall be applied. Mr. Aston Webb, the architect, taking advantage of the fact that the edifice, as it now stands, is the choir only of the ancient priory church, is erecting clergy choir stalls at the west end, this being the position originally occupied by the canons. Over these the organ, recently purchased from St. Stephen's Church, Walbrook, is being erected. Schemes for improving the arrangements for warming the church, and for opening a doorway at the west end of the south aisle, in place of the present west door, were sanctioned last Tuesday, and it was hoped that towards the end of the present month a day might be fixed for the ceremony of reopening the church for divine service. The seats for the congregation will not be placed as heretofore facing the east end, but facing north and south, after the usual manner of arranging seats in cathedral choirs. The committee have still a heavy work before them. They desire to clear off the debts, which amount to upwards of 5,000*l.*, on account of several of the works which we have described. They also wish to remove the blacksmith's forge and dwelling-house from the north transept. The forge is now held by four members of the committee, at the disposal of the committee for 1,125*l.* As a portion only of the premises will be required by the architect's plans, the remainder could be sold or exchanged for the dwelling-house which will be required for the restoration. Being charity property the consent of the Charity Commissioners to dispose of the dwelling-house will be necessary. The removal of the boys' school from the triforium will enable the arches to be opened out at a merely nominal expense. To remove the vestry, which now blocks up the south transept, is a very necessary work; the mouldings of the great arch are hidden, and the canvas-covered hoarding is a great disfigurement. The only remaining Norman arch and arcade of the triforium of the transepts are entirely hidden, the arch being at present filled by the vestry fireplace. The light which this transept window would afford is much needed in the church, and a new vestry could conveniently be provided elsewhere. It is proposed to build shallow transepts only, both north and south, but the construction of these now becomes a very urgent matter, as the architect reports that the great arches of the crossing have dropped considerably, owing to the destruction of the original transepts.

FIRE AND DANGEROUS PARTY WALLS.

MANY Londoners have to live in houses separated from each other by a wall which they suppose to be so solid and massive as to be a guarantee that their neighbours can do them no harm. They think, too, that except for perhaps some temporary alarm, they may sit in security while their neighbour's house is burned out. They are, for the most part, happily ignorant that the wall is honeycombed with flues; they see the smoke go up, and they think that somehow or other it finds its way safely to the chimney-pots. In most houses there are the projecting chimney-breasts, but in many there are none; and the party-wall runs through in an unbroken straight line. People are conscious of flues, perhaps, when the sweep (!), at an unearthly hour, begins to push up his broom from below. Gradually it passes the bedroom, and then there is a series of rushing noises and rattling noises as detached pieces of pargetting fall off; but when the sweep goes off, they fancy perfect security reigns. It may surprise them to know that sweeping knocks off bad pargetting, and leaves the bricks exposed, and these bricks are sometimes not laid so carefully as they ought to be by the working bricklayer, and that open joints, putlog holes, timbers, and lead may be sources of danger of the most insidious kind. Occasionally smells are noticed, and then die away, until at last the much-enduring woodwork gets so heated that a floor is ignited where contiguous to the bad flue, especially if it gets overheated by a collection of soot. Recently, two cases of ignition by this cause have occurred at



Fig. 11.



Fig. 17.



Fig. 18.



Fig. 21.

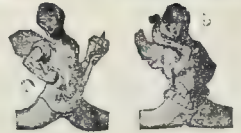
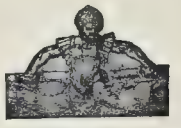


Fig. 19.

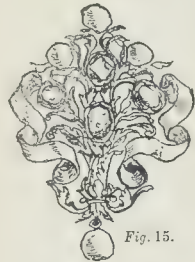


Fig. 15.

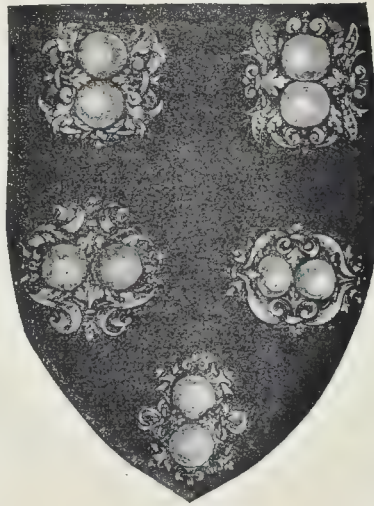


Fig. 13.



Fig. 20.



Fig. 22.



Fig. 23.

Nos. 1 and 2, Connaught-place, the residences of Mr. Beresford-Hope and of Lord Randolph Churchill, M.P., respectively. When Mr. R. H. Carpenter examined the houses he found that the first fire was caused by ties of fir covered with lead (!) passing each side of the flue, with the object apparently of tying in the front to the party wall. These ties had ignited, and there being nothing between the burning flue and the library bookcases except this tie 4 in. wide, the result may be imagined. Providentially, this ignition took place in the daytime, and Mr. Beresford-Hope's servants quickly extinguished it. A few weeks later the smell of fire was noticed for many hours, and was traced by the builder sent for to the lead flat over the offices next Hyde Park. It was extinguished easily, as the lead had kept the smouldering red-hot timbers from bursting into flame; and the house was again saved. On examination, it was found that the horizontal flues were so badly built that in one place a portion of a brick had been knocked out by a sweep, and thus direct communication was opened between the flue and the wood trimmer, 4 in. from it. The result was not surprising. Here, again, timber and lead were found to be introduced into the flues, and the pargeting had disappeared.

Such bad floors may have been safe in the old times of open ranges, just as Medieval buildings still exist, with beams built into their flues, in the days of wood fires; but now that kitcheners and improved ranges are used, the draught, and consequent heat, is so much greater, that the weak points in our flues are found out. The Building Act, of course, forbids such contiguity of wood and flues, but many London houses were built before its enactment, and many houses even now, with all the care taken by the District Surveyors, are far from perfect.

Mr. Beresford-Hope, under his architect's directions, has had the wall-face of all his flues cut out, and the pargeting renewed, and all open joints filled in solidly, the wood cut out when running into the flues and new stacks of external flues have been built for the office-flues of both Nos. 1 and 2, Connaught-place, so as to keep the heat from the ranges, &c., out of the thin (18 in.) party-wall, and away from the floors and other woodwork. At the same time, the very dangerous horizontal flues of No. 2 have been entirely rebuilt in a thoroughly solid manner.

It may be added that the houses in Connaught-place were erected some eighty years ago, and were the first built of that long line of houses facing Hyde Park.

HANS HOLBEIN'S DECORATIVE WORK.*

SEVERAL of the mounts are devoted exclusively to designs for jewellery. In fig. 13 there are five different designs for setting two pearls. Fig. 14 is an elaborate pendant for sapphires and pearls; fig. 15, a pleasantly-devised brooch, with scrolls and good conventional leaves supporting jewels. Fig. 16, an elaborate and very finely



Fig. 16.

designed bit of Renaissance work, set with large stones, probably intended for a bracelet. Turning to "another class of goods," figures 17 and 18 are charming little pieces of gold work, which, unless it is an anachronism to say so, may have served for the terminals to fob-ribbons. In fig. 19 are five designs for figures, probably part of the detail of some loving-cup.

In fig. 20, a magnificent jewelled cup, the designer had more scope for the free play of his fancy. All the detail is worked out with scrupulous care, the arabesque chasing being especially fine. We have reserved what are, perhaps, the choicest specimens of the work till the last; they are a series of dagger-hilts and guards, from which we have selected two very beautiful ones (figures 21 and 22) and a magnificently embossed dagger in sheath (fig. 23). The first of these is noticeable for the elaborateness of the design and the fidelity with which the lines of construction are followed by the chief feature of the ornament;

the second is noticeable for its simplicity, the work on the guard being especially fine; and the third is remarkable as well for the graceful lines of construction as for the wealth of ornament which is lavished upon it.

There are many more designs in this remarkable collection to which we should like to have drawn our readers' attention, but our space as well as our stock of superlatives is exhausted. Our own appreciation of them we confess to be of the highest, and, if we may judge by his words and his deeds, so also was his royal master's. Of his deeds there is sufficient witness in the multitude of designs which Holbein made for him, and of which the collection in the British Museum is clearly but a very small sample; of his words we close this article with the well-known ones:—"I tell you, my lord, that out of seven peasants I can, if I please any day, make seven earls; but out of seven earls, I could not make one such artist as Hans Holbein."

THE PRESIDENT'S ADDRESS:

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE following is the address delivered by the President of the Institute, Mr. E. T. Anson, F.G.S.,* on Monday evening last:—

Gentlemen,—It is my duty this evening, when presiding for the first time at the opening meeting of a new session, to address you, not only on the subject of the affairs of the body corporate of which we are members, but also in respect of matters which interest generally all British architects throughout the empire. I cannot, however, hope in any remarks I may make to impress you in the same fashion or with the same weight of argument and personal quality as the majority of my predecessors in this chair have succeeded in doing. I am simply a man who for many years has sat as a member of your Council and worked to the best of his ability for the welfare of the Institute, with the hope of rising in the position of an ordinary member of Council to attain that of a Vice-President, and then that of President; and, gentlemen, I thank you, with all my heart, for having permitted and having assisted me to gratify my expectations and desires in this respect. For if, as I believe, men work best who work with some ulterior object,—provided, of course, that it be an honourable one, as all the work of this Institute is,—it is natural to conceive that a great incentive to such work lies in the assurance that it will be acknowledged by the members and recompensed by advancement to honours which it is within their power to confer; and I venture to think that there is no man who takes an interest in this Institute who would not esteem it an ample reward for any labours he may have undergone in its behalf, to be placed by his compeers in the first rank, and at the head of the noble profession to which he belongs.

It cannot, I think, be questioned that during the last ten years, a great increase of our members, of our general prosperity, and of our legitimate influence, has taken place; and I can see nothing, when looking back over a few months, or looking forward, as I may be excused for doing, through the term of my office, which has impaired, or is likely to impair, the comparative success already achieved. The absorbing work of the past Session lay in the preparation of a draft Charter, partly as a supplement to the one we possess, and for the grant of which we proposed to petition Her Majesty in Council. This has been done, and it has been announced that a Committee of the Lords of the Privy Council will take our petition into consideration on Wednesday next. The draft in question occupied many months of careful thought, both by your Council and by the general body of members; and, if I may express a personal opinion, the draft includes an enlargement of functions and a series of progressive developments necessitated by the ever-changing conditions of existence, which, if granted to us and duly carried out, will conduce to the lasting and best interests, not only of the body corporate

* No. 2 of the Institute's *Journal of Proceedings* for the current Session says that Mr. T. Anson, whose first year of office as President commenced in May last, is the senior Fellow of the Institute, having been elected in 1848. Next to him come Mr. David Brandon, F.S.A., Past Vice-President, elected a Fellow in the same year, and an Associate in 1839; but Mr. T. Anson, who was never an Associate, is not the oldest living member, for Mr. George Godwin, F.R.S. (Past Vice-President and Royal Gold Medalist), elected a Fellow in 1841, entered the then limited ranks of the Associates in 1836.

but also of the profession of British architects; for in all that we carry out, or hope to carry out, we must remember that the two,—the Institute and the Profession,—are more than allied; they are one and the same force, inseparable and indistinguishable one from the other. Moreover, our petition, which prays for the grant of powers to further professional education, and, among other things, to impose an Examination test, has raised the hopes and aroused the sympathies of our brethren not in the mother country alone, but also in Canada, Australia, New Zealand, Cape Colony, and many other smaller though not less valued sections of the British Empire.

During the consideration of the Supplemental Charter, a happy proposal was made by one of our senior members, intended by him to act in direct harmony with the accepted movement indicated by the terms of that draft. It was to organise, for what the original Charter calls the advancement of architecture, four Departmental Committees, to be appointed by the general body of members, and each to have its own honorary officers, and its own departmental action. This important step, which, in my opinion, is quite in the right direction if only kept within certain limits, was considered by a Special Committee, whose report enabled the new Standing Committees to be appointed at our last annual meeting, namely, one for art, one for literature, one for practice, and one for science. These quasi-independent committees are now well at work, and when I qualify approval of the step thus taken, by hinting, as I have just done, at the limits necessary to their action, I mean simply to extol the wisdom shown by the general body in ordaining that such committees should report to your Council only, and that no public action should be taken by any one of them, or any combination of them, except through your Council.

Another step, which I think is fraught with more possibilities of accident than is the former,—a step towards the professional federation of architects,—has been taken by a special committee, at whose meetings I have presided, and where I have had opportunities of hearing the opinions on the subject of the several societies in Glasgow, Liverpool, Manchester, Leeds, Leicester, Nottingham, and Bristol, as well as of individual members from various parts of the country. They have led me to believe that the desire for federation, or, in other words, systematic organisation, is stronger and more pronounced in the provinces than it is in London, and I know that this desire is felt and expressed in Australia and New Zealand, countries which, during the lifetime of living men of forty, have grown into the possession of vast cities, containing public and private buildings which even this mighty metropolis might well be proud to see included within its area. Our next meeting takes place to-morrow, when we are to discuss as a whole a series of tentative propositions, put together from time to time, after much consideration during former meetings, which propositions have been in the hands of every member of the Special Committee since the end of August last. That there should be difficulty in settling the conditions under which such organisation can be carried out is, I think, easy to understand. But there are principles which may be established as a basis, not the least of which are the desirability of maintaining uniformity of practice, the necessity of examinations, and a constant interchange of communications relating to the art, science, and profession of architecture. When I tell you that all these things, with many others incidental thereto, are being considered, and by men who do not hesitate, as the accredited representatives of local societies, to make repeated journeys from distant and important centres of activity, expressly to take part with their metropolitan brethren in the consideration of the subject, you will, I think, be disposed to await, not impatiently, the Committee's Report, which cannot now be long delayed.

The closing meeting of the past session was one of a highly gratifying character, as much to the members generally as to myself. The presentation of the Royal Gold Medal was witnessed by distinguished members of our body from America and France, attracted by the presence of Monsieur Garnier, whose name has long been favourably known to us as the architect of the Paris Opera House. Many of us have admired its magnificent exterior, its vast and sumptuous halls, and their approaches; but we had not until then had its accomplished

architect bodily with us. We knew his work, we saw and welcomed him personally amongst us, and there was a reality and a vitality in the meeting which gave it unusual interest.

That, too, was the evening on which the medals and prizes annually awarded by this Institute were distributed, and as I had previously assisted at a similar distribution of prizes in Paris, I could hardly fail to note the difference between an important annual event as it is carried out in the two countries.

In Paris the annual distribution of prizes is held in the handsome theatre of the *École des Beaux-Arts*, filled by friends of the prizewinners, who testify by their applause to the interest they take as the various prizes are distributed; and an important officer of State presides. The *Hémicycle*, which forms the background, is decorated with one of the finest of modern frescoes, painted by Paul Delaroche. One special feature of the meeting, which was very noteworthy, also attracted me. Prizes were not only distributed to students in architecture, but others were also given to master-artificers and to foremen of works, whose skill as workmen and whose general good conduct had merited such distinction. Many of this latter class of men were veterans, and, in their sphere, of wide reputation; and the cordial enthusiasm with which they were greeted whilst receiving their prizes formed a scene of peculiar interest to an Englishman. Again, at the close of the proceedings, the *Société Centrale des Architectes* invited every prizeman,—architect, master-artificer, and contre-maitre,—to join the members' dinner, which was provided in one of the magnificent rooms of the *Hôtel Continental*, and which it was my good fortune to attend. Whether we could do the same thing here I will not stop to inquire; but certainly such a public and solemn distribution of honours must promote an enthusiasm which cannot but tend to incite all student-workers, both of manual and of mental capacity, to attain distinction in their career, and must, moreover, confer exceptional happiness on a large number of meritorious artisans, who, at different social levels are labouring with us, and without whose intelligent co-operation the work which the architect designs cannot be properly realised.

Amongst the events which have occurred since the last Presidential address, I may record with much satisfaction that one of our former Presidents, Horace Jones, has received the honour of knighthood. The Council had, prior to the recess, the pleasure of formally congratulating him, and we may congratulate ourselves, gentlemen, that this honour has been awarded to him as a public recognition of the many years of service he has devoted to carrying out the work of the City of London; having erected during his years of office the spacious and excellent markets the City now possesses in Billingsgate, Smithfield, and Leadenhall; having re-roofed the Guildhall, built a library, and a Hall of Assembly for the Common Council, besides other works of importance. These are all great municipal buildings, but he has also done work which does not fall to the lot of most architects: namely, the onerous task of acquiring the costly sites on which these large buildings stand, and of settling, I believe, in the most satisfactory manner, the compensations which were paid. Such work is always more or less contentious, yet it has been accomplished by Sir Horace Jones with an urbanity and a success,—though he may not, and no doubt, did not, concur in every owner's estimate of the property acquired,—which go to prove that he did, at all events, satisfy the claimants that they were considerably and kindly dealt with.

But if we have cause to congratulate ourselves on some of the events of the last session, there have been numerous losses by death in almost all our classes of members which arouse an opposite sentiment. The death of Mr. James Ferguson, a Past Vice-President, at the age of 78, was a loss all the more felt because up to within a month of his death he was busy on our committees, and actively interested in the work of the Institute. We have also lost Mr. J. H. Good, an Associate as early as 1840, and a Fellow in 1847, who was a life member, and who, latterly, having relinquished practice, occupied himself very regularly with the affairs of the Architects' Benevolent Society. Another life member, elected a Fellow in 1861, and an Associate in 1849, Mr. R. Kyrle Penson, has recently died at the age of 70. He held several appointments in Carmarthenshire and Cardigan-

shire, was a justice of the peace, and the architect of a large number of churches, residences, schools, bridges, and other works, among which I will mention the new church of St. Mark at Wrexham, and Dynevor Castle. Mr. Edward Hughes, of Huddersfield, elected an Associate in 1863 and a Fellow in 1878, who has bequeathed to our library some volumes of the well-known "Spring Gardens Sketch Book," and Mr. Sancton Wood, who has left a legacy of 100*l.* to the Architects' Benevolent Society, are both deceased. The latter, who was elected an Associate in 1841, and a Fellow in 1847, had been the District Surveyor for St. Luke's, Chelsea, for twenty years, and he was a member of the Board of Examiners appointed by the Institute under the terms of the Metropolitan Building Act; his later years were much employed in arbitrations, but he will be always remembered as the architect of several of the early termini and local railway stations. He designed those on the Eastern Counties Railway, now the Great Eastern, including the old terminus at Shoreditch, and he was the architect of the various stations between Dublin and Cork. Another Fellow, elected in 1880, Mr. Thomas Goodchild, whose practice lay at Teddington and its neighbourhood, died last December. From among our Associates we have lost Mr. C. B. Thurston, a Bachelor of Arts, and a Fellow of the Society of Antiquaries, who was elected a member of this body in 1851; also Mr. George Borer, of the firm of Messrs. Borer & Dobb; and Mr. George Smith, of Chester; also Mr. A. T. Ellison, elected in 1885, and Mr. Lionel T. Weller, elected in 1884, the two last having passed the Obligatory Examination in Architecture. Four Hon. Associates are deceased, namely, the Duke of Abercorn, K.G., the well-remembered Viceroy of Ireland; Mr. E. E. Antrobus, the genial Hon. Secretary to the Art Union of London; Colonel Morant, R.E., who went to Madras as the Officiating Government Architect while our Fellow, Mr. Chisholm, was at home on leave; and the Rev. Benjamin Webb, M.A., a Fellow of the Society of Antiquaries, the Vicar of St. Andrew's, Wells-street, and a Prebendary of St. Paul's. Mr. Webb, as many of my audience may remember, took an active part with Mr. Beresford Hope in founding the Cambridge Camden Society, and he was editor of the *Ecclesiologist*, and the *Ecclesiological Society's* publications.

Outside the ranks of this Institute there has passed away, somewhat suddenly, an architect of great ability, who, at an earlier period of his career, executed works which have had considerable influence upon the arts of design in this country, namely, Mr. E. W. Godwin, F.S.A. There has also succumbed, at the age of sixty-eight, a practitioner of some note, a man of high character, Mr. John Pritchard, of Llandaff. A pupil of Augustus Welby Pugin, and the principal author of the new portions of Llandaff Cathedral, he will be justly remembered as the architect of a celebrated residence in Warwickshire,—I mean Easington Hall,—which twenty odd years ago excited much comment, and deserved approbation.

We have further learned, since my predecessor in this chair addressed you, that three Corresponding Members, located respectively in Athens, France, and the United States, are deceased. The first, Lysandre Kaftangiolou, a friend of the late Professor Donaldson, was originally the director of the *École des Beaux-Arts* at Athens, and an hon. member of the Academy of St. Luc at Rome, and of those of Milan, Bologna, Parma, Madrid, Lisbon, Copenhagen, and Vienna. He made communications upon archaeological subjects during the earlier years of the Institute, having been elected in 1857, and he died in October of last year. The second, Mathien-Prosper Morey, elected in 1855, was architect to the City of Nancy, and a Corresponding Member of the *Académie des Beaux-Arts* (Institut de France). The third, Mr. Henry Hobson Richardson, who, though elected a member, did not live long enough to enable us to insert his name in our distinguished list of Corresponding Members, was born in 1838 in Louisiana, one of the Southern States of America. He appears to have graduated at Harvard College in 1859, and soon afterwards left for Europe, to enter the *Paris École des Beaux-Arts* as a student. While there he heard that his parents had been reduced to penury in consequence of the Civil War then raging, and being thus forced to earn his own living he obtained employment in Paris. Some seven

years after, he returned to New York and started there in business. Mr. Richardson subsequently went to Boston, and from the Boston professional journal (the *American Architect*) I have cut the following note:—

"To him his work was everything. He could talk well of a hundred other things, and did so when the occasion seemed to require it, but he had evidently not much heart in them, and was always glad to return to the one theme of which he was never tired, and from which no pain or fatigue could turn away his thoughts. It was impossible to be long near him without sharing to some extent in his enthusiasm, and the high ideal of their work, which so honourably distinguishes the younger generation of our architects, is undoubtedly due in great part to the direct or indirect influence of his example. In his death American architecture suffers an invaluable bereavement. Few of us perhaps, and least of all himself, have realised how conspicuous he was in the profession in this country, yet from Maine to Texas there is probably not an office in which Mr. Richardson's work was not an inexhaustible subject of discussion and source of inspiration. It will be harder than we think to accustom ourselves to go without this, but if we would do as he would wish to have us, let us, as the recollection of our loss recurs to us, resolve to emulate his courage and enthusiasm, and rejoice that his physical sufferings should to the end have been consoled by the affection which he cared for beyond all other things."

Those who were present at an exhibition of photographs of the late Mr. Richardson's executed works, held in this room a few months ago, while he was yet alive, will not readily forget the impression they made upon the architects of the "old country." We thereby learned that a school, so to speak, had arisen within the United States, a school of much artistic power, which bade fair in due season to attain position and ultimate eminence in the architectural records of the old and new worlds; and looking back now, as I can do, over half a century of practice as an architect and surveyor, I venture to lay some stress on this advent of our American kinsmen to a place in the great Republic of Arts. I hope that they have laid for it a solid and substantial foundation of science, without which no architecture, however beautiful in appearance, can ever flourish or reach perfection.

When I was a young man, my feelings used to induce me to think that the only really important part of architecture was art, and that artistic power was wholly an instinct; that, in fact, the highest quality of an architect was to be an artist. But, depend upon it, art-power does not suffice to make an architect. The grandest effects in architecture have depended quite as much upon constructive as upon artistic knowledge. The composition of a plan, its adaptation to the purpose for which the building is intended, is rather a mental than a manual exercise, and, though artistic feeling may undoubtedly enhance the effects to be obtained by thoughtful arrangement, it is study and practice and experience that combine to render an interior workable and fit for every-day use. I am, therefore, an advocate for the systematic teaching of art, as far as it can be taught, and of all those sciences pertaining to the theory and practice of building construction. The traditional custom of apprenticing young men to a practitioner, whereby they can closely follow and assist in the work done in an architect's office, is, I still think, a right system, advantageous to the apprentice if he be worth anything at all; but it is far, very far, from being enough, and the more often this is emphasised by those who occupy the position I have the honour for a time to hold, the better it will be for the profession, at least until the subject of architectural education is better understood than it is at present, or until people cease to repeat the formula that architects, like French cooks, must be born and cannot be made. Surely the old and true saying that the three things necessary to make a successful man in any profession are nature, study, and practice, may be safely applied to our own, and surely two out of these three items are distinctly within the area of teachable things. Indeed, they require a great deal of teaching, and any attempt to teach, if it is to be successful, must be tested by constant examination.

Happily this Institute agreed, some ten years ago, to make the passing of an Examination a condition precedent to admission as a candidate for the Associateship, and the probability of a similar step being taken as regards the Fellowship, even now foreshadowed, may in a few years become a reality. I feel that it is an absolute obligation on the senior members of the Institute to personally bring this matter to the notice of those in their employ, whether as assistants or pupils. I venture even to recommend the insertion in the indentures of every articled pupil that he should engage in due

course to present himself before our Board of Examiners, and pass, or, at least, try to pass, the Examination in Architecture.

Every pupil who has devoted himself in a reasonable manner to his studies, and whose professional education has received due care from the master to whom he has been articled, should be able, within a year after he is out of his time, to pass that Examination; for in its present range it comprises merely the minimum amount of knowledge which a young professional man should early possess. The mental exercise, both before and during the examination, is proved to have been of the highest value to many. In their preparation for it candidates are compelled to review and consolidate the information acquired by them in previous years. The Examination itself serves to indicate their weakness in particular branches of knowledge, and the necessity of extending or continuing their studies thenceforth on the sound basis which their preparation for the Examination will have laid become apparent to them. But it is too much to expect that young men who see their predecessors successful in practice without having undergone what some may call the drudgery of this educational course, will voluntarily subject themselves to such a test, at least in large numbers; and it is only by the direct personal influence of masters and employers over their pupils and clerks that the advantages derived from passing the examination can be brought home to young men.

Nevertheless it cannot be too clearly or too quickly understood that the only and proper gate for admission into the recognised ranks of the profession is the Examination test, and all young students proposing to become architects, should prepare themselves by study and application to undergo it. The inducements to do so are two-fold, namely the immeasurable personal advantage, and the absolute professional necessity.

However great, though, may be our exertions in this respect, both corporate and individual, they must be frustrated for some time to come by the lamentable deficiency, in too many cases, of early education among those who seek to enter, and who do enter, our profession. The fact has not escaped the attention of the Special Education Committee now sitting,—a committee which includes three representatives appointed by the Architectural Association,—and I trust that the report which we may expect to receive ere long from this Committee will enable you, gentlemen, to see your way to devising some important measures for the furtherance of professional education, in conjunction with the Committee and Members of the Architectural Association. The excellence of the educational work it does, and the self-sacrifice and devotion of its senior members, who direct the studies of their more youthful brethren, are known to you all, but, perhaps, none who have not personally assisted at its classes know how great is that self-sacrifice, how real is that devotion, and how ungrudgingly the lasting services thus rendered are bestowed. For this reason I experience a sense of satisfaction, mingled with hope, in which I feel sure that you join, that the powers we have humbly asked for, in the petition recently presented to Her Majesty in Council, will enable the Institute to render to the Architectural Association not only verbal commendation, but also substantial aid in support of its educational work.

And while preparing, in all good faith, to lend a hand, or at least to offer one, to a junior and distinct body, working for objects which, if not identical, are identified with our own, may we not hope that a higher educational institution, far older, infinitely richer than we are, and invested with extraordinary powers, which it derives direct from the Sovereign, may in like manner hold out a hand to us? Although there exists nothing in this country resembling the Paris École des Beaux-Arts, which is maintained at great cost by the State, there is the Royal Academy of Arts, which, by prudent management, under the protection of three kings and one queen of England, has become possessed of very ample means. May we not naturally look to this favoured institution, and hope that the Royal Academy will see its way not only to carry out the provisions relating to architecture as laid down at its foundation, but also to develop the educational powers with which it has been specially intrusted? I hope that no one will misinterpret my meaning, or fancy that I am in the slightest degree inimical to the Royal Academy, or that I wish it the

smallest harm. On the contrary, I look back to its "Antique" school with gratitude, for in my time it was the only institution in England which offered any help or encouragement to art-students, and during all the years I have known the Academy there has never been, I feel sure, a President of that body more desirous of elevating the arts of his country, or more wisely alive to the value of useful modifications and developments, or in his own person more fully accomplished, than Sir Frederick Leighton. At the same time, I feel bound, as the President of this Institute, to offer a remark on the present incomplete representation of Architecture at the Royal Academy, and an expression of regret that the careful recommendations of the Royal Commission of 1863, which were intended to improve the character of that representation, have been totally disregarded. Indeed, I venture to direct your attention, gentlemen, to an article entitled, "The Position of Architecture at the Royal Academy," which appeared on the 2nd of October last in the *Builder*,—that excellent journal so long edited by my old and esteemed friend, Mr. George Godwin. That article contained the gist of a memorial which was presented by this Institute twenty-seven years ago, to the Council of the Royal Academy, respectfully praying them for (1) the appointment of a larger number of architect-Academicians and architect-Associates, (2) greater powers for the same, (3) the provision of means of instruction to architect-students, and (4) a more systematic scheme of general instruction in all branches of the fine arts, and more efficient tests, by examination or otherwise, of knowledge and proficiency. Of these four points only the third, the Class of Architecture, was accorded to us, and that only eight years after we had respectfully asked for it. Of the three points which remain, the first and fourth seem to me to be of great importance, and quite worthy, gentlemen, of your renewed consideration during the present session.

Before leaving the subject of the educational means provided for architectural students, I should like to refer to the Examination which, for the last thirty years, has been entrusted to us by statute. Although but slight artistic acquirements are necessary for those who have to fulfil the duties of district surveyor, a large amount of practical knowledge is necessary, and I hold that these appointments, some of which are of considerable value, offer opportunities for professional employment which form a valuable incident in our profession. The emoluments differ greatly in different districts, and I think that the Metropolitan Board would act wisely, and to the public advantage, if it promoted the most meritorious of its surveyors as vacancies from death or resignation occur in the busier and consequently more remunerative districts,—a proceeding which, in the cases respectively of Mr. Aitchison, A.R.A., and Professor T. Roger Smith, has already afforded cause for satisfaction. Anyhow, I venture to recommend young men not to neglect the means of advancement secured, in more ways than one, by passing the Examination for Certificates of Competency to Act as District Surveyor in London, or as Building Surveyor under Local Authorities; for although such positions offer but little scope for the attainment of artistic distinction, they confer substantial advantages, both practical and pecuniary, which an exclusive devotion to art often fails to provide.

I hear a general complaint that professional employment is conspicuously lacking, but there is still a considerable amount of metropolitan building going on, and much land rendered vacant by recent alterations, after remaining uncovered for some time, is now being built upon. This is particularly noticeable on the noble course of the Victoria Embankment, than which I think there are few finer thoroughfares in Europe. A little further westwards, Northumberland Avenue, which remained so long devoid of buildings, is now lined with them, including three huge hotels; and it is very noteworthy that, within the last twenty years, so many edifices of this description should have been erected. It was, no doubt, a pressing want in London, and, judging by the rapidity and ease with which these hotels appear to fill and to continue to be filled, the demand for them does not appear to have been even yet quite supplied. There is another class of buildings the increase of which has been very remarkable of late years, namely theatres, due probably as much

to the larger number of visitors, which the facility of locomotion brings to us, as to the spread of the metropolis and the increase of its population.

The wonderful extension of the suburbs still goes on, and looking to the old part of London,—that comprising the greater portion of the City,—although much has been pulled down and rebuilt, there still remains a very large number of buildings, which must find work to do for metropolitan architects for many years still to come. In the provinces, also, there are municipal and other large works commenced and contemplated, and though I have heard some of my younger brethren say that they are fighting the battle of life in our profession somewhat in the guise of an army of martyrs,—and in our early years success seems long deferred,—still, as a rule, it comes to those who fight for it well and honestly, and with perseverance. Indeed, I have lived to see many of my contemporaries of fifty years ago realise a full result for their early labours, and I do not doubt but that fifty years hence, more than one juvenile martyr of the present time will, in all humility and thankfulness, admit the same. Although apparently not so prosperous in England as we were some fifteen or twenty years ago, we are now undoubtedly living in the enjoyment of comforts and comparative advantages unknown, undreamed of, at the beginning of even the third decade of this century, while among the really industrious classes there is a greater distribution of ease and wealth than existed then.

Many changes, too, have come over the spirit of the time of which I am speaking. The strong feelings to which utterance was given after Augustus Welby Pugin published his "Parallels," and when Sir William Tite disputed with Mr. (afterwards Sir Gilbert) Scott as to the shape of a window or the slope of a roof, have considerably softened; and when I remember that one of the most distinguished architects of the century once expressed to me his opinion that St. Paul's Cathedral was only fit to be converted into a railway station, I confess to some surprise, tempered with satisfaction, at seeing quite lately the details of Sir Christopher Wren's masterpiece illustrated in the Architectural Association's Sketch-Book,—a work fairly representative, I think, of the youthful sentiments of the day. And, though I do not agree with that Minister of the Crown who, two years ago, in this room, stated his belief that as far as public buildings were concerned the Gothic style was extinct, yet there can be no doubt that the too literal application of Mediæval forms has recently received, from various causes, a very decided check. In what direction the present desire for freedom in the choice of models and in the application of precedents may lead, I do not attempt to predict. But I remember that this very year, through the energy and zeal of my friend Mr. Bashill,—who, in this particular, followed almost in the footsteps of the late Edmund Sharpe,—some twenty English students accomplished a visit to Rome during their Easter vacation. To visit Rome and Athens was an indispensable part of an architect's education in my youth, when the Classical buildings of Sir John Soane, of Sir Robert Smirke, and afterwards of Sir Charles Barry, were objects of admiration; but at a later period the "Classic" ground of British architects seemed for many years transferred to the old province of the Ile-de-France, then to that of Brittany, and until recently, I am told, to Holland. But now that Italy has had another chance at the hands and pencils of our students,—and I am sure that they did not find her cities wanting in those qualities of picturesque effect which they are taught, very properly, to admire,—I have every hope that the gloom and monastic austerity, the labyrinth-like arrangements of stair and corridor, of which the people who pay for our public and municipal buildings complain as characteristic of too many recent interiors, will disappear.

That visit to Italy seems to me to be a sign of the time pregnant with meaning, and I am the more glad of it because men who go thither and who make any stay there are sure to yearn for opportunities of studying on the spot the more refined monuments of classical art which Athens and ancient Greece can alone afford. The recent erection of a British School of Archaeology under the hill of Lycabettus may in due course supply such a want, and I cannot veil the significance of the fact that, a day or two hence, our friend Mr. Penrose will be on

his way to Athens to take charge of the new school, as its first Director. Thus, "the whirligig of time brings in his revenges,"—revenges not of a hostile or bitter nature, but teeming with goodwill and satisfaction; for think, gentlemen, how much has been learned, how much information has been stored, how many records of the past, hitherto ignored, have been collected during our progressive albeit circuitous journeys of the last thirty or forty years! What the world of learning owes to the labours of architects and archaeologists during this century may be seen in the ordinary library of the English gentleman; the extent of such researches may be tested in the public libraries of the country, and in our own. If, at the same time, there are visible, in the modern catalogue of undoubted architectural triumphs, some conspicuous reverses, let us not forget that much more is often learned from one honest failure than from a score of immature or superficial successes.

[Of the discussion which followed we give a report on another page.]

BUST OF PLATO.

The illustration represents the inscribed bust of Plato, now in the Berlin museum, to which we recently referred in a Note (p. 584, *ante*) as being undoubtedly authentic, and which, formerly the property of Signor Alessandro Castellani, has now passed into the keeping of the Berlin Museum. The bust is reproduced, by permission, from a plate in the second issue of the new *Jahrbuch* of the German Archaeological Institute.

Illustrations.

ST. MARIE'S (R.C.) CHURCH, SHEFFIELD.

WE illustrate this week the "Altarinos," or shrines of the Blessed Virgin and Sacred Heart, which were erected a few years ago in the north transept of the above church (one of the best works of the late Mr. Hadfield during the revival at the close of the first half of the century).

Both have surbasses of alabaster and Hopton Wood stone, with thirteenth-century columns of Frosterly marble, which originally stood in Durham Cathedral, and bear offering tables of Derbyshire fossil marble, for lights and flowers, and the occasional exposition of relics.

The upper portions are carved in wainscot oak, entirely gilded, and richly decorated in colour, with paintings in the panels by Mr. Westlake.

The figure of the Blessed Virgin is carved in pear-wood, richly gilded and decorated, and was the work of Herr Petts, a well-known Munich sculptor. The figure of the Sacred Heart was sculptured by Mr. Boulton, and richly decorated in gold and colours and Mr. Westlake.

Subdued blue velvet curtains hang at each side of the shrine of the Blessed Virgin, and the effect of the whole is rich and decorative, especially on festival days, when they are gay with lights and choice flowers.

The work was designed by Mr. Charles Hadfield, and executed under his supervision.

THE "NEW WORK," OLD ST. PAUL'S CATHEDRAL.

THAT portion of Old St. Paul's Cathedral which stood between the great altar-screen and the east end of the church was called the "New Work," probably to distinguish it from the western portion of the choir, or choir proper, which had been rebuilt by St. Roger. It must always be a matter of doubt whether, when St. Roger rebuilt, or recased, the choir of the cathedral he left the old apse standing, and also whether he contemplated the eastern prolongation of the building, which was carried out some time after his death under the name of the "New Work." The "New Work" at Old St. Paul's consisted of a retro-choir and aisles. At the east end of the former a portion was screened off, and formed a Lady-chapel. At the end of the north aisle a chapel, inclosed within arcades, was dedicated to St. George, and a similar one at the end of the south aisle was dedicated to St. Dunstan. Thus it will be seen that in plan the "New Work" corresponded exactly with the arrangement of the presbyteries of York and



Bust of Plato, in the Berlin Museum.

Lincoln cathedrals. The exact date of the commencement of the "New Work" is not very clearly ascertainable. The choir proper seems to have been completed in the year 1240, and Dugdale says that the "New Work" was commenced in 1256, but the first positive mention that we have of the building called the "New Work" is in a grant by Richard de Hereford, who, in the year 1287, made over the rents of certain houses in Adde Hill to the Dean and Chapter of St. Paul's, "ad opus et sustentationem perpetuam 'Novi Operis' gloriosum et beate Virginis Mariæ, matris Domini mei Jean Christi fundati et inchoati ad caput famosæ ecclesiæ S. Pauli, versus orientem." Contributions towards the work appear to have come, not only from all the English bishops, but from foreigners also; amongst others are mentioned the Archbishop of Cologne, "Albinus, Bishop of Brechin," in Scotland, and the following Irish bishops:—Christian, Bishop of Emely; William, Bishop of Leghlin; Gilbert, Bishop of Emely; Isaac, Bishop of Killalaw; William, Bishop of Conor; Thomas, Bishop of Ely; David, Bishop of Cashal; and Thomas, Bishop of Down." Lady Isabella Bruce, daughter of William, King of Scotland, was also a contributor. In the year 1312 the marble pavement of the "New Work," which cost 5d. per foot, was laid down. In general design the New Work seems to have followed the arrangement of the choir, though there seems to have been a considerable difference in the details. Judging from Hollar's drawings, the piers of the New Work were far more complicated in plan than those of the choir; whereas the capitals of the choir appear to have been foliated, those of the New Work seem all to have been moulded. The triforium of the choir appears to have been filled with geometrical tracery, but that of the New Work has a tendency to curvilinear forms. The east end was certainly a very magnificent composition. The upper portion formed a fine rose-window, enclosed in a square, beneath which were seven large and very wide lights. The tracery of the lower portion of this great window appears to have been doubled. It is a somewhat remarkable fact that this arrangement for the east end of the church is so uncommon in the Middle Ages; for, although rose-windows are common enough at the ends of the transepts and at the west ends of large churches, we rarely find them forming east windows. Durham and Laon are the only cathedrals which occur to us as possessing such a feature. St. Margaret's, Lynn, certainly possesses a rose-window at the east

end, but it is a question how far the tracery is original. The beautiful Church of Fulgoat, in Brittany, is a magnificent example, and bears a strong resemblance to Old St. Paul's, and there are little Norman rose-windows in the chancel ends of Barfreston Church, Kent, and Castle Headingham Church, Essex.

The curious Caroline Gothic Church of St. Catherine Cree, in Leadenhall-street, also possesses an eastern rose-window, presumably copied from Old St. Paul's.

The monuments shown in our view are as follow:—Sir Christopher Hatton, 1593, under the fifth arch on the south side; an immense but heavy and ungraceful example of Elizabethan work. The pretty little chantry chapel and tomb of Radulph De Hengham in the south aisle; the stately altar-tomb of Henry Lacy, Earl of Lincoln, in the north-eastern arch between the Lady-chapel and that of St. Dunstan.

The tablets affixed to the columns of the church record Francis Florus, 1593, and other worthies of the time, whilst the brasses on the floor covered the tombs of Robert de Braybrooke, bishop of London (1444), Ralph de Baldock, bishop of London, and other distinguished churchmen connected with this noble cathedral. We presume that it is generally known (though perhaps almost as generally forgotten) that Vandyck, the painter, was buried in Old St. Paul's Cathedral; his monument, if one was ever erected, perished with all the others. Surely, however, the new cathedral ought to contain some memorial to this great artist, and we venture to suggest to the Royal Academy and other leading art societies

of this country the propriety of voting a small sum out of the funds at their disposal for this purpose.

The drawing we give is, like our previous restorations of Old St. Paul's, founded chiefly on Hollar's views and Dugdale's description and measurements of the ancient church. Hollar's detail is, however, corrected by a careful study of contemporary churches. Wherever Hollar's drawings represent features which could by any possibility have existed as he shows them he has been followed, but where the want of knowledge of Gothic architecture possessed by all the draughtsmen of his time has led him obviously to misrepresent details they have been corrected by comparison with similar details in other churches.

H. W. B.

HOUSE, MONTREAL.

SEVERAL fine residences have recently been erected in Montreal. Our illustration shows one in contemplation, for which plans and specifications have been prepared.

The basement portion it is intended to build in local limestone in rock-faced ashlar, partially dressed. The rest will be in red brick, with Credit Valley or other red stone dressings.

A double conservatory is a feature of the plan, having access from both ground and first floors. Behind this is the picture-gallery and billiard-room. A covered way gives access to the stables in the rear.

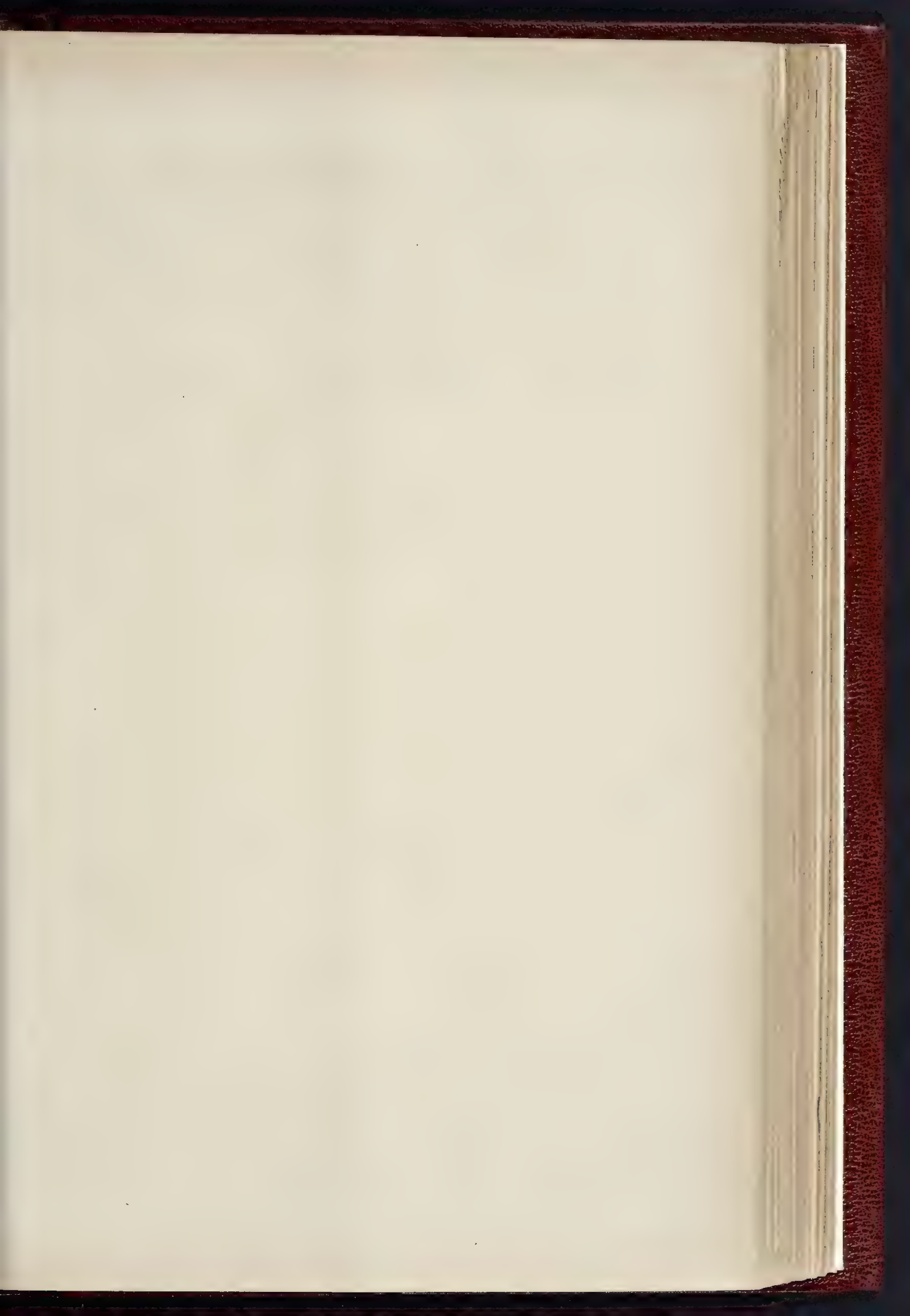
Our illustration is from a drawing exhibited in this year's Royal Academy.

The architects are Messrs. Taylor & Gordon, of London and Montreal.

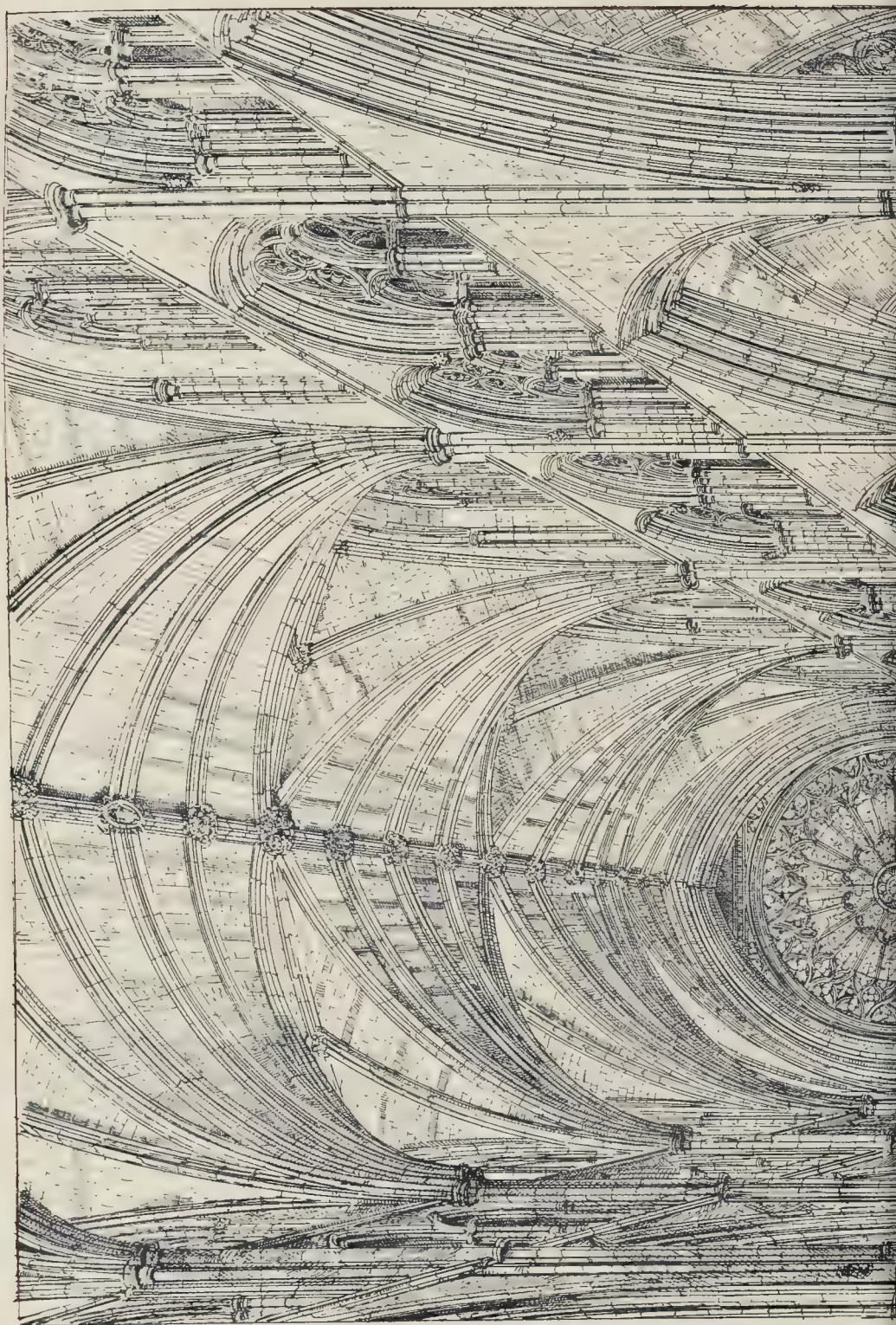
CHURCH OF OUR LADY OF THE SACRED HEART, WELLINGBOROUGH.

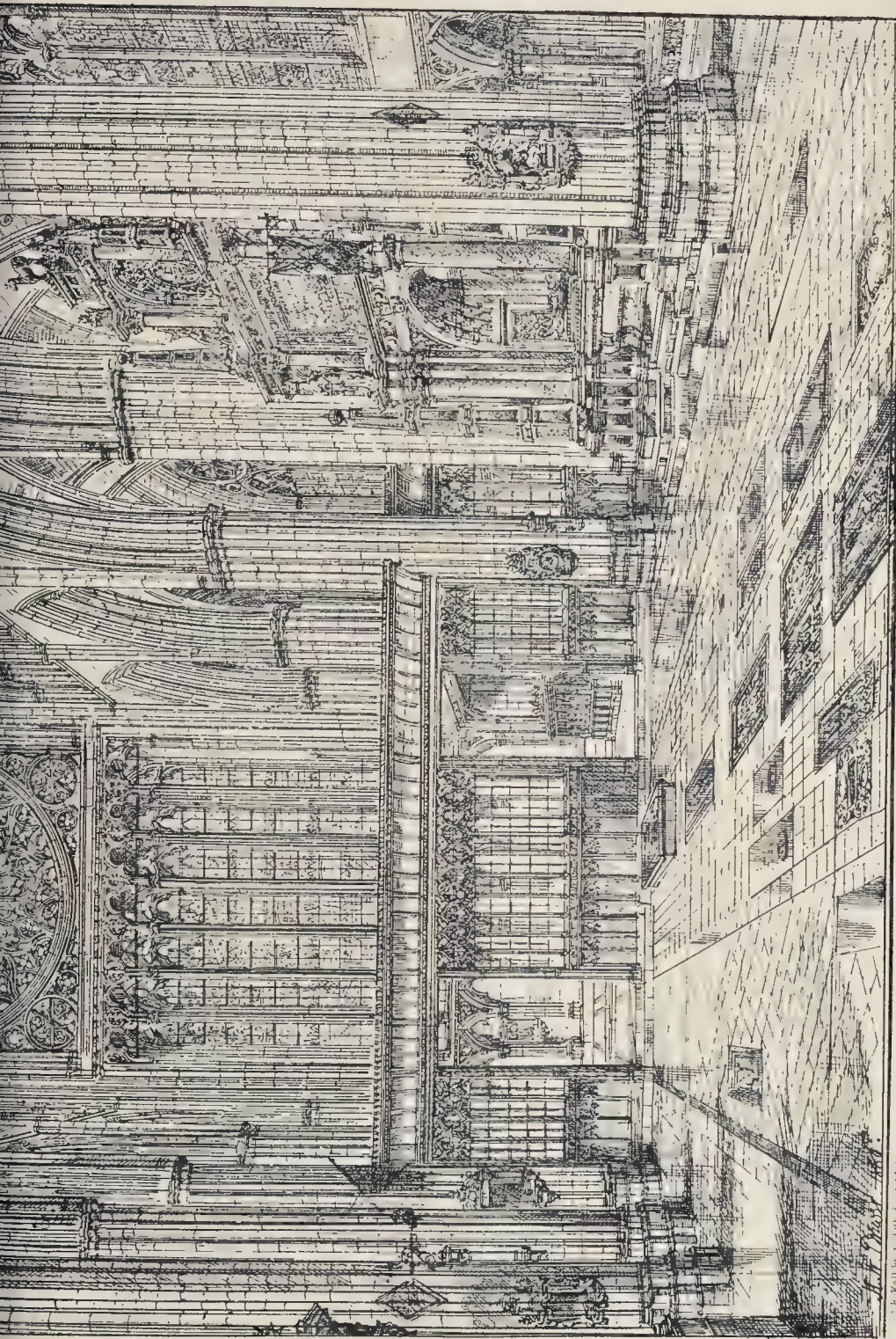
THIS church has been designed for the requirements of the ritual of the Roman Catholic Church. The style of the church is English of the latter part of the fourteenth century, freely treated, and both in the plan and ornamentation the ancient symbolism has been preserved. The main dimensions are 100 ft. in length by 50 ft. across the transepts clear between the walls, the accommodation, including the choir, being for about 400 persons.

The lighting, warming, and ventilation, have been carefully attended to; besides the usual provisions for the admission of air, flues are constructed in the wall opening upwards in the cills of the windows, an idea first employed by



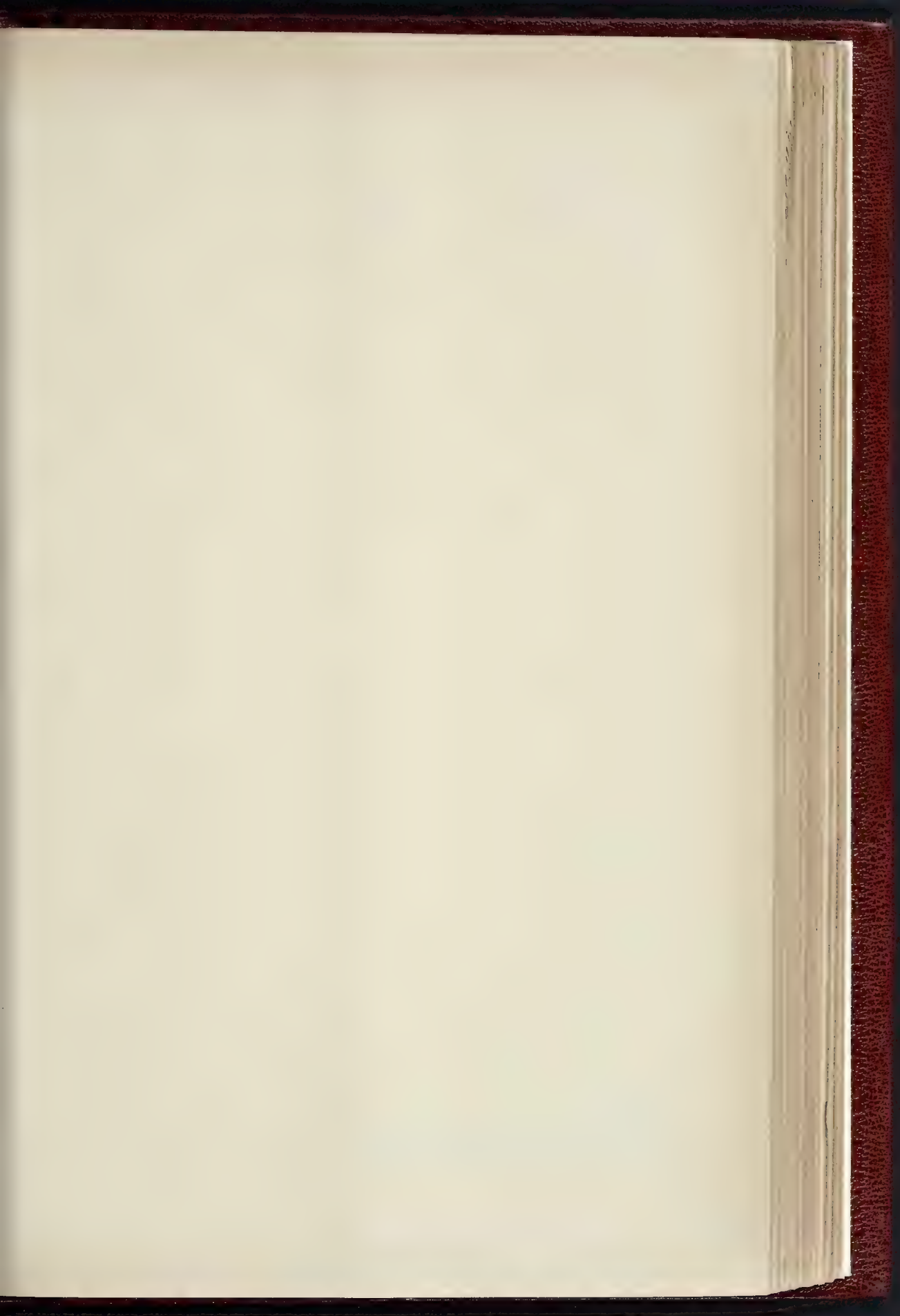
THE BUILDER, NOVEMBER 6 1886





THE "NEW WORK," OLD ST. PAULS.

ST. PAUL'S, LONDON.



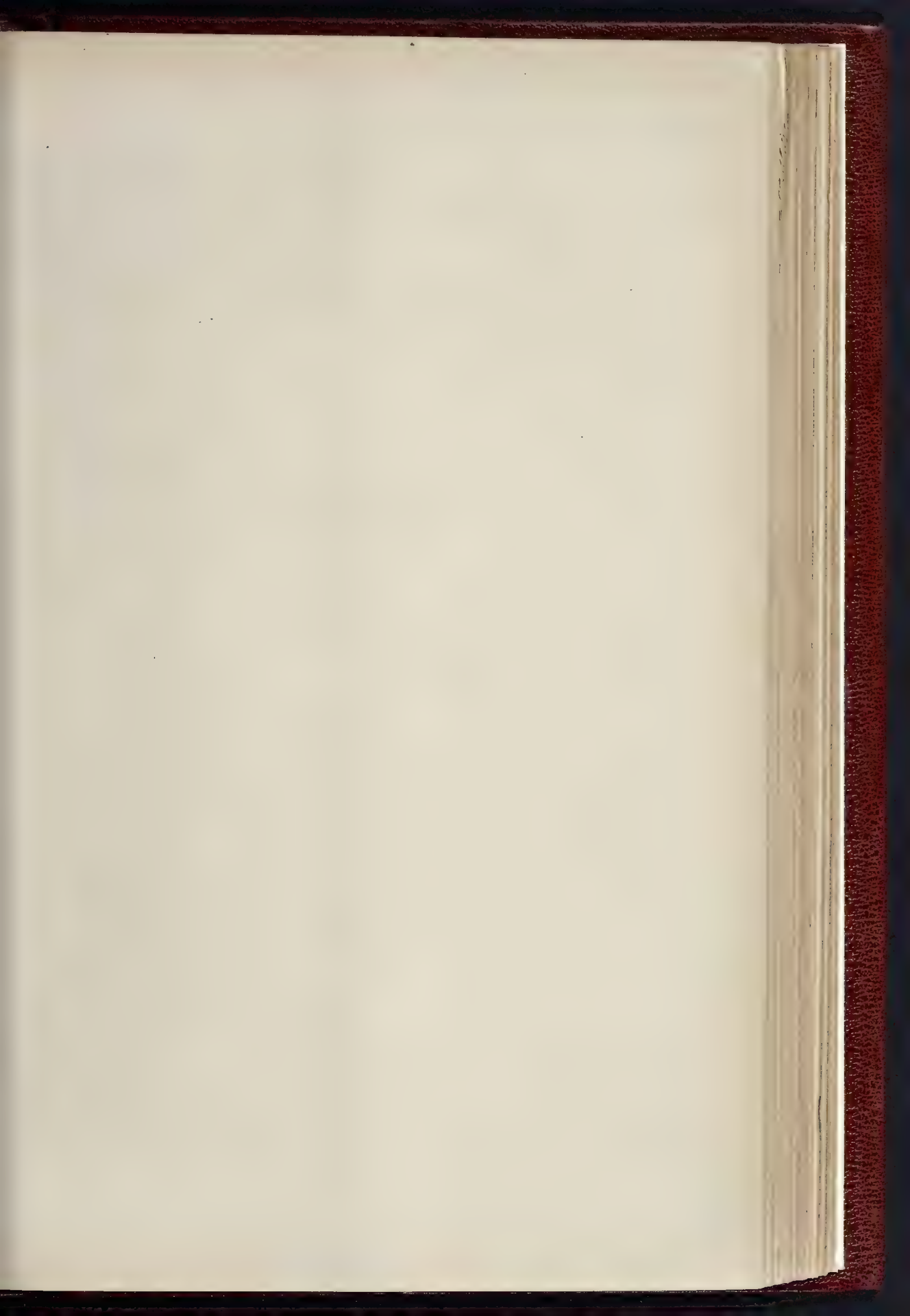


C. HUSSE, LEIPZIG.

"PHOTO-SIMIL" HILL & COMPANY, 6 MONAGHAN ST. LONDON, E. C.

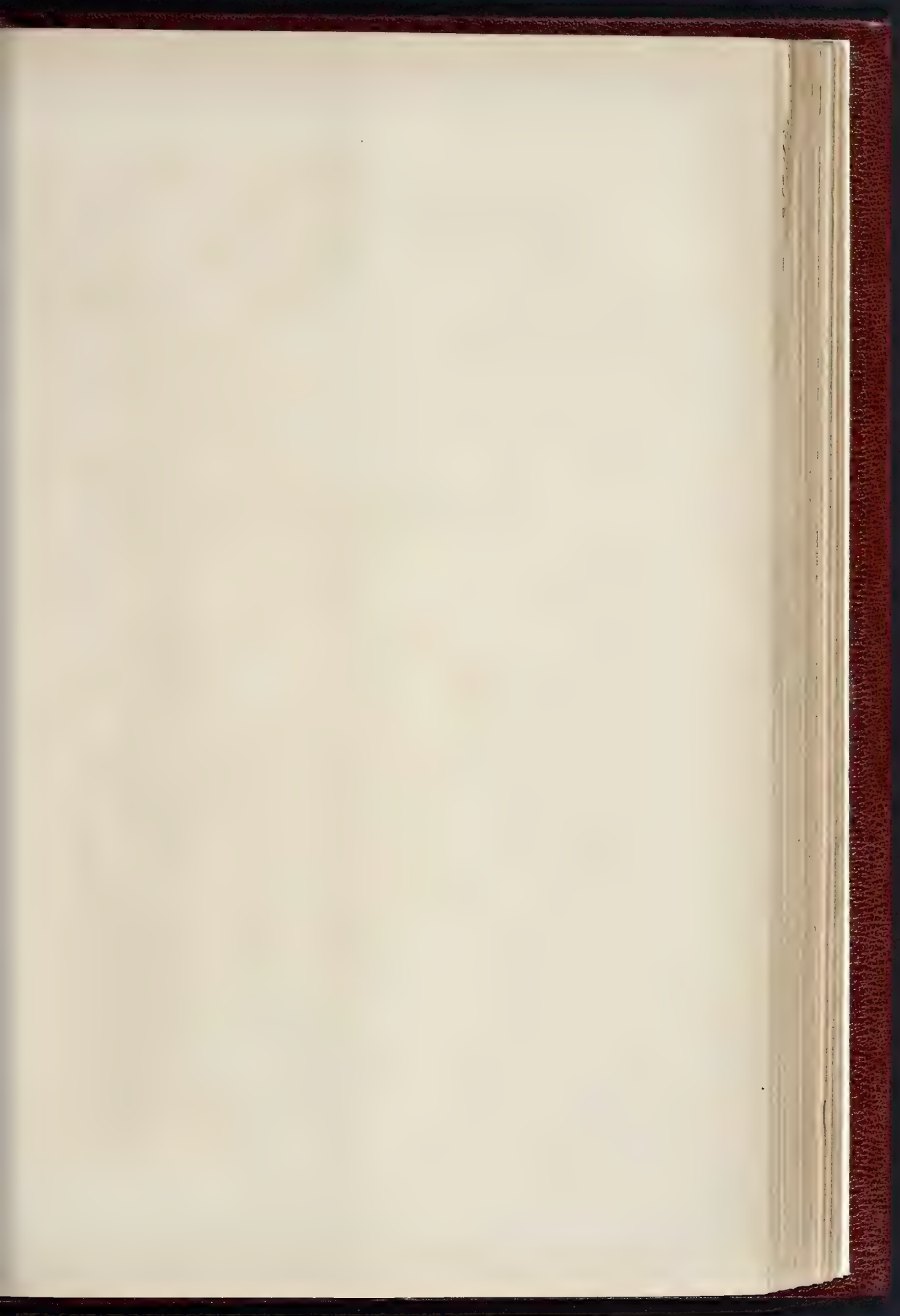
SHRINE, ST. MARIE'S (R. C.) CHURCH, SHEFFIELD.

DESIGNED BY MR. HADFIELD, F. R. I. B. A.



THE BUILDER, NOVEMBER 6, 1886.







HEAD OF ARCH.



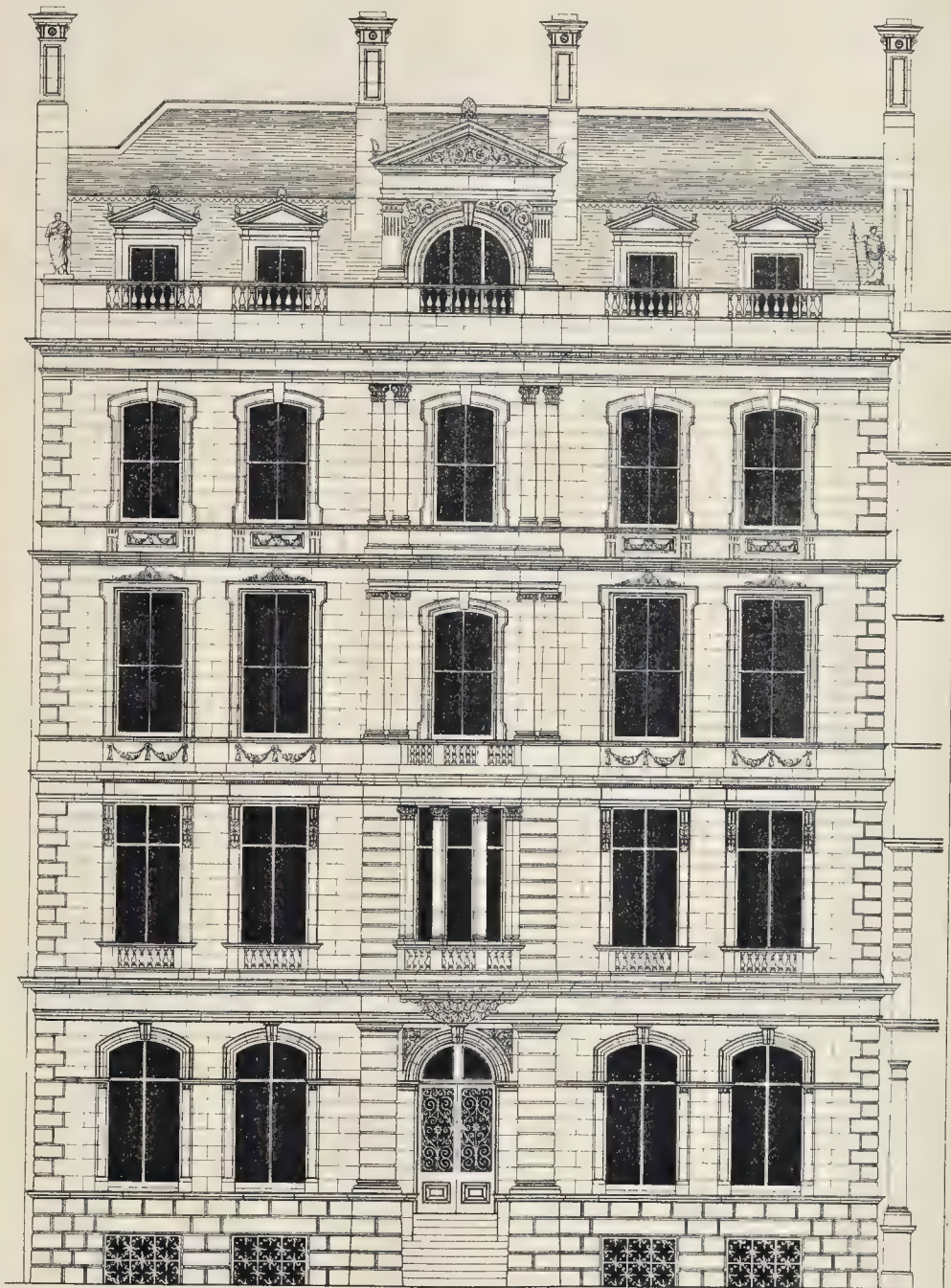
SOFFIT OF ARCH



JAMB OF WINDOW IN TYMPANUM.

CARVINGS, MAIN ENTRANCE ARCH, NORTHUMBERLAND AVENUE HOTEL.

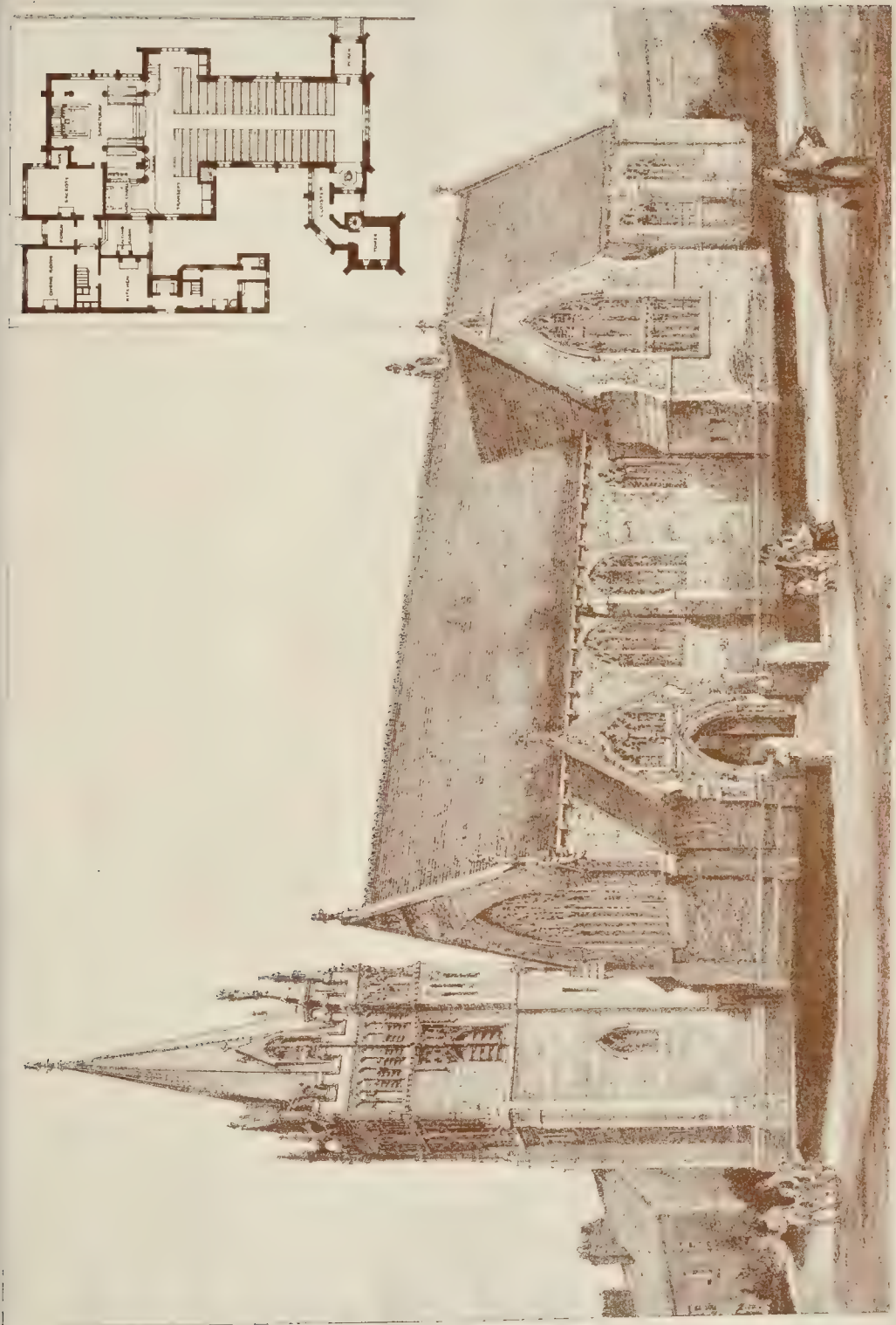
MESSRS ISAACS AND FLORENCE, ARCHITECTS; MR. J. BOEKBINDER, SCULPTOR.



FACADE TO NORTHUMBERLAND AVENUE



THE ROYAL COLONIAL INSTITUTE, NORTHUMBERLAND AVENUE.
MESSRS. HABERSHON AND FAWCNER, ARCHITECTS.



CHURCH OF OUR LADY OF THE SACRED HEART, WELLENBOROUGH, N.S.W. ARCHT. BY S. J. NIELSEN, A.R.C.D., A.M.I.C.E.

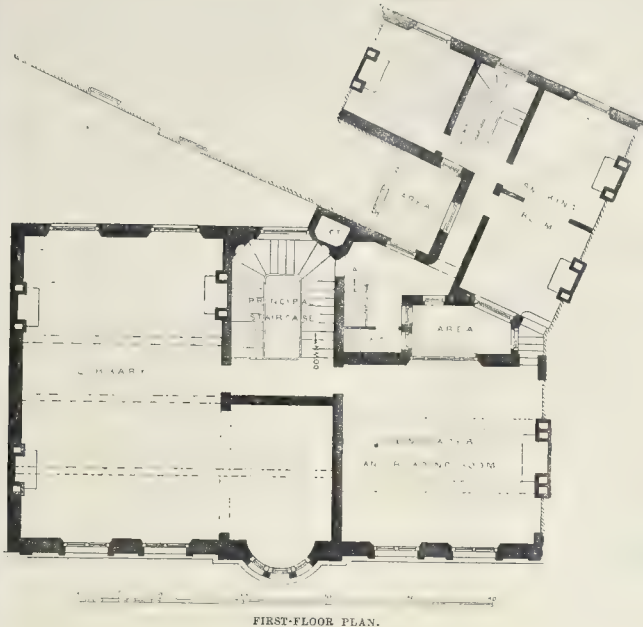


C. HESSIG, LEIPZIG

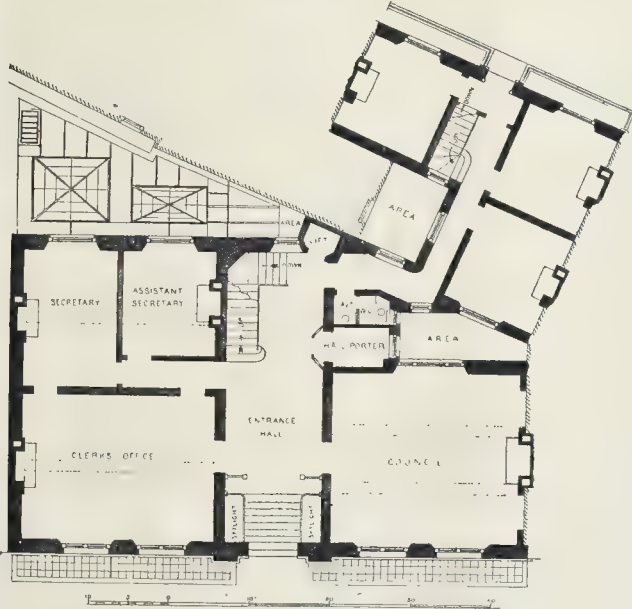
"PHOTODUPLICATION" HILL & COMPANY, 9 MONKWELL ST. LONDON, E. C.

SHRINE. ST. MARIE'S (R. C.) CHURCH, SHEFFIELD.

DESIGNED BY MR. HADFIELD, F. R. I. B. A.



FIRST-FLOOR PLAN.



GROUND-FLOOR PLAN.

The Colonial Institute.—Messrs. Habershon & Fawcner, Architects.

ROYAL COLONIAL INSTITUTE.

The premises recently built for the above occupy a central position on the north-east side of Northumberland-avenue, between the Thames Embankment and Northumberland-street, and facing the Hôtel Métropole.

The lower portion is built of granite, rusticated and battering to the string-course of the ground-floor windows, above which the front is carried out in Portland stone, making an effective contrast with the quoins, cornices, and other dressings, which are of blue Bridgend stone. The jambs to the entrance, columns to windows, and pilasters are of polished red Aberdeen granite.

The ground-floor is raised 6 ft. above the Avenue to meet the level of the pavement in Craven-street, in which the Institute has also a frontage.

The general arrangement of the interior consists of central hall, from which direct access is obtained to the large council-chamber, which has a decorated ceiling, and dado of walnut and ebony in fancy panels, and also the offices for the secretary and executive.

A spacious stone staircase leads to the library, an L-shaped room, occupying the full depth of the building, and extending over the front entrance and enhancing the central bay window. The "newspaper," reading, and private writing rooms are also arranged on the first floor; above, and in the rear, are some sixty rooms, at present occupied by the Admiralty Department.

The basement (see plan on next page) has two levels; the lower one intended to accommodate a museum, 50 ft. by 24 ft.; the upper level on which the caretaker's and other offices are arranged.

There are separate staircases for the front and back portions which are shut off by double iron doors. A hydraulic passenger-lift communicates with each floor. Ample light is obtained to all the rooms by means of interior areas, which also preserve the "ancient lights" of adjoining properties.

The joinery and fittings of the principal rooms are a combination of American walnut, pitch-pine, and ebony. The balustrade to the stairs, grills, gasfittings, &c., are of wrought-iron. The walls of the entrance lobby are lined with Belgian marble, and the floors are paved with Minton's tiles. The vaults under the pavement have also been paved and lined with tiles and fitted up for lavatories, water-closets, &c. A large tank is placed on the top of the building for the supply of hydrants on the various floors. The staircases and passages are warmed with hot water.

The furniture and fittings were all designed by the architects, Messrs. W. G. Habershon & Fawcner, the clerk of works being Mr. John Gilling.

The works have been carried out by the following firms:—The building by Messrs. Patman & Fotheringham; the ironwork by Mr. Starkie Gardner; sanitary work by Mr. George Jennings; the heating and gas by Messrs. Berry & Son; the lifts by Messrs. Archibald Smith & Stevens; and the furnishing by Messrs. Wallace. The total cost of the building inclusive is 20,224l.

CARVING, NORTHUMBERLAND-AVENUE HOTEL.

We give this week illustrations of portions of the carving which decorates the principal entrance of the Northumberland-avenue Hotel, executed by Mr. J. Boekbinder, under the direction of Messrs. Isaacs & Florence, the architects of the building. Though not presenting any special originality of conception or idea, the work has the merit of good and careful execution. Mr. Boekbinder is desirous to characterise the work as "Flemish Renaissance"; and there is a certain degree of reminiscence of the feeling of Aldegrevier and other designers of that school, in the soffit design at all events, which may justify the description.

Mr. F. C. Penrose.—We are requested to state, as there is some misapprehension on the subject, that Mr. Penrose has accepted the appointment of Director of the British School at Athens for one year only, and is not leaving England permanently.

Sale of Building Land at Epping.—Last week Mr. Frank C. Kettle, of Moorgate-street, submitted for sale, at the Cock Hotel, Epping, forty-four plots of freehold land, being the second portion of the Kendal Lodge Estate. Lot 26, a corner-plot, with a frontage to Kendal-avenue of 75 ft. 4 in., and a frontage to Hartland-road of 280 ft., sold for 155l. Lot 41, another corner-plot, with frontages of 89 ft. to Hartland-road, 293 ft. 11 in. to Kendal-avenue, and 97 ft. 4 in. to Hennells-street, sold for 320l. Lot 45, another corner-plot, having frontages of 59 ft. 4 in. to Kendal-avenue and 260 ft. to Hartland-road, sold for 155l. Lots 46 to 50 (inclusive), each having frontages of 60 ft., and an average depth of about 249 ft., sold for 615l. collectively. Lot 59, with a frontage of 200 ft. to Kendal-avenue, and an average depth of 53 ft., realised 100l.

the architect in St. Charles's Church, Ogle-street, London, in 1862.

The first stone was laid on the 18th August, 1885, by the Rev. Dr. Riddell (R.O. Bishop of Northampton), who also officiated at the solemn opening on September 2nd, 1886.

The contract for the whole of the work was taken by Mr. F. G. Anstey, from the designs and under the direction of the architect, Mr. S. J. Nicholl, of 1, Caversham-road, London.

Design for Birmingham Law Courts.—The competition design published in our last should have been described as by Messrs. R. S. Wilkinson & E. G. Warren, architects, and not as by Mr. Wilkinson only.



The City of London Institute.—Messrs. Habershon & Fawcner, Architects.

THE REGISTRATION OF PLUMBERS.

THE Lord Mayor (Alderman Staples, F.S.A.) presided at the third meeting of the General Council of Plumbers,* which met in the Library Committee-room at the Guildhall, on Wednesday afternoon for the purpose of receiving a report from the committee appointed to devise a scheme for the registration of plumbers. There was a large attendance.

Mr. Alderman Stuart Knill, Master of the Plumbers' Company, thanked the Lord Mayor for his presence on that occasion, and said that it was under his lordship's auspices that the actual work of registration commenced. He ventured to say that they had not been idle in their endeavours to carry out the resolutions passed at the last Council meeting. Within a fortnight from the date of that meeting the committee had met, and had continued to do so at regular intervals, and had instituted the technical examinations that preceded registration. There were certain matters that required legislative action, and these the committee and Court of the Company had under their immediate consideration, and hoped before long, with the assistance of his lordship's successors and the encouragement of their fellow-countrymen generally, to succeed in carrying.

Mr. George Shaw, late Master of the Company, and who will continue to hold the office of Chairman of the Registration Committee, read the report, which was as follows:—

"I have to report that in proceeding with the scheme of registration I deemed it essential to fix the conditions which should be considered sufficient to entitle plumbers to enrolment upon the Company's Register, and with that object I discussed the matter very closely with the Committee, and it was finally decided that the present standing of master plumbers and journeymen, provided they were able to satisfy the Committee of being otherwise qualified, should be deemed a sufficient qualification. It was further decided that journeymen able to produce evidence of apprenticeship to plumbers, coupled with satisfactory testimonials from employers, should be eligible for enrolment.

In the next place, I proposed, and it was decided, that all information placed before the Registering Committee by applicants should be treated as confidential communications, made in good faith, for the sole purpose of satisfying the Plumbers

Company of the qualifications of the applicants, and further, that all inquiries necessary to test the correctness of applicants' statements or otherwise should be conducted with due circumspection and regard for the personal interests of the parties. I have great pleasure in saying that from this method of treatment, and from the representative character of the Committee, the utmost goodwill has been displayed by all, and we find that, with few, if any, exceptions, we obtain information freely and impartially from all ranks of the plumbing trade, and from men who, though active opponents in business, are quite united in their desire and effort to elevate the general status of the craft.

The applications for registration have come in from a very wide area. We have not only applications from every quarter of London, but from almost every important district of the United Kingdom. With regard to the applications from distant places, I have proposed, and it has been agreed, that in cases where it is inconvenient or impracticable for the applicants passed by the Committee to attend at Guildhall to receive the Company's Certificate, they shall be issued in the applicants' districts, under due regulations and adequate precautions.

The number of each class of applications dealt with by the Committee up to yesterday was:—London Masters, 149; Provincial Masters, 123; London Journeymen, 280; Provincial Journeymen, 150; total applications dealt with, 702; and several hundred applications have yet to be considered. I proposed that Examiners should be appointed to examine practically those applicants who were unable otherwise to satisfy the Committee of their qualifications as plumbers, and after the separate nomination of almost every practical plumber upon the Committee, eight were elected to act with me in this important department of the work. I sought and obtained special facilities from the City and Guilds Institute for carrying out these examinations in a manner which I consider to be thoroughly sufficient to test the efficiency of the candidates in the practical as well as the theoretical branches of the plumbers' trade. My endeavour has been to make these examinations of as practical a character as possible,—not so severe as to prevent men of even moderate skill and knowledge from obtaining the Company's Certificate, while, at the same time, being such as every man should, in my opinion, be able to pass to entitle him to work practically as a plumber in our houses. Later, these examinations may be changed as technical instruction may extend among the coming generations of plumbers, but at present I believe we have as sound and efficient a system as the circumstances warrant. During the course of the practical work of the registration, it has been thought desirable to have the additional assistance of members to the Committee, for the applications have been numerous and the examination of them is laborious. Messrs. J. C. Ashdown, A. Common, R. A. Nurse, and J. Smith are now acting with us, and their aid will, I am sure, be generally appreciated by the trade. I have pro-

posed, and it has been accepted by the Committee, that a separate register should be kept of those plumbers who in the opinion of the Examining Committee are not possessed of the necessary qualifications sufficient to entitle them to immediate registration, but may be able to qualify themselves later after they have acquired further experience.

In conclusion, I have to report and express my warm acknowledgments for the loyal support and unflinching assistance I have received from every member of the Committee and the Examiners, and also my acknowledgments for the numerous expressions of approval and offers of co-operation tendered to me personally from plumbers in all parts of the kingdom."

The report having been adopted, on the motion of Mr. Shaw, seconded by Mr. P. J. Davies,

Mr. George Godwin, F.R.S., moved:—

"That the warm thanks of the Plumbers' Company and General Council are tendered to the City and Guilds Institute for the encouragement and assistance they have given in promoting the knowledge of the art and mystery of plumbing by means of the special classes in London and throughout the provinces, thus spreading by their high authority the action of the Plumbers' Company."

He said that to his mind the result of the Committee's work was not quite satisfactory, for he thought the numbers enrolled ought to have been very much larger. This, he had no doubt, would be remedied as the objects of the examination became better known. The necessity for such a movement as this was so great that one was astonished that the trade had been allowed to go on as it had for so many years. As an instance of this he mentioned that a few days ago he heard of a good house that had been built about twenty years, which had a bad reputation for dampness. The drains were seen to several times without any result, until lately an architect who knew something about sanitary matters,—and it was not all architects who had given their attention to that subject, though many were doing so now, and some had done so for many years,—was called in, and on taking up the floor of the basement of the house he found that in the water supply pipe there was a large hole, which allowed the water to escape every time it passed through, with the result that the whole surface of ground under the basement floor was nothing but a puddle. That was but one instance of what was going on in hundreds of houses, and of the way in which work was but too frequently done and remained undetected for years.

Dr. Vacher, of Birkenhead, seconded the resolution, which was agreed to.

Mr. George Shaw was next presented with an illuminated address on vellum, accompanied by a certificate of enrolment, in recognition of his services as Master of the Company and Chairman of the Registration Committee. The success that had attended Mr. Shaw's efforts having been referred to by the Master, the Lord Mayor presented him with the certificate and address. This address bore the signature of the Master of the Company and the Lord Mayor, on behalf of the General Council. The design of the illumination has been executed by Mr. Joseph Pippet, medieval artist, Solihull, Warwickshire. On either side of the address specimens of good and bad plumbing are depicted, fouled water being discharged through a demon's head on one side and pure water through a cherub's head on the other. These examples of the good and bad systems of plumbing are separated by the arms and crest of Mr. George Shaw, and are bordered on one side by the figure of St. Michael (which forms the upper portion of the crest of the Plumbers' Company) bearing in his left hand scales and in his right a lance, which transfixes a three-headed demon bearing on its several collars the words "Ruin," "Disease," "Death." The border on the other side is the British oak, growing out of a field of flowers and supporting the City arms, through the foliage of the tree being disclosed views of the Hall of the Trinity Guild as represented in "Old London" (which Mr. Shaw initiated); and surrounding the tree is a triple fountain, which forms part of the crest of the Plumbers' Company. The first illuminated letter of the address bears the arms and crest of the Plumbers' Company, combined with picturesque views of gabled roofs and ancient forms of leaden spires. Mr. Godwin expressed his opinion that this address, in design and execution, was very much above the average of similar works of the kind. The Lord Mayor endorsed this opinion.

Mr. Shaw having returned thanks for the compliment,

* This Council, it should be stated, includes not only members of the Plumbers' Company, but architects, builders, engineers, medical men, master plumbers and journeymen plumbers (society and non-society men), besides a few gentlemen concerned in legislation and local government. Its constitution has been already given in the columns of the Builder.

Mr. J. Underwood (Chairman of the Health Committee, Leicester), moved, and Mr. S. Stevens Hellyer seconded, a vote of thanks to the Lord Mayor, which was heartily accorded.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE opening meeting of this Institute for the present session was held on Monday last, Mr. Edward Fanson, F.G.S., President, in the chair.

Mr. William H. White (Secretary) announced that since the issue of the last list of members, the following Associates were deceased, viz., Messrs. Oswald Adhead, Thomas Farrer, and Harry Saxon Snell, jun. In conformity with the By-laws the sum of five guineas had been received for the library from Mr. J. T. Newman, Fellow, and 11. from Mr. Anderson, Associate. Several donations of books had been made, and the principal donations were mentioned in detail in the first number of the "Proceedings." He might, however, specially refer to the work presented by M. Charles Garnier. Since the "Proceedings" were published, M. Honoré Daumet, Member of the Institut of France, and Hon. Corresponding Member of the Institute, the architect of the Châteaue de Chantilly, had visited London. He brought with him some plans and sections of the chateau, and also two volumes of a very valuable work published in 1876, and referring to an archaeological mission to Macedonia by himself and M. Henzey.

Mr. Octavius Hansard proposed a vote of thanks to the donors, with a special vote to M. Garnier, who had presented to the library all the magnificent works he had published. The votes were carried by acclamation.

The following new members were then balloted for and declared duly elected:—*As Fellows*, Messrs. G. M. Alexander, of Cape Town, Cape Colony; P. Herapath, of Auckland, New Zealand; G. E. Grayson, of Liverpool; F. U. Holme, of Liverpool; J. S. E. Ellis, of Sydney; and A. Young, of Queen Anne's Gate. *As Associates*, Messrs. W. Dunn, of Crouch-hill; A. E. Coxhead, of Eastbourne; and W. G. Smithson, of Idridgehay, near Derby.

The Street Bust.

Mr. A. W. Blomfield, M.A., F.S.A. (Vice-President).—Mr. President, before the business of the evening commences, I may be permitted to say a few words in discharging the duty which now falls upon me, of presenting to the Institute, on behalf of the subscribers, a marble bust of one of our most distinguished Presidents, Mr. George Edmund Street. His memory, sir, is still green in the hearts of his friends and admirers, and will long continue to be so. I am sure, therefore, that no eulogy is required on my part to claim for it a just title to the honourable distinction of being preserved in its visible form within the walls of this Institute. I think I may venture to say, without fear of contradiction, that few if any of us ever listened to an abler and better address from the chair which you so worthily occupy, as that with which Mr. Street opened our annual session five years ago. No one who listened to that address could fail to recognise in it the promise of a brilliant and useful career as President of this Institute. All who knew him must feel perfectly well assured that if he had been spared to complete his term of office in unimpaired health and vigour, that promise would have been amply and honourably fulfilled. Of the bust itself, and its merits as a work of art and a likeness, I hesitate to speak in the presence of the distinguished sculptor; but I may say this, that my friend Mr. Armistead added to his other eminent qualifications for the task a close personal friendship with Mr. Street, and an intimate knowledge of his features and expression, without which a posthumous portrait would have been almost impossible. I have now, sir, formally, as representing the Committee, to present to the Institute the bust which is now before us, and I will simply conclude with the expression of a regret and of a hope,—of regret that so long a time has elapsed since the death of Mr. Street before its presentation; and of hope that this memorial which is now before us may not only long survive to recall the features of a friend whom we knew so well and respected so much, but that it may also serve to remind us, to our benefit, of the high mind and lofty aspirations

which were the animating principles of the career of a great and good man (applause). I would also like to say before sitting down that the fund for the portrait of our late President is progressing favourably.

The President.—I am sure it would only be expressing your feelings if I say that the Institute cordially accepts from the Committee the presentation of this bust. It will always be, I think, a living memorial of a man whose genius and ability were respected and admired so much.

Mr. J. Macvicar Anderson (Hon. Secretary).—Sir, you will agree with me that it required no marble monument to keep alive the memory of Mr. Street. In this room, and in the hearts of a body of men whose lives are devoted to the study and practice of architecture, it would be strange, indeed, if we did not welcome the living likeness of one who was at once of the most diligent students and one of the most accomplished masters in our art that our times have seen. Mr. Street was what all distinguished professors of our art are not,—he was loyal to this Institute and proud of its membership. If any of you doubt this I would recommend you to peruse that remarkable address to which Mr. Blomfield has already alluded,—the only one he, unfortunately, was permitted to deliver from this chair,—an address in which he told us that this Institute existed not because of our art, but for our art, in order to promote its best interests and success; in which he told us that the interests of this Institute and the interests of the public were identical, as, undoubtedly, they are in the opinion of all right-thinking people; in which he told us that the conditions of our membership here were of such a high and noble character that any one who honoured those conditions could only work, as a member of this Institute, in the spirit and according to the traditions of gentlemen. It was an address in which he told us that each one individually could improve the vernacular of the art, low as its standard may be in the present day, by showing in his own practice how it is possible to produce good work of the simplest possible description, without being either ostentatious or costly. Mr. Street also pointed out how the Government of the day should always refer to the Council of the Institute, as a body of experts, best capable of giving an opinion on architectural subjects,—on works of great and public importance,—advice that I may take occasion to say might be well taken by the Government of the present day. This Institute has already taken some action in regard to the great public buildings for the Admiralty and War Offices, and certainly my humble influence will be used in the direction as I have the honour to know, to take this Institute into their councils in any decision they may arrive at as to these buildings. Mr. Street was a member of the Royal Academy, and was proud of the distinguished position he held there, as one of the very few members of our profession who are selected to enjoy the privilege of writing "R.A." after their names. But, though he was proud of this distinction, he was no less proud of his membership of the Institute, and still more proud of having been selected to fill the honourable position of its President. This is shown, if any one doubts it, by his own words, when he said, in the address to which I have alluded, that he felt that "we cannot too much interest ourselves in the work of this Institute in order, above all things, that the position of our art, as our art, may more and more be recognised." In regard to that address well might Mr. Beresford-Hope, in seconding the vote of thanks to Mr. Street, remark that it was "masculine, able, sensible, well-spoken, and admirably composed." We can no longer, gentlemen, honour the presence of Mr. Street, for he has gone to the land of spirits, but we can, each in his own position, honour his memory by endeavouring to emulate the noble example he set us, and by dedicating the powers with which we may be endowed to the earnest study and honourable practice of the profession of that art which it is our privilege as it was his glory to practise.

The President then delivered his address, which we print on another page.

Mr. J. Fletcher Monilton, Q.C.—It falls to my pleasant lot to move a vote of thanks to the President, for the charming and most interesting address which he has just given. I suppose that I am selected to do this, because I possess

in a marked degree that faculty of wonder with which a very uninstructed person listens to the utterances of the erudite; and I may say, if this was the reason that I was selected, the address which we have just heard is one which has defeated that reason, for anything plainer and simpler, and going straighter home to the hearts of educated men, I cannot imagine coming from the Presidential chair. I am quite sure, that in moving this vote of thanks, I shall be expressing, though very imperfectly, the desire of all those who had the pleasure of listening to it.

Mr. George Aitchison, A.R.A.—I beg to second this vote of thanks to our President for the excellent address he has given us; and I feel with every one here that he has given us a great deal of information on many points on which we were very anxious to hear his opinion. I am sure that we can re-echo many of the things he has said, for there is a very marked improvement in the general artistic feeling that now pervades the whole of architecture in this, and I may say, in almost all modern European countries. I was extremely pleased to hear the great importance he gave to construction, and to the effects which really fine construction produce on the mind. It was my good fortune within the last few days to have been in one of the towns in the South of France where there is a Romanesque cathedral almost utterly devoid of any kind of ornament, and yet the proportions of it are so excellent that I do not know any of the more ornate buildings of France that have given me more pleasure, and at the same time have impressed me with a greater opinion of the extraordinary skill of those architects whose names are now almost unknown, but who at least have left us a proof of what can be done by pure proportion, and the skill of forming elegant edifices with plainness *though* with perfect success.

The vote of thanks was then put, and was most cordially received.

The President.—Gentlemen, I thank you very sincerely for so kindly receiving the few words you have allowed me to address to you. I have already told you how grateful I am to you all for giving me the opportunity of doing it. I feel very much the honour you have done me, and I am greatly pleased that any words I have written have been satisfactory to you.

Mr. Charles Barry, P.S.A.—Mr. President and gentlemen, I have been asked to request you to perform another pleasing duty, which is peculiar to this evening, viz., to express our thanks for the result of the artistic labours of Mr. Armistead in the bust which has just been presented to the Institute. We are not unaccustomed here to feel ourselves under very deep obligations to both painters and sculptors who have assisted to embellish the rooms in which we meet, and Mr. Armistead has enabled us, by the beautiful bust and good likeness that he has given us of our late friend, to transmit the memory of a great and good man to those who are to come after us, to add to the list of those worthies in our art who have gained for themselves an honourable place and who deserve to be remembered for many and many a long year. Mr. Armistead on this occasion, as has been the case on others, has met the somewhat limited means which we poor architects have at our disposal by giving us a grand work of art at very much less, I am told by the treasurer, than we had any right to expect. Therefore I am quite sure you will feel with me that we ought not to separate to-night without expressing our great thanks to him for the assistance he has given us on this occasion.

The motion was not formally seconded, but was received with acclamation.

Mr. Armistead, R.A.—Sir, and gentlemen, I beg to thank you very sincerely for the honour you have conferred upon me by allowing me to make a bust of one of your distinguished Presidents. It was a labour of love. I hope it has been worthy of your trust; and I thank you very sincerely for your kindness.

Remains of the Palace of Darius at Susa.

Mr. Aitchison.—Mr. President and gentlemen, I dare say you will bear with me for five minutes, because what I am about to say is more of a tribute to our Hon. Corresponding Member, M. Paul Sédille, than anything concerning myself. I happened, in coming from the South of France, to pass through Paris, and I called and saw M. Sédille. He said to

me, "They have to-day got at the Louvre some remains of the Palace of Darius at Susa, which have been brought over by M. and Madame Dienlafoy. They have been brought to the Louvre for the purpose of being seen by the President of the Republic, and as M. Dienlafoy and his wife are friends of mine, I think I can enable you to be the first Englishman to see them." I may tell you that Madame Dienlafoy has been so important an assistant to her husband that the French Republic has made her, I believe, the second lady who has ever received the decoration of the Legion of Honour. I took M. Sédille's note, and had, of course, to wait until the President of the Republic with his friends and officials had seen these things, but after that I was permitted to inspect them before any of the public had seen them, and I believe I am the first Englishman who has done so. Those parts that are put up are in one of the vaults of the Louvre, which are not yet open to the public. They consist of two walls or portions of walls about 16 ft. long and nearly up to the springing of the vaults. They are in bricks each about 13½ in. long and 3½ in. high, all enamelled, with the figures in bas-relief. The top, which there was not height enough to put up, consists of about six courses of these bricks. The whole ground is of a pale turquoise green, and the upper portion, which, as I have said, there was not height enough to put up, consists simply of crenellations in white, somewhat like the modern Arabic ones. Below that come two courses of brick with a turquoise green ground, with triangles of white standing on their points. Between them are three more courses, on the top course of which are palmettes in white with stalks in yellow on the two lower courses, and below the figure frieze this band of ornament, seven courses high, is repeated. The figure frieze is about 5 ft. 6 in. high, and is divided from the ornament at top and bottom by half a brick width of broad yellow band. On this frieze, with its turquoise green ground, are six soldiers walking, with spears in their right hands, extending the whole height from yellow line to yellow line. They have also strung bows on their left shoulders, and covered quivers at their backs. They wear turbans, the small cap brown and the twist yellow. The quivers are dark, covered with a sort of shape like a kidney. The cover or top of the quiver is white. The dresses are alternately white and yellow. The white dresses have rhomboidal patterns with three towers on them in black, and the yellow dresses have circles of green with white stars on them. The dark copper-coloured skin of the soldiers is shown on the hands, faces, and legs, above yellow slippers, and the beards have this extraordinary peculiarity, that they are all nearly of the same colour as the green ground. I believe it is the custom even now in some parts of the East to dye the human beard with some fancy colour. The hair is black and curled. Beyond that I do not know that I have much more to add, but I thought it might interest you to give you this information.

The President then announced that the next meeting would take place on the 15th inst., when a paper would be read in English, entitled "Une Étude sur la Renaissance de la Polychromie Monumentale en France," by M. Paul Sédille, Hon. Corresponding Member.

MOSAIC PAVEMENTS, AND THEIR TEACHINGS.

SIR,—With reference to the remarks in the *Builder* of the 23rd of October [p. 581], on the practical importance of studying the "details of formation" of Roman tessellated pavements, it may be of interest to note that an unusually fine specimen of mosaic pavement, of geometrical design, was recently discovered at Colchester, 5 ft. beneath the surface of a street. It was at first thought hopeless to attempt its removal, but by the skill and energy of Mr. L. J. Watts, of Colchester, the operation was successfully accomplished, the portions being first set in plaster, and then removed *en bloc*. By this means the pavement now retains its exact appearance when discovered (even to the unevenness of surface), and "the colour and composition of the mortar which holds the blocks of stone together" (the importance of which factor is insisted upon in the *Builder*) can be studied to perfection. In most cases the pavements have been so much broken up before removal that this is difficult, if not impossible. This pavement is now visible to the public, having been deposited in the Museum.

It is a curious fact that for the first time at Colchester, or (I imagine) anywhere else, a good-sized lump of tessellated pavement, with the crotches bed on which it rested, has been found to have been employed as material by the Norman builders, having been discovered by Mr. Watts and myself in the rear of the 5 ft. wall of a building which I assign to the close of the eleventh century, and which has just been deliberately demolished.

J. H. R.

SCULPTURED STONES AT ST. NICHOLAS CHURCH, IPSWICH.

SIR,—In your issue for Oct. 16 [p. 573] your correspondent, Lord F. Harvey, asks some questions respecting the old sculptured stones in the Church of St. Nicholas, Ipswich. As I made drawings of them when they were outside, let into the church wall, half a century ago, I may be able to give some information.

The letters on that of St. Michael encountering the Dragon are, under the right arm of angel, the remains of that word, viz., N. The rest is:—

HER: SC: MICHAEL: TERTHED: DANE: DRAGON.

i.e., "Here St. Michael fighteth Dane Dragon." It is to be noted that in the inscription there are two forms of E introduced; the first part of "Michael" is obscured. It is quite certain that the figure alluded to is intended for a boar. The generic form is like that animal still found in the Rhine provinces; and the tusks leave no doubt whatever. The inscription above the boar has always been very obscure, but was probably "*In dedicatione ecclesie omniun auctum*." The parts italicised were visible when my drawing was made. I do not remember anything like "*ostolus*."

J. G. WALLER, F.S.A.

"INTERPRETATION OF BY-LAWS."

SIR,—In answer to the letter of "A Chiswick Builder" in your issue of October 23rd [p. 612], I beg to point out that the object of the by-law is to obtain a thickness of 9 in. between the backs of chimney openings, and that if one wall is erected against another, although touching, they are both external walls, and in that case the thickness of the back of each chimney opening should be 4½ in. It would be arbitrary and unreasonable to read the by-law to mean that the backs of the openings should be 9 in. in each case, though in a case where an existing external wall is to be altered into a party-wall, it is usual to insist that a width of 4½ in. be built against it, so as to make sure that there would be 9 in. of brickwork between the flues and any timber that may be in the old walls.

I have never heard of such an idea as that each flue was to have its distinct 4½ in. of brickwork round it; but, of course, the 4½ in. work of one flue is applicable to the other, as all that is required is distance of 4½ in. of brickwork between the flues.

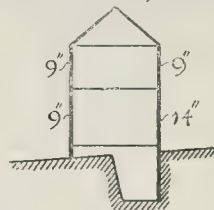
With respect to the by-law requiring parapets to walls within a distance of 15 ft. of other buildings, I certainly think this by-law absurd. It would require parapets to back additions where buildings are contiguous; also a person proposing to erect a building, say, 12 ft. within his own ground, may have to spoil the elevation, and be unable, by constructing overhanging eaves, to prevent the walls getting damp in consequence of a neighbour having previously erected some small building to the full extent of his own ground; or a person may have deposited a plan one day with the surveyor which may be satisfactory, but a plan deposited later on may make this same building irregular before it is erected.

What I would propose would be that the by-law should be framed so as to insist on parapet walls where a building is erected within a certain distance of the boundary of the property (say 3 ft. or 4 ft., which I consider quite sufficient). This would do away with the haphazard way of putting the onus on the unfortunate builder who should be last in erecting his building, although the property is precisely similar.

By insisting on this by-law no good is done, but the surveyor brings himself into antagonism with architects, builders, and the public in general, which is greatly to his disadvantage, considering that he is at the mercy of the public. By returning a majority of members opposed to him to the Board, can bring about his dismissal through his being too anxious to carry out the law.

There is another point in the Model By-laws to which I should like to draw attention. I cannot understand why walls should require to be thicker in suburban districts than in the metropolis; nor can I understand how the Local Government Board intended the By-laws to be carried out with respect to this matter. A two-story building can be erected with 9-in. walls, but by making a cellar underneath the walls should be 14 in. thick below the top story, which means that this building could not be underpinned without thickening the ground-floor story. This I fail to see the force of, as, in the metropolis, the cellar only would require to be 14-in. work. In the case of a building with a half cellar the walls

of the ground-floor room would be 14 in. thick on one side and 9 in. on the other, as in sketch.



I should like to draw attention to some further points on another occasion, and while giving the Local Government Board credit for having introduced many valuable by-laws which have brought about a great improvement in building operations, I cannot but think the Model By-laws might have been very greatly improved and simplified, had their compilers availed themselves of the advice and experience of surveyors who had drawn up other by-laws, and in practice found out the weak points and defects thereof.

JOHN E. MORLEY, M.S.I.

HOLBORN UNION WORKHOUSE, MITCHAM.

SIR,—It is quite true that the excellently planned workhouses for the Parish of Lambeth and for the Wandsworth and Clapham Union, designed by Mr. Aldwinckle, are both upon the block system, and it is also the fact that many others designed upon this principle have for some time past been erected in various parts of London and the country; but, so far as I know, the statement made in your issue of the 23rd ult. [p. 583], that the Holborn Union Workhouse at Mitcham "is the first attempt to apply the principle in its entirety to a workhouse" is a perfectly correct one. The words in italics were omitted in Mr. Aldwinckle's letter in your last issue [p. 646], and "hence the confusion."

All the connecting corridors in the Mitcham building are quite open, and the air cannot, therefore, be conveyed through these corridors from one block to another. In all the other buildings referred to, the communication is by means of enclosed corridors, and therefore this clearly does not carry out the most improved principle of the block system.

H. SAXON SNELL.

WINDSOR TOWN-HALL WINDOWS.

SIR,—We shall be obliged if you will allow us to correct Mr. Warrington's assertion which appeared in your issue of the 9th ult. [p. 540]. Mr. Warrington simply painted the windows for us, and was in no way responsible for the design.

We have waited until after the windows were fixed to do this, in order that the gentleman who gave us the design and whose ideas we carried out might see them. We enclose his letter, which we shall be glad if you will publish with this, which will emphatically prove the correctness of our assertion.

We regret that this controversy should have arisen over so small a matter.

CHARLES BUSELL, GIBBS, & Co.

"Windsor, October 28th, 1886.

"To Messrs. Bussell, Gibbs, & Co.
DEAR SIRS,—Replying to your inquiry respecting the stained glass windows you have just fixed for me in our Town Hall, I have pleasure in saying that you have truthfully carried out my idea of the design for the windows expressed in the sketches I sent you.—Yours truly,
"Geo. CATLAND."

PAINT FOR ROOFS.

SIR,—I have a large shed roof to paint white; it has been tarred and sanded, and I should be glad to know if any of your readers can recommend a preparation that would stop the tar eating through and so discolouring the white paint.

Any suggestions, I have no doubt, would be of service to others in a similar difficulty.

F. A. B.

Water Supply, Blackburn.—Guide Village, with about 500 inhabitants, is situated above the highest reservoir of the Blackburn Corporation Waterworks. Mr. J. B. McCallum, C.E., the Borough and Water Engineer, has recently put down two of Blake's patent hydraulic rams, capable of forcing about 30,000 gallons per day to a service-tank about three-quarters of a mile from the rams, and 170 ft. higher. The waste water from the rams gravitates to an adjacent reservoir. Mr. McCallum reports well of the working and efficiency of the rams.

Slough.—Mr. T. B. Richards has been appointed assessor to advise the committee in reference to the Slough Public Hall and Leopold Institute limited competition.

The Student's Column.

STONE QUARRIES.—XIX.

LIMESTONES (continued.)

Bath Stone.

THE oolitic freestone which comes from the neighbourhood of Bath is known to every architect. It is found principally in the Great Oolitic series of geologists, and is remarkable for the comparative paucity of fossils in a good state of preservation.

This, although so tantalising to the scientist, is rather a fortunate circumstance from a commercial point of view, as the stone has a better chance of being uniform, both in colour and texture.

But, even allowing that the partial absence of fossils so materially influences the structure and appearance of the stone, it goes but a very little way to prove that the material is fitting for such a trying atmosphere as that we are now having in London. No doubt it is an important item in the cost of working, and personally we think that Bath stone carvings are about as good as any, when they are taken care of. We would point out, however, that the stone which goes under the name of "Bath" is about as variable in structure and durability as can well be. It would be useless to hide from ourselves the fact that buildings in the metropolis and elsewhere that have been constructed externally with Bath stone, have soon decayed, but it would be very rash to denounce the whole of the stone coming from that locality, on these grounds alone. We can point to elaborate carvings in the material that have stood out in the London atmosphere for over twenty-five years, and if we except the smoke and dirt which are always associated with such carvings here, they look almost as good as when they were put up. The angles and lines are still well preserved, and certainly the stones have withstood the action of the atmosphere as well as any limestone is capable of doing. Yet, in spite of such a good character, Bath stone is often seen presenting a washed-out and woe-begone appearance. The cause, as usual, is not far to seek. The fault does not always lie with the stone itself, but with those who select it.

Taking the assertion that the fault lies with the stone, first let us examine it.

The rule we have so repeatedly laid down, that stones vary both in structure and composition in the same quarry, and even along the same horizon in the quarry, must be more rigidly enforced in the case of Bath stone than with any other we have mentioned. We can easily understand that when the material comes from different levels, variations in quality are most likely to ensue; but quite a different problem is presented when we know that stone from one level only is being supplied. It seems the most natural thing in the world to regard the material, under the last-mentioned circumstance, as being of only one quality, and so we are taken off our guard. The quarry-owners exercise considerable care in rejecting, as much as possible, all bad blocks, and by the time the stones arrive in London they are therefore in some measure selected; but the methods the quarry-owners use to discriminate between good and bad blocks may be somewhat different from our own, and to make sure of using the best stone it is always desirable to overhaul them. There can be no doubt that there is no place like the quarry itself for selecting the stone. All kinds of difficulties arise if it is not done before they reach London. For instance, the great majority of carvings, mouldings, and the like, in order to effect economy, both as regards labour and carriage, are treated on the spot; so that when these mouldings, &c., reach London one does not like to reject them, for obvious reasons. Besides, it is much more difficult to judge of the qualities of stone when dressed than when it is in the rough.

When the fault with the stone is not inherent it generally results from inattention to its proper seasoning, or from being improperly placed in the building. With reference to the former cause, we may mention that we think it absolutely necessary that all free-working limestones should be exposed to the air and well seasoned before being built up. As to the duration of time to be allowed to elapse between the quarrying and building up of the stone, we believe that a rule can be laid down, as it must vary with each kind. But of this much we feel certain, that in some instances Bath stones have not been

long enough exposed to the seasoning process, whilst at others they have been overdone. We would call particular attention to those falling under the latter heading. There is no doubt that all stones, within certain limits, get harder as their "quarry-water" is dried out by the air. But the average Bath material, in addition to becoming harder as a whole, takes on a crust of hard matter, which is said to arise from a slight decomposition taking place, which will remove most of the softer particles, and leave the hardest and most durable to act as a protection to the remainder. It is self-evident, then, that if the stone is left too long in the seasoning process this crust will more or less form; and when it is subsequently dressed and another face formed (perhaps only a short space behind the originally seasoned one), the materials for again forming the hard surface crust might not be forthcoming quite so readily: the internal structure of the stone will, therefore, then be more vigorously acted upon by the deleterious atmospheric acids easily soaking in.

When the stone is not placed in its proper position in the building very disastrous results almost always follow. We cannot do better, perhaps, than to quote from one of the largest quarry-owners' pamphlets on this subject. They say that, with few exceptions, Bath stone should be laid on its natural bed (or with the bedding planes in a horizontal direction) as in this position it is found to weather better, and is also capable of carrying greater weight. This should be made a *sine qua non*, as favourable results depend upon it. Cornices and copings are, however, found to stand the weather better when worked joint-bedded, and, in consequence, are generally so placed; but, when this is done, care should be taken that the angle quoins to the cornice and coping are upon the natural bed of the stone, as, if put joint-bedded, one side would be face-bedded. Tracery windows should be worked face-bedded, to avoid the bed running across the point or cusp.

There is yet another thing to which we would draw the student's attention. Certain kinds of Bath stone are more suitable for exterior than interior work. We have no objection to each kind being placed in the position most suitable to it, but we must demur to so many kinds being used in any one building. Surely, if one kind is used outside and one other inside, the requirements, as far as selection is concerned, will be amply fulfilled. We remember not long since seeing no less than six different kinds of Bath stone used in the porch of a church. Such a work might be a fitting ornament for a museum, but, if it is allowed to stand where it now is and architects judge in after years of the durability of Bath stone from it, the result cannot be but detrimental to its more extended use. One stone might stand well, perhaps, whilst its neighbour is crumbling to dust. But how are they to know from which quarry the better stone has come? It would be much more satisfactory to all concerned if only one kind were used in such a case.

We do not propose to describe here the minute details respecting the quarries and the stone raised. Strictly speaking, the majority of the workings being underground, and not open, are mines. Some of these are of vast extent, and a block plan of them has a very labyrinthine appearance, resembling the branches of a tree. On entering the tunnel of the Box Hill Quarry, under guidance, of course, it seems as though the end will never be reached. There is a series of main paths, with innumerable other paths leading from them on either side at every few yards. In fact, the whole working is a vast clearance with pillars of stone left here and there to prop up the roof. After a few miles walking we emerge from the tunnels and find ourselves at the Corsham end of the quarry, where, after a laborious climb up several stone steps we once more stand in the open air.

No powder is used in any of the Bath quarries, as it spoils so much stone, but the blocks are shifted from their natural position by picking, sawing, and wedging, assisted by cranes. The blocks after being trimmed or "scalped," as it is called, are drawn to the mouth of the quarries either by horses or by a locomotive engine, the latter being about the ugliest piece of machinery it is possible to conceive of.

The following are the names of some of the principal stones obtained:—

1. Bethel
2. Box Ground
3. Combe Down
4. Corngrit
5. Corsham Down
6. Corsham Ridge
7. Farleigh Down
8. Monk's Park
9. Stoke Ground
10. Westwood Ground
11. Winsley Ground

The colour of the whole of them varies from a white to cream tint. All are oolitic, but the sizes of the little spherules are not altogether uniform, and the grain of the rock alters accordingly. The durability of the stone, like that of Portland, depends almost entirely on the character and state of crystallisation of the material which cements the little spherules together, and the student should therefore turn to our remarks on Portland stone to get some idea of the method of selecting. As every block of stone so largely stands on its own merits, we do not care to state which of the Bath stones are superior to the others. For the same reason it is not necessary to say much about their respective chemical compositions, resistance to thrusting stress, amount of absorption of water, and matters of a like nature. We have several of the results of experiments before us, but in very few cases are the descriptions of the stone given in sufficient detail to justify us in identifying the kinds of stone to which they respectively refer, and we may as well at once state that, with the materials at our command, it would be simply ridiculous to draw any inferences as to quality, or kindred matters, from them. Many of the experiments were conducted years and years ago, and they not infrequently were made on stones from parts of the quarries no longer worked, though the names are perpetuated, and refer to remote workings in the same quarries. Before anything like sound deductions will be enabled to be made from a purely scientific standpoint, a great number of new experiments will have to be carried out, a principal feature in which should be an accurate description of the exact quarry and horizon of each of the specimens experimented upon, a matter hitherto neglected almost without exception.

With regard to the use of Bath stone, we may mention that although it was used as far back as the twelfth century, and probably even in the time of the Romans, the trade as now known did not spring up until the completion of the Box Tunnel in 1841. Box Church, built in the year 1200; Lacock Abbey; Balliol and Keble Colleges, Oxford; St. Mary Magdalene Church, Paddington; St. Jude's Church, South Kensington; New Arcade, Birmingham; Post Office, Guildford; St. Matthias Church, Plymouth; and the new Cathedral at Truro, are a few examples of edifices in which Bath stone has been largely employed.

Chilmark and Wardour Quarries.—With reference to our observations on these quarries [p. 647, ante], the proprietor writes to say that the stone known as "Tisbury Stone" is no longer worked, and that the name does not apply to the Chilmark stone, although, we may mention, the latter is quarried in the vicinity of Tisbury, and we regret that we were misinformed on the subject. He also states that the "trough" beds are not oolitic in structure, but in this he is quite incorrect, as an inquiry into the subject would soon convince him.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,467, Glazing. J. Jeffreys.

This invention relates to a new and improved system of glazing for roofs, &c. The bars to which the glazing is applied are made of oak or mahogany or other wood, and are rebated for glass on the upper side to a depth about the thickness of the glass. The glass is bedded in with a plastic material which does not get hard by exposure to the weather. The edges of the glass above the rebates are thinly covered with this plastic material and a strip of roofing felt, the width of the supporting bar, is then laid on, and the whole covered with a metal capping of half-hoop form with returned feet, and this capping is screwed down to the wooden bar by metal screws. Provision is made for carrying off condensed water on the inside by means of a thin strip of glass or metal curved to an S or ogee section.

14,500, Sash-line Socket. W. Musselwhite and W. Prewett.

This invention consists of an iron socket, and grip or pair of small jaws for holding the sash-rod. On the inside of the surface of these jaws are three pointed teeth, two in one jaw and one in the other; these engage the end of the sash-rod, and when

closed form a taper and fit into a little thimble-like socket, securely holding the cord. The fastener is fixed so as to strengthen the corner of the ash-frame.

14,793, Embossed Canvas for Walls. W. Scott-Morton.

With the view of improving and cheapening embossed canvas for decorating walls, a hollow metal cylinder, arranged to be heated by steam or other hot fluid, is used for embossing the plastic surface, which by this is more quickly dried and stiffened, and the sharp effects of the pattern are better preserved.

14,866, Fireplaces. R. M. Somers.

The object of the invention is to prevent the fumes of the burning coal being drawn into the room by the draught caused by a lady's dress in passing, the opening or slamming of a door, or such like cause. A canopy is secured to the brickwork of the fireplace in that part of the fire-back which connects and forms the contracted part of the chimney. By this means the stray smoke is conducted into the chimney, and the draught up the chimney is encouraged or increased, and the projecting fire-back is, to a great extent, hidden from view. The canopy is of metal or of plain ornamental tiles framed in metal.

9,828, Lattice Work. F. H. Street and W. Ellis.

The lattice work is principally designed for use in the construction of ships' berths, and it is so made that it may have an extensible and collapsible motion given to it in one direction—longitudinally—without corresponding alteration of dimension in the other (or transverse) direction. It may also be used for garden seats, shelves, and cattle or stable fittings, &c.

10,261, Automatic Valves for Ventilating Pipes. J. Broadfoot.

A valve for ventilating pipes, such as are fitted in situations where it is desirable to prevent the passage of water from one compartment to others through which the ventilating pipes extend. In the automatic valve a pocket or recess into which water will drain is fitted, and when water fills into the pocket the valve-piece is raised by it and so closes the passage.

NEW APPLICATIONS FOR PATENTS.

Oct. 22.—13,477, T. Cheverton, Catch or Fastener.—13,492, W. Ellis, Rendering Laths and Cutting Veueurs.—13,511, R. Briggs and Others, Kivins for Limestone Cement, &c.

Oct. 23.—13,537, D. Lyon, Flushing Apparatus and Water-Water-preventer.—13,554, S. Johnson, Automatic Water-closet Apparatus.—13,577, J. Stott, Indicating Escape of Gas in Buildings.

Oct. 25.—13,596, J. Mitchell, Water Tap.—13,597, J. Parsons, Fall Pipes, and Fixing same.—13,603, C. Whitehouse, Screw or Twist Augers and Boring Bits.—13,616, E. Schofield, Machinery for Making Bricks, Tiles, &c.—13,627, W. Clark, and J. Furneaux, Hoist, &c.—13,632, H. Walker, Woodworking Tools.—13,647, A. Stone, Automatic Fasteners for Doors, Windows, &c.

Oct. 26.—13,670, J. Summerscales and H. Longdon, Hinge Joint for Step Ladders, &c.—13,683, N. Locke, Opening and Closing Fanlights, &c.—13,693, J. Gozney, Cleaning Fans and Seats of Closets.—13,718, G. Capewell, Manufacture of Nails.—13,780, R. Crane, Water-supply Cisterns.—13,731, C. Letzing, Look.—13,735, E. Pearson, Valve Arrangement and Container for Closets.

Oct. 27.—13,788, D. Webster and P. Pfeiffer, Cleaning Flues and Chimneys.

Oct. 28.—13,835, A. Caldwell, Controlling the Flow of Water into Dwelling-houses, Factories, &c.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,289, T. Easley, Attaching Door-knobs to Spindles.—11,633, D. Duncan and W. Welton, Automatic Air-valves for Water-pipes.—11,756, S. Gratix, Lead Pipes, &c.—11,798, R. Knight, Hot-water Pipes for Heating Buildings.—11,863, L. Dove and J. Bush, Regulating Mechanism for Doors and Window-sashes.—11,877, R. Robinson, Brick-cutting Tables.—11,934, W. Dunn, Preventing Water-pipes Bursting during Frosty Weather.—11,985, W. Dunn, Preventing Water Freezing in Water-pipes.—12,311, W. Morrison, Cooking-ranges.—12,367, H. Whiteley, Regulating the Opening and Closing of Fanlights, &c.—12,401, E. Taylor, Opening, Closing, or Fastening Casements, &c.—12,443, H. Heim, Fireplaces or Stoves.—12,042, H. Broadway, Casements or Fanlight Stays and Fasteners.—12,407, W. Macfarlane, Fixing Pipes to Buildings.—12,421, W. Curzon and others, Cementitious Slabs.—12,470, E. Long, Concrete Blocks.—12,542, E. Blundstone, Plaster of Paris.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

13,100, E. Hughes, Feed-motion for Circular Saws, &c.—15,464, E. Preston and E. De Russett, Lavatories.—15,860, H. Doulton, Joints of Stoneware Pipes.—16,096, H. Hadden, Construction of Terraces and Flat Roofs.—15,124, W. Allen, Ladders.—15,581, R. Rastick and G. Hughes, Mire-cutting Machine.—11,234, T. Whitehead, Tops or Cows for Chimneys, &c.—11,922, J. Garfield, Ventilating Apparatus.—31, W. Joy, Utilisation of Waste Heat

from Cement Kilns, &c.—2,896, W. Ross, Water-waste Preventers.—10,691, H. and L. Stollwerck, Stairs or Staircases.—11,091, J. Anderson, Bricks, Tiles, &c.—11,820, C. Heaton, Ornamental Cloissonné Work for Decorative Building Purposes.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

OCTOBER 25.
By HOBBS, SON, & FRYBURN.
Fulham 88 and 89, Sherbrooke-road, 90 years, ground-rent 331. £890
Sheditch, New Norfolk-street—Freehold stabling and premises. 560
Twickenham, Fulwell-road—Kate Cottage, freehold 178

OCTOBER 26.
By JONES, LANG, & CO.
City—20 and 22, Gresham-street, 24 years, ground-rent 71. 4,700
32, Gresham-street, and 7, Mumford-court, 20 years, ground-rent 123. 84
Peckham—Ground-rents of 121, reversion in 52 years. 4,500

By OTTMANN & CO.
Hamstead-road, 102, 50 years, ground-rent 81. 500
Camden road—No. 48, term 44 years, ground-rent 61, 6s. 1,056

By G. B. SMALLPRICE.
Bethnal Green—1 to 11 odd, Three Colts-lane, 31½ years, ground-rent 83. 1,920
Nos. 184, 186, and 188, Brady-street, 31½ years, ground-rent 81. 368
43 to 69 odd, Seabright-street, 31½ years, ground-rent 724. 10s. 3,965
14 to 84 even, Seabright-street, 31½ years, ground-rent 571. 10s. 3,965
1 to 12, Teale-street, 31½ years, ground-rent 327. 10s. 2,330
3 to 53 odd, Viaduct-street, 31½ years, ground-rent 271. 10s. 1,790
55 to 65 odd, Viaduct-street, 29½ years, ground-rent 181, and ground-rents of 181, term 2 years. 1,875
52 to 60 and 68 and 74 even, Viaduct-street, 31½ years, ground-rent 301. 1,725

OCTOBER 27.
By JOSHUA BAKER & SON.
Harrow-on-the-Hill—14s Villa and Ivy Cottage, freehold. 1,920
Ground-rent of 34, reversion in 21 years. 155
Sudbury, Finner-road—Three freehold cottages. 205

By G. F. FRANCIS.
Pimlico—19, Charlwood-street, 30 years, ground-rent 81, 18s. 475

By C. W. DAVIES.
Islington—1 to 8, Goldsmith-place, 16 years, ground-rent 1451. 12s. 695

By G. B. SMALLPRICE.
Bethnal Green—3 to 41 odd, Seabright-street, 31½ years, ground-rent 621. 10s. 3,380
2 to 42 even, Seabright-street, and 2, Viaduct-place, 31½ years, ground-rent 691. 10s. 5,230

1 to 32, Viaduct-street, and 1, Viaduct-place, 31½ years, ground-rent 871. 10s. 6,305
34, 36, 38, 40, 42, and 50, Viaduct-place, 31½ years, ground-rent 171. 1,220

By D. SMITH, SON, & CARRIV.
Tulse Hill 147, Upper Lawn, 61 years, ground-rent 304. 1,480
Camberwell—73, 75, and 77, Denmark-hill, 70 years, ground-rent 804. 1,075

Euston-road—15, Mabledon-place, 20 years, ground-rent 211. 170

OCTOBER 28.
By J. C. PLATT.
Hammersmith—34, Southcroft-road, 79 years, ground-rent 81. 2,500

By GLASIER & SONS.
Kew—Freehold land, 44 acres. 460
Battersea—50, Northcote-road, freehold. 7,007

By A. WALTON.
Norwood—2, Clifton-villas, 68 years, ground-rent 87. 180
Sydenham—Ground-rent of 261, reversion in 79 years. 650

By C. P. WHITELEY.
Clerkenwell—81, St. John-street-road, 44 years, ground-rent 101. 10s. 630
Plaistow—1 and 2, Sweto-street, freehold. 420
West Ham—6 and 8, Dirlston-street, 78 years, ground-rent 81. 155

By G. B. SMALLPRICE.
Bethnal Green-road—No. 406 to 403 even, 31½ years, ground-rent 1071. 7,245
A plot of land, 31½ years, ground-rent 41. 1,145

1 and 1a, Seabright-street, 32 years, ground-rent 101. 465
Nov. 33 to 417 odd, and 1a, Camberwell, 32 years, ground-rent 1021. 6,105

1 to 12 and 14, Wolverley-street, 32 years, ground-rent 241. 1,680
2 to 7, 9, and 11, Camberwell-street, 32 years, ground-rent 241. 1,445

13 and 15 and 16 to 30 even, Wolverley-street, 32 years, ground-rent 241. 1,360
1 to 4, Teale-street, and 40, Teale-street, 30½ years, ground-rent 161. 930

Kingland-road—33 and 35, Harwar-street, 2 years, ground-rent 24. 22

By BLAIR & DALRYMPLE.
Deptford—47, Douglas-street, 65 years, ground-rent 21. 8s. 280
East Greenwich—52 to 56 even, Calvert-road, freehold. 1,235
57 and 59, Calvert-road, freehold. 2,325
64 to 78 even, Calvert-road, freehold. 2,325

By E. STRIMON.
Newington—7, 8, and 10, Calverbury-terrace, 10 years, ground-rent 124. 11s. 4. 265
Walworth—72, Olney-street, 20 years, ground-rent 41. 1s. 270
Camberwell—13, 15, and 17, Lepsie-road, 19 years, ground-rent 71. 533

Battersea—37 to 45 odd, Lindford-street, 22 years, ground-rent 81. 2,238
West Dulwich—18, Crooked-road, 74 years, ground-rent 131. 10s. 94. 585
Ealing Dean—The freehold residence called Carrara Ground-rents of 361, reversion in 80 years. 900
Deptford—31 to 34, Heston-street, 39 years, ground-rent 161. 400
Bermundsey—Ground-rent of 421. 10s., reversion in 74 years. 1,020
Acton—Ground-rent of 31 11s., reversion in 95 years. 71
Walthamstow—Ground-rent of 181, reversion in 96 years. 406

By NEWSON & HARDING.
Poplar—185, East India Dock-road, freehold. 840
Stoke Newington—15, Midmay-grove, 75 years, ground-rent 71. 290
Homerton—34 to 48 even, Nisbet-street, 94 years, ground-rent 201. 653

Highbury—70, Petherton-road, 63 years, ground-rent 71. 7s. 600
9, Elphinstone-street, freehold. 450
King's Cross—8, Derby-street, freehold. 850
Marylebone—Ground-rent of 211, reversion in 34 years. 595

OCTOBER 29.
By G. B. SMALLPRICE.
Shoreditch—61, High-street, freehold. 2,660
Kingland—Ground-rent of 201, reversion in 62 years. 860

Bethnal Green—Improved ground-rents of 2441. 10s., term 32 years. 2,900
Improved ground-rents of 1891. 10s., term 32 years. 2,860
Improved ground-rents of 2101, term 32 years. 2,830

Improved ground-rents of 801. 10s., term 32 years, with reversion to 1,001, year for 53½ years. 4,840
Hackney-road—Improved ground-rents of 1801. 19s. 3d., term 32 years. 2,600
Improved ground-rents of 81, term 32 years. 105

Improved ground-rents of 1891. 14s., term 31 years. 1,300
By THURGOOD & MARTIN.
High Holborn—No. 233, term 57 years, ground-rent 3001. 2,800

MEETINGS.

SATURDAY, NOVEMBER 6.
Association of Public Sanitary Inspectors.—Address by the Chairman of Council, Mr. G. B. Jerram. 7 p.m.

MONDAY, NOVEMBER 8.
Surrey's Institution.—Opening address of the Session by Mr. W. J. Beadell, M.P. 8 p.m.

TUESDAY, NOVEMBER 9.
Institution of Civil Engineers.—Inaugural Address by the President, Mr. Edward Woods. 8 p.m.

WEDNESDAY, NOVEMBER 10.
Tyndal's and Birkley's Company.—Dinner at the "Albion" for 6 p.m.
United Arts Club.—General Meeting. 8 p.m.

THURSDAY, NOVEMBER 11.
Society of Telegraph Engineers and Electricians.—Mr. Gilbert Kapp on "The Predetermination of the Characteristics of a Dynamo." 8 p.m.

FRIDAY, NOVEMBER 12.
Bradford Historical and Antiquarian Society.—Mr. T. Kimpell on "Bradford in the Seventeenth Century." 7.30 p.m.

Miscellaneous.

Mineral-water Reservoirs, Harrogate.—On the 22nd ult. the ceremony of turning the water into the newly-constructed reservoirs was performed by the Mayor of Harrogate (Mr. Alderman Ellis). These works, which have been completed in the short space of four months, have been designed by Mr. E. Wareham Harry, C.E., the Borough Surveyor. The purpose for which they are intended is the storing of the valuable mineral water which hitherto has run to waste during the winter. The Corporation having decided to remedy the evil they instructed their engineer to prepare plans and estimates, which received the approval and sanction of the Local Government Board. The works consist of a series of twelve chambers, each about 19 ft. 6 in. square and 13 ft. deep, capable of holding an aggregate of 372,000 gallons. They are constructed of brickwork in cement, having a concrete flooring, and the sides being surrounded by the same material 15 in. thick. The roof consists of iron girders with concrete arches, the whole being covered with a layer of Limer asphalt. The contractors have been Messrs. Langley Bros., Leeds and Harrogate, and the clerk of the works was Mr. W. J. Hague.

Builders' Benevolent Institution.—The thirty-ninth annual dinner in aid of the funds of this Institution took place on Thursday evening last in the Hall of the Worshipful Company of Carpenters, London Wall. Mr. Basil E. Peto, the President, occupied the chair, and covers were laid for about 150 persons. During the evening the Secretary, Major Brinton, announced subscriptions and donations to the amount of 678s. A report of the proceedings will appear in our next issue.

Birmingham Architectural Association.—The opening meeting and conversations of the present session took place at Queen's College, Paradise-street, on Tuesday night. Mr. F. B. Osborn (President) occupied the chair, and amongst those present were the Mayor (Alderman Martineau), Messrs. J. Everard (President of the Leicester Architectural Association), J. Jackson (secretary, Leicester), T. Camm, H. R. Smith, W. Churchill, J. A. Cossins, Victor Bourton (secretary), &c. There was a large attendance. Letters of apology for non-attendance were received from the Royal Institute of British Architects, the Architectural Association (London), and from the Liverpool, Nottingham, Manchester, Edinburgh, Leeds, York, and Northern Architectural Associations. The President, in his address, said that one of the most important matters of the year was the proposed new charter of the Royal Institute of British Architects, which would inaugurate a new era in their profession. They had had two important competitions in the town during the last year,—the Assize Courts and the Workhouse Infirmary. Much as they wished that the competition could have been confined to Birmingham architects, yet they had in the Assize Courts a subject for congratulation,—namely, the employment of a professional referee, and the perfect fairness with which the competition was conducted.

Institution of Civil Engineers.—The first ordinary meeting of the session 1886-87, will be held on Tuesday, November 9th, 1886, at eight p.m., when the inaugural address will be delivered by the President, Mr. Edward Woods, and the presentation will take place of the medals, premiums, and prizes awarded during the last session.

The Office of Superintending Architect, M.B.W.—The report of which we made mention in our last (p. 650) was adopted by the Board on the 29th ult., and it was at the same time resolved that the whole question relating to the appointment of Superintending Architect be referred back to the Works and General Purposes Committee for further consideration and report.

Port Said British Hospital.—This hospital has been built from the designs of Viscountess Strangford, by Messrs. W. H. Lascelles & Co., and is a commodious airy structure of one story, admirably adapted for the Egyptian climate. It consists of two wings, one on each side of an open passage, and united under one roof at the entrance. The material used is Balfour, which will be painted outside and varnished within. At present the hospital is planned to contain thirty beds in five wards, the principal of which is 38 ft. long by 28 ft. wide, and the average height of the various apartments is 10 ft. to the eaves, or 19 ft. to the top of the ridge. The whole of the building stands on a frame, which will rest on concrete pillars 4 ft. above the ground, so as to allow of a free draught of air underneath. Inside the rafters of the wards and other rooms are lined with match-boarding, and the building will be entirely roofed with "Wilkesen Paper." Besides the accommodation for patients, there are quarters for the resident doctor and three nurses, a spacious bath-room, lighted from the roof, a kitchen, and necessary offices, and the dispensary, which is in a sense apart from the hospital, and is intended to be of service, not only to the patients, but generally to the native inhabitants of the Delta. Round three sides of the building runs a verandah, approached from the wards and rooms by French windows. The flooring of the structure is "tongued," by which means it is made thoroughly draught-proof, but the floors of the verandahs and over the open passage are latticed, to allow the rain-water to pass away. As the hospital now stands at Messrs. Lascelles' premises at Stratford, it is "in frame," and ready to be put on board ship for transport to Port Said as soon as its several parts have been numbered and taken down.—*Morning Post.*

Carlisle Mansions, Chelsea.—The Secretary of Wilkes's Metallic Flooring Company writes to say that the staircase in these buildings (illustrated in our last) has been entirely constructed by the company in Wilkes's patent metallic stone.

United Arts Club.—The first general meeting of this club, "for architects, painters, sculptors, and engineers," will be held, as will be seen from an advertisement in another column, on Wednesday next, the chair being taken by Mr. E. P. Anson.

Bradford Historical Society.—From the Leeds Mercury of the 30th ult. we learn that this Society opened its winter session on Friday, the 22nd ult., with an interesting paper by Mr. J. P. Pritchett, on the family of the Nevilles, and the castles built or developed by them, including Raby, Standrop, and Brancepeth castles; Brancepeth Church, Middleham Castle and Church, Coverham Abbey, Barnard Castle and Church, &c.

Diocesan Surveyorship.—Mr. R. Knill Freeman, architect, of Bolton-le-Moors, has been appointed (subject to the approval of the Bishop) to the office of Surveyor under the Ecclesiastical Dilapidations Act, 1871, for the whole diocese of Manchester for a period of three years. Thirty applications for the office were considered and first reduced to three, including Mr. R. K. Freeman, of Bolton-le-Moors; Mr. T. H. Myres, of Preston; and Mr. A. W. R. Simpson, of Blackburn.

The Mineral Products of the United States.—From an advance proof of the summary report of the mineral production of the United States in 1885, published by the United States Geological Survey, it appears that the value of building stone quarried in the States during 1885 was \$19,000,000, or about the same as in 1884. The demand and consequent production of bricks and tiles increased to an estimated value of \$35,000,000, as against \$30,000,000 in 1884, and \$34,000,000 in 1883. With the price of lime constant at 50 cents per barrel at the kilns, the production increased from 37,000,000 barrels in 1884 to 40,000,000 in 1885. The production of cement from natural rock increased to 4,000,000 barrels of 300 lb. each (against 3,900,000 barrels in 1884), but was valued at only \$3,200,000. The production of artificial Portland cement amounted to 150,000 barrels of 400 lb. each (as compared with 100,000 barrels in 1884), with a total value of \$292,500. The total production of cement of all kinds was 4,150,000 barrels, valued at \$3,492,500, against 4,000,000 barrels, valued at \$3,720,000 in 1884.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G.	6	10	0	7	0	0
Task, F.I.	8	0	0	14	0	0
Saguaro, U.S.	2	4	0	2	7	0
Ash, Canada	3	0	0	4	10	0
Birch	2	5	0	3	10	0
Elm	3	10	0	4	10	0
Fir, Dantsic, &c.	1	10	0	4	0	0
Oak	2	10	0	4	10	0
Canada	3	0	0	6	0	0
Pine, Canada red	2	0	0	3	10	0
" yellow	2	5	0	4	0	0
Lath, Dantsic, &c.	3	0	0	5	0	0
St. Petersburg	4	0	0	5	10	0
Waincoat, Riga	2	15	0	4	0	0
Odessa, crown	3	5	0	7	6	0
Deals, Finland, 2nd and 1st. s.d. 100	7	0	0	8	0	0
" 4th and 3rd	6	0	0	6	10	0

TIMBER (continued).	£.	s.	d.	£.	s.	d.
Deals, Riga	5	10	0	7	0	0
St. Petersburg, 1st yellow	8	10	0	14	0	0
" 2nd	7	0	0	8	0	0
" white	7	0	0	10	0	0
Swedish	6	0	0	15	0	0
White Sea	7	0	0	17	0	0
Canada, Pine, 1st	17	0	0	23	0	0
" 2nd	11	0	0	17	0	0
" 3rd, &c.	6	0	0	8	0	0
" Spruce, 1st	8	0	0	11	0	0
" 3rd and 2nd	5	0	0	7	10	0
New Brunswick, &c.	5	0	0	7	0	0
Battens, all kinds	4	0	0	13	0	0
Flooring Boards, sq. 1 in., prepared, first	0	8	0	13	0	0
" Second	0	7	6	8	6	0
Other qualities	0	5	0	7	0	0
Cedar, Cuba	0	0	3	0	34	0
Honduras, &c.	0	0	24	0	34	0
Australian	0	2	0	3	3	0
Mahogany, Cuba	0	4	0	7	0	0
St. Domingo, cargo average	0	0	0	7	0	0
Mexican	0	34	0	0	44	0
Tobacco	0	4	0	0	64	0
Honduras	0	4	0	0	64	0
Maple, Bird's-eye	0	6	0	8	0	0
Rose, Rio	0	7	0	10	0	0
Bahia	6	0	0	10	0	0
Box, Turkey	5	0	0	17	0	0
Bata, St. Domingo	0	10	0	0	10	0
Porto Rico	0	7	0	1	0	0
Walnut, Italian	0	4	0	5	0	0

METALS.	£.	s.	d.	£.	s.	d.
Iron—Pig, in Scotland	0	0	0	0	0	0
Bar, Welsh, in London	4	7	6	4	15	0
" in Wales	4	6	4	7	6	0
Sheet, Staffordshire, London	5	10	0	0	0	0
Sheets, single, in London	4	15	0	8	10	0
Hoops	8	0	0	7	0	0
Rail-roads	5	15	0	8	10	0
Copper—						
British, cake and ingot	44	0	0	45	0	0
Best selected	46	10	0	46	0	0
Sheets, strong	51	10	0	62	0	0
" India	48	19	0	0	0	0
Australian	0	0	0	0	0	0
Chili, bars	43	12	6	41	0	0
Yellow Metal	0	4	0	0	44	0
Lead—						
Pig, Spanish	12	15	0	12	17	6
English, common brands	13	0	0	0	0	0
Sheet, English	13	17	6	14	0	0
Brasses—						
Silesian, special	14	5	0	14	7	6
Ordinary brands	14	2	0	14	5	0
Tin—						
Banca	0	0	0	0	0	0
Bilinton	0	0	0	0	0	0
Straits	101	10	0	0	0	0
Australian	102	0	0	0	0	0
English ingots	105	0	0	0	0	0
Zinc—						
English sheet	0	0	0	0	0	0

OILS.	£.	s.	d.	£.	s.	d.
Linseed	20	5	0	20	15	0
Cocanout, Cochiti	35	10	0	38	0	0
Ceylon	26	10	0	0	0	0
Copra	0	0	0	0	0	0
Palm, Lagoa	23	10	0	0	0	0
Palm-nut Kernel	0	10	0	0	0	0
Rapeseed, English pale	22	10	0	22	15	0
" brown	21	0	0	21	5	0
Cottonseed, refined	18	10	0	19	10	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, V.S.	8	0	0	10	0	0
" refined	8	0	0	13	0	0
TURPENTINE—						
American, in casks	1	8	0	0	0	0
Tar—						
Stockholm	0	15	0	0	15	6
Archangel	0	10	6	0	11	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Road-Making and Paving Works	Hammersmith Vestry	Official	Nov. 10th	i.
Sewerage Works, Putney	Estate Proprietors	F. Stocker	Nov. 15th	ii.
Paving Cartway	Bermondsey Vestry	Official	do.	ii.
Drainage Works, Willesden	Metropolitan Rail. Co.	W. Buck	Nov. 16th	xiii.
Repairs and Painting Ten Houses	Tottenham Local Board	Do Paper	do.	ii.
Pumping Machinery	do.	do.	do.	i.
Engine-House, &c.	do.	do.	do.	ii.
Oak Park Fencing	Met. Board of Works	Official	Nov. 18th	do.
Main Drainage, Sewers, Pumping Stations, &c.	do.	do.	do.	ii.
Laying-out and Planting Infirmary Grounds ..	St. Saviour's Union	Jarvis & Son	Nov. 19th	ii.
Water Works (Buildings and Machinery)	Farnham Water Co.	Pollard & Forde	Nov. 20th	ii.
Sea Walls & Steps, Cutting Cliffs, &c.	Dawlish Local Board	J. S. Dalbridge	Nov. 24th	ii.
Firewood	Tunbridge Wells Ld Bd	W. Brentnall	Nov. 26th	ii.
Formation and Construction of Roads	Bournemouth Com.	G. R. Andrews	Nov. 29th	xiii.
Dredging	do.	do.	Dec. 3rd	ii.
Stores and Materials	Cheshire Lanes Com.	Official	Dec. 4th	xiii.
Furnishing New Town-hall	Barrow-in-Furness Cor.	do.	Dec. 7th	xiii.
Sewage Precipitation Works, Barking Creek ..	Met. Board of Works	do.	Not stated ..	xiii.
Blue Guernsey Granite	Acton Local Board	C. N. Lesley	do.	ii.
Methodist New Chapel, W. Kensington	do.	A. H. Goodall	do.	ii.
Erection and Enlargement, &c., of Schools ..	School Bd. for London	Official	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Deputy Inspector of Nuisances	Liverpool Corporation	150%	Nov. 26th	xvi.

TENDERS.

BATTERSEA.—For the construction of concrete river wall, dumb dock, flushing-chamber, &c., at Lombard-road Wharf, Battersea, for the Board of Works for the Wandsworth District:—

Dickenson, Loughborough Junction (accepted) £1,100 0 0
[For full list see *Builder*, October 23, p. 616.]

RETINAL GREEN.—For rebuilding Somerset Dairy, No. 2, Lisbon-street, for Mr. Lewis Jones. Mr. Edward Clark, architect, Strand. Quantities by the architect:—
A. Hood (accepted) £4,530 0 0

BIRMINGHAM.—For new workhouse infirmary. Mr. W. B. Ward, architect, Birmingham. Quantities by the architect:—

Howell & Son, Bristol	£28,500 0 0
Everall, Malvern	87,278 0 0
Jones & Son, Wolverhampton	79,987 0 0
Biggs, Handsworth	79,000 0 0
Edge & Co., Birmingham	79,000 0 0
Smith, Leamington	78,550 0 0
Barnesley & Sons, Birmingham	75,880 0 0
Barker & Son, Handsworth	75,760 0 0
Sapote & Sons, Birmingham	75,600 0 0
Moffatt, Birmingham	75,600 0 0
Horsman & Co., Wolverhampton	74,560 0 0
Lovatt, Wolverhampton	73,000 0 0
Webb, W. & J., Birmingham	72,900 0 0
Bowen, Birmingham	72,652 0 0
Rowbotham, Birmingham	72,600 0 0
Wall, London	68,788 0 0
Garlick, London	67,900 0 0
Gowing & Ingram, Birmingham	66,842 0 0
Storrs, Sons, & Co., Manchester	66,599 0 0
Horsley Bros., Birmingham	65,703 0 0
Potter, London	65,600 0 0
Bisset & Sons, Sheffield (accepted)	69,850 0 0
Robinson, Birmingham	69,353 0 0

COLCHESTER.—For alterations and additions to Higham House, for Mr. Thomas S. Furniss. Mr. Wm. H. Atkin Berry, architect, Bedford-row. Quantities by the architect:—

	Credit old materials.	Net.
F. Bennett, Ipswich	£1,537 6 5	£27 6 5
E. C. Farmer, Colchester	1,588 0 0	28 0 0
Braintree & Sons, Grimsby	1,876 0 0	30 0 0
Sudbury	1,876 0 0	30 0 0
G. R. Sawlings, Monks Elough	1,605 3 0	10 0 0
F. Dupont, Colchester	1,490 0 0	55 0 0
Saunders & Son, Dedham	1,415 0 0	35 0 0

CUBITT TOWN.—For finishing four houses in the Wharf-road, Cubitt Town, for Messrs. Rogers, Robinson, & Damage. Mr. Stocker, surveyor, St. Mary Axe:—
W. Buckland, Cubitt Town (accepted) £138 18 0

ENFIELD.—For alterations at the Salisbury Arms, Bush Hill Park, Enfield, for Mr. Favers. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster:—
Patman £733 0 0
Burman & Sons 717 0 0
Steel Bros. 685 0 0
Fairhead 636 0 0
Spencer & Co. 600 0 0

FINSBURY PARK.—For the erection of school rooms and lecture hall in rear of Primitive Methodist Church, Durham-road, Finsbury Park. Messrs. Thomas & Wm. Stone, architects, Great Winchester-street:—
Chaffery & Rogers £678 0 0
Chant 550 0 0
Godfrey & Sons 540 0 0
Stead Bros. 530 0 0
Peppiatt 499 0 0

KENSINGTON.—For rebuilding No. 38, High-street, Kensington, for Mr. C. H. Lorberg. Mr. G. E. Edwards, architect, 11, Queen Victoria-street:—

Stevens	£1,795 0 0
Taylor	1,730 0 0
Marten, Wells, & Co.	1,548 0 0
Hussey	1,448 0 0
Skirren	1,443 0 0
Smith	1,439 0 0
Shepherd	1,438 0 0
Logg	1,398 0 0
Ward & Lambie	1,360 0 0
Stimpson & Co.	1,360 0 0
C. Wall	1,360 0 0
Green	1,340 0 0

KENNINGTON.—For Home for Recruits, Kennington-lane, for the Receiver of the Metropolitan Police District. Mr. J. Butler, architect:—

Lanneran	£5,567 0 0
Tyerman	5,545 0 0
Sauby & Son	5,387 0 0
Hook	5,230 0 0
Beal	5,263 0 0
Down	5,150 0 0
Dickenson	5,177 0 0
Oldrey	5,170 0 0
Turker	5,190 0 0
Ansell	5,155 0 0
Finch	5,131 0 0
Howell	5,120 0 0
Staines & Son	5,098 0 0
Nightingale	5,080 0 0
Pack Bros.	5,000 0 0
Lather	4,960 0 0
Hart	4,983 0 0
Simpson	4,865 0 0
Scrivener	4,860 0 0
Dobson	4,898 0 0
Parker	4,890 0 0
Church	4,789 0 0
Higgs & Hill	4,740 0 0

LEWISHAM.—For the erection of a house in the Rokeby-road, Lewisham, for Miss Green. Mr. T. W. Willis, architect:—

Ernest A. Roome	£377 0 0
Smith	360 0 0
Taylor (accepted)	343 0 0

LONDON.—For pewing work at the Roebuck, High Holborn, for Mr. Dickinson. Messrs. Bird & Walters, architects:—

Warne	£170 0 0
Watts & Co.	129 15 6
Heath	129 0 0
Sanders	128 0 0
Edwards	125 14 0
Helling (accepted)	123 0 0

LONDON.—For rebuilding No. 33, Great St. Helen's, for the Worshipful Company of Leathersellers. M. G. A. Willis, Surveyor to the Company, East India-avenue, Leadenhall-street. Quantities supplied:—

Colls & Son	£2,666 0 0
Dove Bros.	2,585 0 0
Kirk & Randall	2,400 0 0
Asby & Horner	2,355 0 0
Richens & Mount (accepted)	1,982 0 0

LONDON.—For the erection of a house in Elgin-avenue, Malda Vale, for Mr. H. F. Batt. Mr. H. M. Newlyn, architect:—
Frost & Co. (accepted) £1,450 0 0

NEW WANDSWORTH.—For alterations at the Plough Hotel, St. John's Hill, New Wandsworth, for Messrs. Young & Co. Messrs. H. I. Newton and Keith D. Young, joint architects:—

Jackson & Todd	£2,949 0 0
Burman & Son	2,585 0 0
Oldrey	2,571 0 0
Smith	2,498 0 0
Godden (too late)	2,195 0 0
Lambie	2,059 0 0

WALTON-ON-THAMES.—For alterations at Crutchfield House, for Mr. W. Lawrence. Mr. A. J. Bolton, architect:—

Weston, South Kensington	£572 0 0
Babbs	540 0 0
Brown	498 0 0
Parker	470 0 0

WOLVERHAMPTON.—For the erection of shop front and alterations, Penn-road, Wolverhampton, for Mr. Richard Lees. Mr. Joseph Lavender, architect, New Bank Buildings, Wolverhampton. Quantities by the architect:—
J. & W. Cockerill £320 0 0
G. & F. Higham 304 0 0
E. Jones 314 0 0
H. Gould 292 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

A. H. (no name or address)—A. A. G. M. & Co.—E. W. (no name or address)—The Editor of the *Builder* is not responsible for the contents of the correspondence which appears in his paper; but he is glad to receive communications from his readers, and to publish them as far as possible. He is not responsible for the contents of the correspondence which appears in his paper; but he is glad to receive communications from his readers, and to publish them as far as possible. He is not responsible for the contents of the correspondence which appears in his paper; but he is glad to receive communications from his readers, and to publish them as far as possible.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication, but for the Editor to be able to refer to the source of the information.

We are compelled to decline pointing out books and giving addresses.

Notice.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.

CORSHAM DOWN, } SUMMER DRIED.
FARLEIGH DOWN, }

BOX GROUND, COMBE DOWN.
WESTWOOD GROUND.

RANDELL, SAUNDERS, & CO., LD.,
CORSHAM, WILTS.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, Wilts. [ADVT.]

Doulting Freestone.

THE CHELYNCH STONE. The stone from these quarries is known as the "Weather Bed," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England.

THE BRAMBLEDITCH STONE. Is of the same crystalline nature as the Chelynch Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.

Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset.

London Agent—Mr. E. WILLIAMS,
16, Craven-street, Strand, W.C. [ADVT.]

Doulting Free Stone

For prices, &c., address S. & J. STAPLE,

HAM HILL STONE, Quarry Owners, Stone

BLUE LIAS LIME and Lime Merchants,

(Ground or Lump), Ilminster. [ADVT.]

Asphalt.—The Seyssel and Metallic Lava

Asphalt Company (Mr. H. Glenn), Office, 38,

Poultry, E.C.—The best and cheapest materials

for damp courses, railway arches, warehouse

floors, flat roofs, stables, cow-sheds, and milk-

rooms, granaries, tin-rooms, and terraces. [ADVT.]

Asphalts.

Seyssel, Patent Metallic Lava, and

White Asphalts.

M. STODART & CO.

Office:
No. 90, Cannon-street, E.C. [ADVT.]

NOTICE.—THE BANNER SANITATION CO. beg to give Notice that having sold over 10,000 BANNER'S PATENT VENTILATORS, also a proportionate number of other Sanitary Appliances, and wishing to keep pace with the times, they have decided to reduce the prices of their goods from 25 per cent. to 40 per cent., thus offering to the public the best appliances at the lowest prices.

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most Important EXHIBITIONS.

Gold Medal. Health Exhibition, 1884.

For further Particulars and Revised Prices, apply to

BANNER SANITATION COMPANY,

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

Vol. LI. No. 524.

SATURDAY, NOVEMBER 13, 1886.

ILLUSTRATIONS.

Mont St. Michel: Present State, and Proposed Restoration.—Mr. Corroyer, Architect	698, 699
Town Hall, Eastbourne: Centre Portion of Principal Front.—Mr. W. T. Foulkes, Architect	702
Premises, Corporation-street, Birmingham.—Mr. William Read, Architect	703
Principal Front of Town Hall, Eastbourne	708
Industrial Dwellings, Wentworth-street, Whitechapel.—Mr. E. Hoole, Architect	707
Designs for a Village Church.—By Mr. W. Arthur Webb, and by Mr. W. Hargreaves Railes	710, 711

CONTENTS.

The Romance of Architecture	687	Proposed New Premises, Corporation-street, Birmingham	713	Area of a Saxon Cathedral	717
Notes	689	Designs for a Village Church	713	The "Ecclesiola" in Domesday	717
Mont St. Michel	691	Industrial Dwellings, Wentworth-street, Whitechapel	713	The Student's Column: Stone Quarries.—XK.	717
The Annual Report of the Local Government Board	691	The Surveyors' Institution: President's Address	713	Recent Patents	718
Pictureque Sketches in Italy (Illustrated)	692	Builders' Benevolent Institution: Annual Dinner	714	Recent Sales of Property	719
Local Government Inquiry at Richmond	692	Architectural Association	715	Meetings	719
Steeple Inn, Rellford	694	The Tylers' and Bricklayers' Company	716	Miscellaneous	719
Mr. Stanley G. Bird	695	The Association of Public Sanitary Inspectors	716	Liverpool Engineering Society	719
Town Hall and Municipal Buildings, Eastbourne	695	Architectural Societies	717	Stafford School of Art	721
		The Block System for Workhouses	717	Prices Current of Building Materials	721

The Romance of Architecture.



HAT our poets have found in architecture to illustrate and enrich their art has been dwelt upon at some length in past numbers of the *Builder*;^{*} what architects may find of Poetry

within the bounds of their own art, severe and prosaic though it be in common estimation, is proposed as a subject for brief consideration in the present article. Much has been said and written in late years with a view to prove that architecture has in reality no claim to be considered a Fine Art, but is merely a rather better form of the ordinary result of the combined products of the handicrafts concerned in building. One argument not infrequently used in this direction has been that any one may dub himself "architect," and practise as such; but it has not been shown that any one so assuming the craft will consequently produce architecture. It is a misfortune for our art that its title, and implied practice, can be so assumed without due training and study; but it is a misfortune shared by what are regarded as undoubted fine arts,—sculpture, namely, and painting,—and with regard to these it is equally true that the mere assumption of the title and professed production of the work of "an artist," by no means carry any assurance that "fine art" will really be found as a result.

A good deal of flimsy "talk talk" is at times indulged in by some who assume the critic's chair, on the superiority of painting and sculpture in the region of art as compared with architecture, on account of the technical, and, even mechanical, features attaching to the practice of the latter; but does not such "talk" betray rather more than a slight deficiency of critical knowledge with regard to the arts which it is sought to exalt? To produce either good sculpture or painting, or any indeed that will be thought worth twice looking at by an educated artist or informed connoisseur, an amount of technical skill, to be acquired only by long and patient labour and study, must appear on the face of such work, which will be found not much behind that which must be apparent in an architect's working designs, the mechanical elements comprised in the latter notwithstanding.

The more strictly practical details involved in executed architectural work constitute one great difficulty in the successful practice of the

art, and when truly met and overcome, so that they do not mar or damage the character of the work in respect of form, chiaroscuro, or breadth, such conquest entitles the designer to almost higher praise than attaches to the successful sculptor or painter; their arts, from their almost purely ornamental nature, having an elasticity and ductility, in skilled hands, which architecture, for use, can never admit of.

There are those, and they are many, who cannot see in architecture, apart from associations of archeology or antiquity, anything to interest the higher mental perceptions; but there are those also, and not a few, whose pleasure, not unintelligent, in painting and sculpture, has a somewhat similar limitation; while a good many, with a fair knowledge of schools and masters, find more enjoyment in the manipulative skill and mechanical decision displayed than in the sentiment of the productions on which these are lavished.

Thus, it may be seen that it is not in architecture only that the technical can prevail over the intellectual of art, but that it rests, in great measure, with the mental calibre of the observer which of the two shall assert supremacy in his preference; while to architecture, as distinct from the simply ornamental arts, attaches the necessity, under corresponding penalty, of satisfying at once the practical requirements of its particular use, and the demands of good taste and refinement in external form.

The distinction has to be made between architecture, properly so-called, and mere building, however elaborated and (would-be) adorned; and this distinction is by no means a matter of intuition, but a power to be acquired, like a knowledge of painting or sculpture, only by study and observation exercised by a mind naturally sensitive to the impressions of art.

Thus much towards clearing our ground: and now to our more specific subject.

Though a large proportion of the lads who are from year to year articulated as pupils to architects are so placed rather as a matter of business, or, perhaps, on account of some aptitude shown for drawing, than from any natural taste for the art itself, a good many, it is satisfactory to know, do take up the pursuit on the latter ground, and may be looked upon as forming "the band of hope" for the profession. To such as these the first experiences of an architect's office are for the most part depressing rather than elevating; and though the fact that they are acquiring the anatomy of the art may to the more practical of such students prove a comfortable set-off to the drudgery of tracing and specification copying (the latter, however, not to the advantage of their train-

ing, being now too often delegated to the quantity surveyor and his clerks), to a large proportion of pupils these mechanical processes act as a great damper upon any aspirations towards the poetry, or, as we are styling it, the romance of their chosen craft. Far more, however, was this the case a generation ago, when, except the medals of the Royal Academy, there were scarcely any prizes offered in this country for aspirants to architectural fame; and the few young men who were enrolled as architectural students in the Academy competed for the medals under stated or implied restrictions which imposed very definite limits to their flights of imagination. The pretty numerous medals, scholarships, and the like, now open to the architectural student afford a fair field for exercising his power of design; while not only the central associations in London, but others in the provinces, give this form of encouragement to their student members, and have thus afforded, as we could bear witness, the first introduction to notice of more than one since successful practitioner. Competitions of this kind, whether within the narrow limits of a provincial society or in the wider field of the Institute or Association, afford many a student his best opportunities for rising above the mechanical part of his calling, and putting into visible shape for consideration by competent critics (a very essential point) the results of perhaps many a dream of design and many a bout of sketching; and surprising sometimes are, as to feeling and fancy, these early productions of some who are destined, perhaps, a few years later to hold a prominent place among their country's artists. A success in some such contest of skill forms for such students a true taste of the romance of architecture, and serves to lift them above the mechanical monotony of a mere routine of occupation, when, as we have some times too much occasion to recognise, a principal has not been of capacity to recognise the genius and power of his pupil. Next to the absolute carrying out of some long-cherished form of design, is to the architectural designer of skill the opportunity of thus placing it completely in shape on paper, and architects who have the advance and dignity of their calling truly at heart will do well to offer to a student of this character all encouragement and every wholesome stimulus to exercise his powers of mind and hand in this manner while engaged in studying, as a subaltern, what we may call the manufacturing part of the profession.

To gain an Academy Gold Medal or one of the Travelling Studentships annually offered as a prize, is at once an introduction to public notice; and we may well excuse a young man if, in the excitement of such a success, he for a time takes a view of his profession not quite

^{*} See "Architecture Among the Poets," vol. xlv. (Jan. to June, 1883), pp. 491, 526, 558, 628, 696, 764.

in accord with the experience of its practised members. No great harm will result from a little temporary intoxication of this kind; it may give a very wholesome stimulus towards stepping above a dead level of trite conventional design, and there is no fear but that a little intercourse with the world in the business relations which always accompany a practice will, ere very long, teach lessons well calculated to temper a too ardent pursuit of the romantic. A great responsibility rests with those in whose hands remain the decisions in such contests of mind and fancy, that they be most impartially and justly awarded, and that the hobbies of professors or the hackneyed preferences of jog-trot practitioners be not allowed, as has sometimes appeared to be the case, to interfere with the full and free recognition of previously unobserved talent or genius.

The power exercised over human feeling, especially when prepared by suitable aptitude and cultivation, by the attributes of proportion, light, and colour, belongs to all the arts appealing to the eye; and it is a mystery of our intellectual constitution that form, light, and colour should assert this sway. Architecture has its power within this mystic triangle, and chiefly on the sides of proportion and light, of the three the most powerful in union; and it is not surprising that men intensely sensitive to their impressions should have revelled in their effects on canvas and paper when debarred by circumstances from putting them into actual form in building. Two names occur to us in this connexion of those who, scarcely within the pale of practical architecture, so lived in architectural feeling that their art is inseparably identified with the very essence of architectural romance, viz., G. B. Piranesi in the eighteenth century and John Martin in the nineteenth.

The various lines of thought which open to us in following a subject like our present might well lead us to an extended essay on architectural design, a topic by no means threadbare, but one only point of which we here diverge on for a moment,—a point suggested by the names just written. The greatest test of successful design in our art may be considered to rest in its combining happily with, and indeed enhancing, the charms of fine natural landscape, and the great landscape-painters of the Renaissance period evince their sense of its value by the manner in which it is found forming an essential part of many of their great epic compositions. Piranesi and Martin both, in their powerful but widely differing manners, laid hold of architecture as their theme, associating its objects with grand vistas of perspective, and strong effects of chiaroscuro. Colour in the case of the earlier artist was only expressed in the tone of his etchings, and in the work of Martin was generally greatly subordinated to effect of light and shade. The ruins of ancient Rome in the case of Piranesi, and compositions chiefly from Scriptural themes by Martin, were made the vehicle of impressions of power, vastness, and solemnity, conveyed with all the force and vividness of true genius; and their works afford (making every allowance for Martin's bad figures and theatrical conceptions) strong proofs of the inherent fitness of architectural forms to produce those impressions which, in a subordinate degree, they were, by landscape painters like Claude Lorraine and Gaspar Poussin, introduced into their pictures to enhance. Piranesi indulged occasionally in grand compositions, both of external and internal architecture, other than his beloved Roman remains, and most impressive some of these are; both artists having the faculty of so treating their subjects that they lay hold of the minds and imaginations of their beholders and fix themselves indelibly in the memory.

The romance of architecture, indeed, in its truest sense, and apart from the trammels of its practice, these works and such as these exemplify; but the practical architect is not dependent on imagination alone, with no solid instances, for his enjoyment of this high reward of his skill. If travel at home and abroad, if careful sketching and laborious study, bring him into sympathy with the great remains and

precious gems of ancient and Mediæval art, he must in a measure, if at all worthy of his vocation, be led to aim at the production of like effects and impressions in his own work; and though much of it will in the common course of practice preclude, perhaps entirely, any aim at the poetry of art, he will be on the watch to use to his best whatever opportunities may fall to his lot for the more refined exercise of his skill. Many an architect could share in the feeling of Fitzjames's soliloquy at the Trossachs:—

... "What a scene were here, he cried,
For princely pomp or churchman's pride!
On this bold brow, a lordly tower;
In that soft vale, a lady's bower;
On yonder meadow far away,
The turrets of a cloister grey."

Varying with the scene before him his ideas of the architectural objects fitted to adorn it; and now and then (which is perhaps often enough) it may be his fortune to realise his day-dream. We can imagine the zest with which the Villa Borghese may have been thought out and executed by its architect, or the steeple of Boston church raised from the fen level towards the sky by its designer. An architect may have travelled in Italy, say, or Spain, and delighted with the charms of character and appropriateness marking their respective buildings may feel how he should rejoice in a commission to build even a small homestead or villa in such fitting scenery. His sketches may be known, and some day a returned traveller of rank or wealth from the land of the Alhambra may apprise him that, having bought a small estate in a part of that country which greatly captivated him, he wished a house built upon it to which he and his family might, from time to time, retire for a winter's residence,—and here is this architect's poetic dream realised. Another, born among the scenes of ancient Border strife, has grown enamoured, as he grew familiar, with the intensely picturesque remains of the feudal strongholds which Border life once made essential to security. He may have had some of the still inhabited of these under his hands for renovation, perhaps enlargement; and he has, with success, lavished his best skill and knowledge to preserve the original character which he was conversant with; but in these piping times of peace who would build a castle? However, a wealthy landowner, with estates in far-apart counties, has no house of fitting scale or in a proper position on his favourite manor, and (after making, perhaps, a costly mistake in not coming at once to the right man) is advised by his friends to call in Mr. —, and on a splendid site, on the shoulder of a hill, in a valley of far-famed beauty, arises in due time a *modern castle*, it is true, but one so true to the genius of the scene, and so conducive to the charms of the scenery, that the anachronism seems fully justified, and these most familiar with it can scarcely realise how it could have looked before the castle was built. This, too, is a genuine realisation of architectural romance, and of a kind the high pleasure of which a man must be an architect to understand. Take another example. An enthusiastic lover of Classical architecture, a beautiful draughtsman, and an artist by nature through and through, is tied down during his pupilage and early practice to all the mechanical drudgery of a City office, mainly concerned with a surveying practice. He keeps his hand in, however, for his favourite work, and with some few congenial fellow students exercises the talent for Classical design with which he is inspired, hoping that some day he may have a chance of carrying out some of his ideas. A great provincial competition is announced, and among designs of varied style and merit, some businesslike (some, perhaps, tradesmanlike), some extravagant, some impracticable, but in the whole representing 10,000, worth of voluntary labour, one design stands out so distinguished for originality and power of treatment, and beauty, though freedom of execution, that it engrosses the attention of the assessors, and, despite evidences of inexperience in plan and some difficulties of adaptation, its beauty carries it to the first place, and the day-dream of the young enthusiast is realised; though alas! in

the instance referred to, to lead through overwrought mental and physical energy to an early though distinguished grave.

Smaller, far smaller, triumphs than these may at times afford an architect a good measure of that high mental enjoyment which results from the conscious achievement of success in the difficult task of trespassing on a landscape to its advantage. "Ah! Mr. B.," says, with a grievous air, the cultivated, reserved, and sensitive vicar of a small, picturesque country parish, "so you are going to spoil our pet view from the vicarage windows by building a manager's house for Mr. C.'s paper-mills just at the top of the hill."

"By no means, Mr. D.," replies our architect; "I hope to improve your view by breaking the round of the hill just where it needs it."

"Oh! impossible," responds the vicar, "any house there *must* spoil it; just, you know, at the top of the hill, and so near us too."

"It will not be at the top of the hill, Mr. D., but just below it, and when the house is built I confidently hope to hear you say your landscape is better for it."

With a shrug, a deep sigh, and an incredulous shake of the head, the vicar proceeds on his parish round, and the manager's house, cheap and unpretending, but *carefully not ugly*, and as carefully studied as to its exact position below the crest of the hill, in course of time rises against the sky. The architect, when the roof is framing, walks past the vicarage on one of his visits of inspection, to view the eyecore, and sees that he has gained his aim. The house is finished, however, and occupied before he again meets the vicar, and when he catches sight of him he is rather nervous as to what the good gentleman may have adopted as his *settled* opinion, for *settled* his opinions were. He need not have been nervous, as he is greeted with a hearty shake of the hand, and "Thank you, Mr. B.,—you have kept your promise, and much as I dreaded your building anything on my favourite slope, now that the house is up I agree with you that it is exactly in the right place, and decidedly improves the line of our middle distance." An architect of feeling, as all should be, will be himself very sensitive to the intrusion of new buildings on a cherished view, and as sensitive on behalf of those he himself intrudes them on; and the success of a difficult problem such as just described (a real case) is a very material and legitimate source of pleasure.

How many an architect has looked at some beautiful but decayed and neglected specimen of our national church architecture and longed for the liberty to take it in hand, efface its defacements, restore its losses by time or violence, and make it what it was at its best, with the added charm of age and association; and how, *now and then*, may it fall to the lot of such a one to have that liberty. That is a legitimate instance of the romance of architecture; and when such noble specimens of Mediæval work as some of our cathedrals are placed in consciously competent hands for restoration, a sense of delight surely scarcely to be exceeded by any result of professional success may be fitly experienced, and the best energies of the artist devoted to produce thorough success; and thorough successes some of such restorations have proved, and as greatly do they redound to their authors' honour as the best original work, for not only must there be that thorough knowledge which a life is not too long to mature, but that veneration for the old men's work, and that self-abnegation in its presence, which are essential to prevent a restoration becoming a renovation.

The rising race of architects will not for generations to come have anything like the work of restoration to undertake which has so occupied the lately past and present ones. Let them, however, cherish heartily all the precious remains of our own country's architecture, and let them learn to imbibe its sentiment and emulate its simplicity and grace. It is full of the nameless charm to reproduce which is to write poetry in stone, and those who can bring it home to the feelings of others are our true poets in architecture. Cherish, too, the records

of still older art. None can, perhaps, lay hold of us like our home-born style, but all have their fitness and their arena of force; and so to deal with design in these as that the associations awakened by your work are those of which you are yourselves conscious in the exploration and loving study of "history in stone," is to impart to others what in such researches will reward your own pains,—another and a very fair experience of the Romance of Architecture.

NOTES.

ANY and various have been the lamentations during the past few weeks over the supposed impending fate of Staple Inn, and the proposals for its retention and utilisation; the last utterance being a broadside in quarto form from the Society for the Protection of Ancient Buildings, addressed to the Lord Mayor and Aldermen and Council of the City of London, and setting forth in many dolorous phrases the reasons for the preservation of Staple Inn, not omitting, as is their wont, to mention the snub their former communication on the subject received, in being ordered to "lie upon the table"; for, indeed, the Society is most conscientious in recording the fact that nobody pays any attention to its maunderings reminding one of Beatrice's rejoinder, "I wonder you will be still talking, Signor Benedick; nobody marks you." We are not given to any exaggerated mourning over old things merely because they are old, but endeavour to keep the balance duly between the claims of things new and old; and our conclusion, after walking about Staple Inn and "telling the towers thereof," is that the block facing Holborn, however picturesque (as it undoubtedly is), cannot possibly be allowed to occupy its present position many years longer; it is a rickety-looking structure, which is probably unhealthy, certainly dirty, probably dilapidated in structural condition, and we can see no use in trying to lengthen out its term of existence on sufferance for a few brief years.

"It is a last bit of Old London": true enough, but Old London must go sooner or later; you cannot keep it for ever. But these remarks apply only to the front block; the return and back wings of the quadrangle are solid substantial buildings which, with some interior reforms, might be useful for many a year, and the quadrangle with its trees is a charming corner which it would be a thousand pities to demolish when the substantial condition of the building is considered. That is what we should do if we were privileged to buy Staple Inn: rebuild the block fronting the street in such a manner as to combine a quietly picturesque effect with modern requirements, and preserve the "quad." and the buildings surrounding its other three sides intact. And that is what we hope will be done.

THE reparation of the Saxon Chapel at Deerhurst is now completed. All the walls have been examined and made good, and everything has been removed which interfered with the building. A great quantity of soil has been taken away from the west side of the chapel, so that an ascent is made to it from the road which runs near the edifice on the west side. This will probably have the effect of preventing water from lying about the foundations in the wet time of the year. All the modern windows and doorways have been filled up, the entrance to the chapel being now effected through a restored Saxon archway. The nave has now two windows, high up on the north and south walls; one of these remains as it was first found; the other has been restored and made like its original companion. The roof or ceiling is flat, and shows the old and now blackened oak rafters, perhaps the original timber of the roof. Above them, the roof is modern. The chancel arch stands well. The half which (our readers will remember) had been cut away, has now been restored. Both the jambs were perfect, being composed of massive stone, as shown in the sketches we gave at the time of the discovery. The chancel

walls had been taken down to the height of about 9 ft. from the pavement, to enable the sixteenth-century room to be built overhead. Acting on the advice of Professor Middleton, the Committee for the restoration caused a large "well-hole" to be cut in the flooring, so as to enable the chancel arch and other details to be seen, but the beams and much of the flooring have been left. A fixed ladder gives access to this flooring from below. The appearance of the building from the outside is that of an ancient chapel added on to a picturesque timbered house of the sixteenth century, and they are quite a pleasing group. The inscribed stone which was found used for a window-head during the exploration of the edifice will be removed and let into the inside of one of the walls, for the sake of security. A copy of the "Odda" stone at Oxford will also be set up in some convenient place.

IN the last number of the *'Εφημερίς Ἀρχαιολογική* (1886, 3, plate 7), Dr. Staes publishes fragments of a vase of very early date, which, both from the circumstances of their finding and their subject, are of special interest. The fragments are three in number; one of them has for years lain in the museum of the Archaeological Society at Athens. The two others have just been discovered in the recent excavations on the Acropolis. The three fragments fit together precisely in the most satisfactory manner. The subject is a Gigantomachia, and we think we are safe in saying it is the earliest representation of the scene as yet known. The fragments evidently formed part of a vessel of very large size; the style is early black figured, and each giant and god is inscribed. We have four groups of combatants, three of them nearly complete, the fourth much broken away. The first group represents Zeus and Herakles in the same chariot. The combination is novel. Behind the two is a woman's face and hand raised in supplication. There can be little doubt that she is the ancient prototype of the figure of Ge, the earth mother of the giants, which is so well known on the great Pergamene frieze. This is an interesting illustration of the extremely traditional character of Greek art. The other groups represent Hermes, Dionysos, and another god who cannot be made out, contending with inscribed giants. The names of the giants have not yet been satisfactorily established.

THE same number of the *'Εφημερίς* gives a detailed account of some further results of the Acropolis excavations. It also devotes a plate to facsimiles of inscriptions found on architectural fragments. Several of these inscriptions run along the flutings of columns. Two of them we may note as of special importance because they contain the signatures of sculptors. Down the fluting of one Doric column runs *Εὐνόριος ἐκὸς [ἱστῆς]*, and in a parallel line *Κίριον ἀνιθ[ῆ]κε*. "Euenor made Kiron dedicated." This Euenor is known to us in this inscription for the first time, as from the form of the letters the Ephesian Euenor, the contemporary of Parrhasios, is out of the question. The second signature we would note is that of Antenor. A sculptor of the name of Antenor made the first portrait statues of the tyrant-slayers Harmodios and Aristogeiton about the time of the sixth and fifth centuries B.C. The statues, of course, have perished, but we know something of their style from copies. Now, we have the signature *Ἀντήριος ἐκ[ὸς] ἱστῆρος* found on the Acropolis written in letters of early fifth century date, and we can scarcely be wrong in associating the signature with the Antenor of the Harmodios and Aristogeiton group. The paper also discusses in detail some of the bronze and terra-cotta figures recently found.

THE work and cost of the Manchester Corporation Health Department is the subject of a paper in the Transactions of the Manchester Statistical Society, session 1885-86. Mr. Henry Whitley, the author, has, unfortunately, limited the scope of his paper, remarking that all those whom he addressed were acquainted with the system of sanitation in practice in the city, and

knew how the work was divided. Presuming on this acquaintance, he has given a large amount of instructive detail. It appears that 66,000 pail closets and 50,000 dust-bins are the receptacles of the refuse of which the Sanitary Committee disposes. This represents a population now amounting, for the City of Manchester alone, to 337,442. The total expenditure of the Health Committee, which in 1879-80 was 90,257*l.*, came to 87,473*l.* for the year 1884-85, which is at the rate of 5*l.* 19 shillings per head. This includes scavenging, as well as the disposal of night soil, but the former item, as well as we can make out, amounts to only about 21½ per cent. of the total cost. It is, however, worthy of note that out of this large expenditure only 450*l.* is paid for disinfectants. There is, indeed, an item of 3,912*l.* for "chemicals, excluding carbolic," but even if that applies to purifying purposes the proportionate amount is very small. We give figures, however, with some reserve; as the tabulated accounts of expenditure and income do not distinguish between capital and annual outlay, so that the reduction of any item per head is complicated. According to the data supplied in Mr. Silverthorne's "London and Provincial Water Supply," the cost of the water service of Manchester and thirty-three associated townships comes to 5*l.* 19 shillings per unit of population per annum, or substantially to the same amount as the cost of the removal of refuse of all kinds.

IT is instructive to compare the cost of the removal of night soil from a large unsewered town with that of the sewer system, where no expense is incurred for systematic disinfection. What we may regard as the capital outlay for Manchester we make out to be 255,000*l.*, which is about 15*l.* 11 shillings per individual. The cost of the main drainage of London to the end of 1885 was 6,518,699*l.*, or 32*l.* 58 shillings per head, for a population given at 4,000,000 by Sir J. W. Bazalgette in 1884. At the low rate of 3½ per cent. per annum this gives the cost for interest of 1*l.* 14*s.*, to which has to be added the working cost of 736*d.*, making in all 21*l.* 0*d.* per head for merely pouring the sewage into the Thames. It follows that the pail system is more than double as costly as what may be called the untreated water-borne system, and that there is a wide margin for the employment of disinfectants in each case, more especially if this can be rendered a means of diminishing rather than of increasing working cost. It should, however, be borne in mind that the London outlay regards the main drainage alone, and that the cost of the local portion of the vast system of London sewers not executed by the Metropolitan Board has to be compared with that portion of the cost of the Manchester system which does not come within the figures of the Board of Health, in order to arrive at an exact balance as to the cost in money of the two systems. As to the cost in the most important item, human life, the death-rate of Manchester for 1884 was 26*d.* 4 per 1,000, against 20*d.* 3 per 1,000 for London.

THE fourteenth section of the Gas Works Clauses Act, 1847, says:—"The undertakers may let for hire any meter for ascertaining the quantity of gas consumed or supplied, or any fittings for the gas . . . and such meters and fittings shall not be subject to distress . . . for rent of the premises where the same may be used." This Act is incorporated with the Metropolitan Gas Act, 1860, and so forms an integral part of it. The Court of Appeal have recently had to decide if a gas-stove was a "fitting for gas." The process of reasoning by which their conclusion was arrived at is not very material. The important point is that a gas-stove is within the meaning of this term, and so is exempt from distress. Here is an exception to the general rule,—one introduced by the Legislature. The question, then, may fairly be asked, why a gas company should have greater privileges than other persons? If these goods are exempt from distress, so also ought to be all goods which do not belong to the indebted tenant.

THE "extraordinary meeting" of the proprietors of the Didcot, Newbury, and Southampton Railway, on Friday last, proved to be extraordinary in more senses than one, and it is seldom that the action of the Directors of a railway company raises such a storm of opposition as was manifested at this meeting. The line is completed to Winchester, and the Directors consider that the best policy would be to join the existing London and South-Western line at that point, although the company have Parliamentary powers for proceeding independently to Southampton. It is alleged that a considerable amount of capital was subscribed at Southampton in anticipation of the latter scheme being carried out, and the abandoning of the independent line to that town is looked upon as akin to "scuttling the ship." The chairman and three-fourths of the directors advocate giving up the idea of a separate line from Winchester, on the grounds of want of capital, and the probability of the competition of the London and South-Western Railway rendering it unprofitable. The chairman stands in the invidious position of being also Chairman of the District Railway Company, which holds friendly relations with the London and South-Western Company, which fact has exposed him to the charge of being unable to do justice to the Didcot and Southampton undertaking; and a very stormy meeting ended without any vote of thanks being accorded to him for presiding. Of course it would be necessary to come to terms with the London and South-Western Railway for running powers, if the company's trains ran on their line from Winchester to Southampton, and it seems very unfortunate that the line was not promoted as the Didcot, Newbury, and Winchester Railway, if it was intended to stop at the latter place. As it is, the inhabitants of Southampton and other subscribers naturally expected a through independent line, and fail to see why the original authorised scheme should not be adhered to.

MR. J. ADAMS sends us a pamphlet on an ingenious method for making a sewer system flush itself by simultaneous automatic action. Repeating what we have already said, that the idea put forth by the Sanitary Committee of the Metropolitan Board of Works as to the possibility of combined action on the part of the householders to flush the sewers is utterly futile, he proposes to arrange a series of flushing-tanks with syphon overflows, the syphon action being ordinarily closed by the intervention of a double dip-trap below the discharge of the syphon pipe. A sealed air-pipe from each dip is connected with the axis of a tip-vessel, filled and tipped by the overflow water from the flushing-tanks as they are filled, the turnover of the tip-vessel releasing all the seals from the air-pipes simultaneously along the whole row of flushing-tanks, so that all the syphons are released and set going simultaneously, and a large discharge of sewage sent off into the sewer. The plugs of the air-pipes are all connected with the prolonged axis of the tip-vessel so as to be lifted simultaneously with its action, and returned when it returns to its normal position after emptying, when the process of gradually filling and overflowing of the flush-tanks is repeated. The ends of the air-pipes terminate each in a receptacle filled with water, covered by an inverted cup attached to the tipping-bucket. Whilst the cup is immersed in the water all air is confined within the traps and syphons, and is allowed to escape on the lifting of the cup by the turn of the bucket. The idea is very ingenious and seems practicable.

THE Journal of the American Association of Engineering Societies gives some particulars of the cements used in the district of St. Louis. Ninety-five per cent., it appears, is the Louisville cement, which is made from stone belonging to the Devonian formation, the properties of which were first noted in 1828 in the course of construction of the Louisville and Portland Canal. The cement derived from the upper stratum is quicker setting and darker than that derived from the lower, and

it requires harder burning. The general condition stated in specifications for this cement is that it shall have a tensile strength of not less than 40 lb. per square inch when mixed pure, made into test bars, and exposed thirty minutes in air and twenty-four hours or more under water. A series of nearly 4,000 tests of the seven chief brands gave the following results:—

	Exposed thirty minutes in air.			
	Twenty-four hours under water.	Two days under water.	Three days under water.	Fifty days under water.
Highest tensile strength	1b. 188.0	1b. 160.0	1b. 100.0	1b. 202.0
Highest average tensile strength of any brand	92.7	99.8	88.0	164.3
Average of all brands tested	72.7	78.7	73.2	150.8

It has been recently stated that the Conservators of the Thames have announced their intention of bringing in a Bill to enable them to raise the price for water supplied to the various companies above Kingston, viz., Lambeth, Chelsea, Grand Junction, West Middlesex, Southwark and Vauxhall. A year or two ago, these water payments were as follows:—Lambeth, 2,252l.; Chelsea, 2,300l.; Southwark and Vauxhall, 2,305l.; West Middlesex, 2,320l.; Grand Junction, 2,300l. We presume that the object of the conservators is to try, in some degree, how far a gentle pressure in the way of economy might be useful in limiting the intake of Thames water; partly, too, perhaps, from the idea that the water companies should not be allowed to make such high profits in these days of general depression. The real difficulty, however, will come when it is recognised that more water is daily taken from the river than its diminishing volume can afford.

THE London and North-Western Railway Company have lately completed a very large station at Rugby; it would be well if the Directors would turn their attention towards the metropolis and improve Willesden Junction. The part of the station for the high-level service is unworthy of the worst-paying branch in the provinces. It is difficult of access, small, without proper waiting-rooms, and altogether inadequate for the purposes of the traffic. The low-level trains for Croydon and Victoria usually start from a siding much exposed to the rain and wind. The connexion also between the different parts of the station is difficult and inconvenient. Willesden is not only the centre of much local traffic, but one of the most important junctions on the southern part of the North-Western system, and it is astonishing that the Directors have so long neglected to remedy its manifest and numerous shortcomings.

THE new Hofburg Theatre, now being erected at Vienna, to hold 2,000 persons, will be one of the most perfect in existence as regards arrangements for the safety of the audience. A foyer, 30 ft. in width, runs round the house on every floor, and on each are twenty-four doors, opening on to wide staircases, so that there can be no possible block in case of a sudden alarm. There is very little wood in the whole of the construction, and what there is has been rendered incombustible by chemical preparation. The staircases are all of stone, the girders of iron, and the ornamental work of marble or enamel. What is of more importance, the stage is cut off from the body of the house by a strong and thick wall of brick and iron, while an iron curtain can be let down in two minutes, thus effectually confining the fire to the stage while the house is being emptied. It will be remembered that when the theatre was burned down with such a lamentable loss of life, it was found impossible to lower the curtain sufficiently rapidly. In other matters the new theatre has some remarkable peculiarities, one being that from its situation, over what was once the moat of the old fortifications, there is an immense amount of spare

room, which is utilised to make ready all the set scenes, and do away with every kind of work on the stage or slips. Behind, the arrangements are equally perfect, every individual actor being accommodated with a separate dressing-room, while even the supers are carefully kept from being overcrowded. No light but electricity is used. Baron Hasenauer is the architect, and he may deservedly claim credit for having inaugurated a new era in theatre building.

THE *Times* Brussels correspondent mentions that in the new Belgian Parliament Hall the seats are arranged with a lifting spring, so that when a member rises to speak his seat rises automatically and falls back against the back partition, so as to leave him much more room for standing and moving during his speech. This is ingenious and no doubt advantageous as far as it goes, but the same automatic movement cannot be applied to cause the seat to descend when the speaker prepares to sit down, and it would have a rather awkward and unhappy effect if a new speaker, not yet used to the peculiarities of the house, were to "resume his seat" by disappearing into the vacant space left by the automatically folding seat,—a catastrophe which we should certainly expect would happen one day.

It may be presumed that those who wish for the establishment of a "Church House" know best what they want, but we cannot help adding our support to the idea, promulgated in some part of the correspondence which has taken place on the subject, of endeavouring to acquire the old Charter House for the purpose. The building would probably be fairly adapted or adaptable for the purpose in a practical sense, and a very suitable use would thus be found for a most interesting and valuable remnant of the architecture of the past, the demolition of which has been already threatened.

WE should like to draw the attention of architects and draughtsmen who may be temporarily concerned about the drawings of buildings for illustration in our pages to a very simple matter, which, nevertheless, we find it very difficult to get attended to. Plans for publication, except in the case of very large and elaborate buildings, are usually produced on our pages on a small scale, either as blocks in the text, or in a corner of a lithograph view. The plans not being required to work from, this is usually sufficient to show all their features and arrangement for illustrative purposes. But it is necessary in such a case that, in the tracing made for publication, the names should be written proportionately larger to allow for reduction. This seems a very simple and obvious matter: the width of our page is a visible quantity, capable of measurement by one of the standard measures of the realm, and when a plan four times the width of the page is traced for publication, it would seem obvious that the writing must be four times the usual size, to appear readable when reduced. We always call special attention to this in correspondence about illustrations, but it is a curious fact that not one draughtsman in twenty can be got to see it. Not infrequently we are obliged to have the whole plan traced again, or all the names cut out and re-written, to render a plan that has been specially traced for the purpose available for publication. Surely an architectural draughtsman ought to be equal to such a simple problem as this.

United Arts Club.—The first general meeting, held on Wednesday evening at the St. James's-place Hotel, was, notwithstanding the wet weather, very well attended. Mr. E. P. Anson, P.R.I.B.A., was supported by Professor Kerr, Mr. H. L. Florence, Mr. W. Young, Mr. J. M. Brydon, Mr. E. Hayes, and others. Letters were read from Sir Douglas Fox, Messrs. Wolfe Barry, Banister Fletcher, Charles Cooke, and others. A committee, with power to add to their number, was then formed for the first six months, Mr. E. P. Anson and Professor Kerr being hon. members of same. The club was then formed under the title of "The United Arts Club."

MONT ST. MICHEL.

We give this week a view copied from M. Corroyer's drawing for the restoration of the church and fortress on Mont St. Michel, accompanied by a view representing the actual condition of the mount and its buildings.

Of the many historical monuments scattered all over France none are more remarkable than the Church and Abbey of Mont St. Michel, erected on the summit of a steep and conical-shaped rock, formed of granite, about 9,000 mètres in circumference, and rising majestically to the height of 140 ft. in the middle of an immense estuary.

The Mount received its name at the beginning of the eighth century. No traces of any construction have ever been found dating further back than the eleventh century. Dom Jean Huynes, however, in his "*Histoire Générale de l'Abbaye du Mont St. Michel au Pêril de la Mer, Diocèse d'Avranches, Province de Normandie*," speaks of an old tradition which attributes the erection of a church to St. Aubert at the commencement of the eighth century. After the consecration of the chapel (16th October, 709) St. Aubert founded the abbey, selecting twelve canons or prebendaries, who were employed to celebrate divine service, &c., granting them for their maintenance the revenues derived from the villages of Huynes and Genest. No supply of fresh water could, however, be found, and in order to obtain this St. Aubert and his companions continually offered up prayers imploring the intercession of St. Michael to discover for them and their successors a source of fresh water, when the Archangel appeared and pointed out to the saint a spring at the foot of the mountain in the rock itself. It was afterwards called St. Aubert's well. The news of the apparition of St. Michael soon spread far and wide, pilgrimages were organised, and the abbey was greatly enriched by many valuable gifts from the Pope, the King of France, and other notabilities. Up to the close of the ninth century it increased in fame and celebrity, and began to be known as the Mont St. Michel. After the death of Charlemagne the Normans invested his dismembered empire, and under the redoubtable Rollo laid waste the whole of the western portion of Normandy. In 966 the grandson of that warrior, Richard the Fearless, installed the Benedictine monks on the rock, and his son Richard II., Duke of Normandy, founded in 1020 the church, of which now only a few vestiges remain. Commenced in the above year by the fourth abbot, Hildebert II., it was finished by Bernard, the monk, in 1135, and consisted of a choir, transepts, and a nave, with seven bays; in the façade, looking west, were three doors, above the principal one a large window lighted up the central aisle. The tower at this period consisted of but one long, narrow, winding precipitous street. Under the next abbot, Robert de Torigni (1154-1186), the monastery was considerably enlarged; literature, science, and art there found a home, but all this peace and prosperity was rudely interrupted when in 1203 Guy de Thonars, foiled in his attempt to seize the place, set fire to the town, and only the church, and the walls and roofs of the abbey, remained intact. The successors of Robert de Torigni repaired the church and the monastery, and designed and erected "*La Merveille*." This noble structure was commenced about 1203-4 by Jourdain, seventeenth abbot, and, thanks to the liberality of Philip Augustus, was continued without interruption until its completion in 1228. As a specimen of religious and military architecture it is unique in its kind. It is formed of two contiguous buildings united, and contains three stories,—the lower one comprising the almonry and the store-rooms; the intermediate one, the refectory and the salle de chevaliers, and the upper one another refectory and the cloisters.

When it is remembered that these buildings are constructed entirely of granite, on the flank of a precipitous rock, separated from the main land by shifting and dangerous sands, and that across these the material had to be transported from the quarries on the opposite coast, one cannot but admire and wonder at the daring conception of the architects, and the indomitable courage and energy of the men who, during a period of twenty-five years, never flagged in their task. The almonry is composed of two aisles with strong, thick columns, the capitals and bases being square;

the store-room has three aisles supported by square columns.

The Salle de Chevaliers, which in 1848 was turned into a prison for criminals and political offenders, was commenced in 1215 by Raoul des Isles, and finished by Thomas des Chambres about 1220, and only received its name after the institution of the order of St. Michael, founded by Louis XI., 1469. The Salle is composed of four vaulted aisles of unequal width, supported by three rows of pillars; the two first, on the north side, rest upon the piers of the store-room, while the third is built upon the rock; a large bay-window looking west, and others of various form facing the north, light up the hall, which, from its construction, was evidently intended for large meetings. A door in the south-east angle of the wall leads to the refectory, which is composed of a double aisle lighted by nine lofty windows. The cloister, one of the most curious, as well as one of the most perfect which France possesses, and a gem of Gothic architecture, was commenced by Thomas des Chambres, and finished by Raoul de Villiedieu in 1228; its form is an irregular quadrilateral, with four galleries surrounding the courtyard, and a double row of pointed arches resting on thin granite columns. The spandrels of the arches are filled in with exquisitely sculptured flowers and foliage, each different in design. The cloisters have been completely restored since 1881, under the direction of M. Corroyer, the Government architect charged with the work of the entire restoration of the whole monument. We may here observe that the granite-like stone of which the cloisters are built was kindly given by the present owner of the quarries, M. le Comte Henry de Canisy, thus following the example of the ancient owners of the mine, the abbots of the Abbey de la Luzerne, who, in the thirteenth century made presents of it to the Benedictine monks of Mont St. Michel.

As a fortress it is almost impregnable, and was the only one which held out for the French king when the whole of Normandy was invested by the armies of the victor of Agincourt, who laid siege to the place, but without result; and in the last attack, 1434, they were completely routed by the garrison and the chevaliers (heroes of the psalter and the sword), under the leadership of the stout-hearted Louis d'Estouteville; two mortars, abandoned by them, are still to be seen, telling the story of their failure. For many centuries the shrine of St. Michael was visited yearly by thousands, but the Revolution of 1789 dispersed the monks, and the building was turned into a prison in which 800 priests were incarcerated and left there until death released them. In 1834 a fire (the thirteenth since its foundation) caused very serious damage to the buildings, which were repaired by simply plastering up the walls and columns with a mortar or cement finished with a granite-like surface, and making, with the same material, fanciful capitals bearing not the slightest resemblance to the originals. Years of neglect began to tell their tale upon the crumbling masonry, the tottering columns, and weather-beaten walls, and the grand old monument, after stoutly withstanding the besiegers' cannon and the storms of centuries, would have become a pile of ruins, had not M. Corroyer eloquently pleaded its cause, calling the attention of the Government to its dilapidated condition.

In 1872, at the request of the Minister of Public Instruction of Fine Arts, M. Corroyer submitted plans for its restoration which were accepted, and in 1873 the work was commenced under his superintendence; M. Louvel, architect, Inspector of Historical Monuments Works, directing, and M. T. Fouché, Government builder, executing the work. Unfortunately, the undertaking was suddenly interrupted by the raising of a heap of rubbish against the ramparts notwithstanding loud and legitimate protestations. This work, carried out by main force, which has been styled a dyke or dam, has already proved an element of destruction, for in 1881 the interior wall of the ramparts fell, large cracks and fissures were observed in the king's tower, and other portions were greatly damaged. Some drawings exhibited by M. Corroyer in the *Salon* of 1883 (architectural section) executed with the most scrupulous exactitude, illustrate the ramparts as they existed in 1879, and their condition in 1883, showing the damage caused by this so-called dyke, which it is to be hoped will before long be removed.

For much of the historical information here

given we are indebted to the remarkable work by M. Corroyer entitled "*Description de l'Abbaye du Mont St. Michel et de ses Abords, précédée d'une Notice historique*," a work for which its author received the academical honours of the Institute of France.

THE ANNUAL REPORT OF THE LOCAL GOVERNMENT BOARD.

THE Fifteenth Annual Report of the Local Government Board,* just issued, contains, as usual, a great array of statistics and facts relating to the pauperism, rating, and sanitary condition of the country. We must pass lightly over the two subjects first named, merely noting, for what it may be worth in point of significance at the present moment, that during the parochial year 1884-85 (which ended at Lady Day, 1885), the mean number of paupers of all classes was smaller, in proportion to the population, than in any previous parochial year for which statistics of pauperism exist. It amounted to a thirty-fifth part of the estimated population. The mean number of adult able-bodied paupers bore the same proportion to the estimated population as in the preceding year. It amounted to 3·5 per 1,000, or 1 in every 283. The cost of poor relief, during the same period, amounted to 8,491,600*l.*, which was 89,047*l.* more than in the preceding year. This expenditure represented an average charge of 6*s.* 3*d.* per head on the estimated population, being one farthing per head less than in the parochial year, 1883-84, and an average rate of 1*s.* 3*d.* in the pound on the rateable value of the property liable to contribute to the poor-rate. In only five of the past twenty years has the average charge per head of the expenditure been less, and in every previous year for which there are statistics the average rate in the pound on the rateable value has been higher. The rateable value of the property liable to contribute to the Poor Rate was 145,527,944*l.*

The second section of the Report relates to "Local Government and Public Health," and covers a wide field of operations. We learn that the total amount of the loans which were sanctioned by the General Board of Health under the Public Health Act, 1848, up to the 1st of September, 1885, when the Local Government Act, 1885, came into force, was 2,956,178*l.* The sanctions granted by the Secretary of State under the latter Act, and the Sewage Utilisation Act, 1865, prior to the 19th of August, 1871, amounted to 7,363,366*l.* Since its constitution on the 19th of August, 1871, the Local Government Board has sanctioned the borrowing, by urban and rural sanitary authorities, of sums amounting in the aggregate to 34,403,478*l.* By far the greater proportion of these sums has been sanctioned for the purpose of sanitary improvements in urban districts, to be executed under the provisions of the Sanitary Acts, the Public Health Act, 1875, and Local and Provisional Orders. The remainder has been sanctioned principally for the execution of sanitary improvements in rural districts or for improvement schemes in urban districts under the Artisans and Labourers' Dwellings Improvement Act, 1875.

During the year covered by the Report, the Board caused to be prepared and submitted to Parliament during the Session, 104 reports and 9 supplemental reports on Bills promoted by local authorities, water companies, railway companies, and others, dealing with matters within the jurisdiction of the Board. The increase in the number of Bills thus reported upon, as compared with former years, was mainly due to the fact that in very many instances the Board had occasion to draw the attention of Parliament to the omission, on the part of the promoters, to insert satisfactory provisions prohibiting the purchase or acquisition, either compulsorily or by agreement, of houses occupied wholly or partially by persons belonging to the labouring classes as tenants or lodgers, except on the conditions prescribed by the new Standing Orders.† This being the first year in which provisions of this character were required to be inserted in private Bills, the details of the clauses embodying them needed careful consideration, and the Board found it necessary to make a considerable number of recommendations to Parliament, not only with a view to facilitate the carrying out

* London: Hansard & Son.

† No. 111, House of Lords; and No. 183, House of Commons.

of proper schemes for providing new dwellings for the working classes in the place of those taken by the promoters, but also for the purpose of placing the Board in a position to require such schemes to be carried out, and to recover substantial penalties in the event of any default in this respect on the part of the promoters. By far the greater number of these recommendations were accepted by Parliament, and the clauses which were thus amended in accordance with the Board's recommendations, will it is believed, afford useful precedents in future years.

In nine of the Bills promoted by local authorities, and reported on by the Board, it was proposed to confer on the promoters powers relating to police or sanitary regulations which deviated from or were in extension of or repugnant to the general law. These Bills, in accordance with the course adopted in former years, were referred to a Select Committee of the House of Commons, who presented a special report to the House, dealing generally with the subject-matter of the Bills referred to them, and making various suggestions. In the course of their report they stated that, "continuing the practice of the Committees appointed to deal with similar Bills in 1882 and 1884, they had, to the best of their ability, enforced two leading principles, which they believed to be accepted by the House, viz.:—(1) That no local powers should be given in excess of the general law, unless there can be shown either (a) strong local reasons for such powers, or (b) general reasons so strong as to render desirable the preparation of clauses, which (pending public legislation) may be granted to every community that shall think fit to apply for them; and (2) That as a general rule, no statutory enactments should be permitted for purposes which can be effected by by-laws." As regards the latter principle, the Committee point out "that by-laws, as compared with statutory enactments, have these advantages: they are more easily and cheaply obtained; they are under direct supervision of the Local Government Board; and they can be more readily amended." On the question of finance, the Committee reported that although unreasonable periods have not, in most instances, been proposed for the repayment of borrowed money, they "have, where it seemed to them practicable, still further reduced these periods, believing it to be the desire of the House that municipal improvements of a transitory character should be paid for by the generation which makes them, and that even when they assume a more permanent character they should be defrayed in periods not exceeding, at the utmost, sixty years, which the Committee think might reasonably be reduced still further."

The action of the Local Government Board and its officers in regard to such questions as come under the Rivers Pollution Prevention Act, 1876, the Artisans and Labourers' Dwellings Acts, and kindred Acts, are detailed at some length in the Board's Report, which is accompanied by a number of appendices and tables which elucidate the work of the Board in its multifarious details. Among the most interesting of these appendices are the reports of Mr. John Brydone, the Inspector under the Canal Boats Act; of Miss Mason on "the boarding-out of pauper children"; and of Colonel Sir Francis Bolton on the Metropolitan Water Supply. In regard to the latter subject, the report of the Water Analyst, Professor Frankland, seems to show that the water both of the Thames and Lea was throughout the summer of 1885 exceptionally free from organic matter. The system of constant service is being steadily extended, and now applies to half the houses supplied by the eight companies. Several of the companies have also greatly improved the character of their works, the result being increased capacity and efficiency. Appendix F gives particulars of expenditure incurred during the year in respect of the purchase, erection, or enlargement, &c., of workhouses, district asylums and district schools connected with Poor Law Administration. The total amount so expended during the year was 420,284*l.*, a large proportion of which sum was expended in bricks and mortar.

A Proposal has been made for the erection of a building for a Free Library and School of Science and Art at Poole, in celebration of the Queen's Jubilee.



Torre di Specca, Rome.—From "Picturesque Sketches in Italy."

PICTURESQUE SKETCHES IN ITALY.

UNDER this title we have a volume of sketches by Mr. Daniel Brade* of various ancient buildings in Italy, some of them which have not been much sketched. Some also which are very familiar are taken from unusual points of view. Others are interesting as records of buildings which have been removed. We give by permission a reproduction of one of the sketches which has this latter kind of interest, showing part of an old building, recently a nunnery, but now mainly pulled down. The sketches are intended, the author says, in a short preface, to convey the pictorial rather than the architectural interest of the buildings sketched; and, indeed, from an architect's point of view, the style of the drawings is somewhat deficient occasionally in clearness of definition. There is a free style and much artistic feeling in many of the sketches, however, and the book, both in regard to the execution of the drawings and the selection of the subjects, has a character of its own.

* Picturesque Sketches in Italy. By Daniel Brade, F.R.I.B.A. London: B. T. Batsford. 1886.

PUPILAGE.

At the meeting of the Architectural Association on the 5th inst., Mr. Aston Webb, F.R.I.B.A., read a paper on "Pupilage." In the course of his prefatory remarks, he said that he should avoid the great subject of architectural education, as that was being at present dealt with by an Institute Committee. Neither should he discuss the conduct and duties of the masters towards their pupils, although he should inevitably have to refer to this subject, which was more a matter for discussion at the Institute, and he was not prepared to say that it might not be discussed there with considerable advantage. His object was merely to consider,—(1) The relations of masters and their pupils, and the terms under which pupils are articulated; and (2) The disadvantages under which pupils, under the present system, labour, and the best way out of them. He continued,—

I am afraid I must take it as certain that in many cases the relations of master and pupils are rather strained, owing, perhaps, to a misunderstanding of the relative duties of each, and we should naturally turn in

the first place to the form of articles to learn what the respective obligations are. Personally I was never bound by formal indentures; neither have I ever had up to the present time, a young man formally bound to me. I dislike the idea, and prefer an annual arrangement, which can be terminated without trouble simply by the wish of either party. In such arrangements it is merely an understanding that a young man enters an architect's office with a view of participating in the work, and by the assistance of his master acquiring a knowledge or the practical working of his profession. This puts a master under as strong a moral obligation to do what he can to forward his pupil's interests as the strictest indentures, and is, to my thinking, more consistent with the feeling that should exist between master and pupil. However, we must naturally turn to the stricter indentures to find what is legally understood by a young man being articulated to an architect. I have had several copies of these indentures lent to me by friends, and a perusal of them seems at once to carry one back almost to Mediaeval times, as much from the quaintness of their requirements as for that of their diction. A good deal is said of what the pupil is to do, but not so much of the master. These seem to be some of the obligations laid on "the said" pupil:—

"That he shall and will during the said term of years faithfully, diligently, and honestly, and to the best of his power, skill, and activity, give him the said architect as a pupil in the said profession, art, or calling of an architect, and that the said pupil shall not at any time during the said term wilfully obliterate, injure, spoil, damage, waste, destroy, mispend or misappropriate any of the property, money, instruments, utensils, goods, or chattels of him, the said architect, and further that the said pupil will at all times keep the secrets of the said architect, and will at all times during the term readily and cheerfully obey and execute his lawful and reasonable commands, and shall at all times conduct himself with all due propriety, honesty, and diligence."

"Also, that the pupil will provide himself with all manner of necessities, with becoming apparel, and also physic and surgery in case of illness;" to which curious programme is sometimes added that "he shall not play at cards, dice, tables, or other unlawful games; that he shall not contract matrimony within the said term;" or commit other crimes too serious to mention. After which formidable programme comes a paragraph to say that "the architect, his administrators, and assigns [what the latter know of architecture I do not know] will [probably for a certain consideration] at all times during the said term of years teach and instruct the said pupil or cause to be taught and instructed in the art, profession, or calling [always great difficulty apparently in deciding what it is] of an architect in such sort as the same is or hereafter may be carried on by him, the said architect, to the best of his knowledge, skill, and ability." Well, now, the terms of such an agreement are apparently so strict and impossible to be absolutely kept on either side that probably both break through them in less than a month. I mention them to remind those here who are pupils of the extent of the obligations imposed upon them. But I purposely omitted in this account of indentures the time for which a pupil was articulated. Fifty years ago this was usually seven years; then it was reduced to five years, and since then has been further reduced in many instances to three years. This is a detail of importance. Now, putting aside all Mediaeval or other verbiage, what is the meaning of these articles? Very roughly put I believe the understanding is that a young man goes into an architect's office to learn how a practice is carried on, it being an obligation on the architect's part to give all the facilities he can to a pupil to learn it both in the office and out of it. He does not undertake the post of a schoolmaster, as some seem to suppose, and probably most young men at seventeen or eighteen would resent being so treated. He rather assumes that a young man at that age is not too young to understand that he is there to learn, not to play, though I am bound to say some seem to think that if they only attend an Academy or Association class in the evening they can spend their pupillage time much as they please. Possibly in many offices they can do so; but surely they should remember the all-importance of these pupillage years to themselves. You can comprehend that these years of pupillage are fraught with momentous consequences to yourselves. Even three years wasted and dawdled away, as they often are at the commencement of a career, means to many a life wasted and dawdled

away. Three years of good work means love of work and business habits acquired. Perhaps you say, "This merely applies to architecture as a business; I follow it as an art." I reply, that possibly if you let your art entirely master the business of your profession you may find hereafter the business entirely swallow up your art.

Architecture is the one art which combines the necessity for art and business capacity, and the greatest names in the architectural roll of fame are those who have most thoroughly combined them.

Some have made a name for their art capacity only; hundreds have made a practice from their business capacity chiefly; but the greatest have been able to build great buildings by their genius in uniting the two; and architecture is the art of erecting beautiful and useful buildings, not only of designing them.

Well, then, taking it you agree with me that a pupil should not expect to be taught in an architect's office as if he were at school, let us consider what he has a right to expect. It is evident that in a term of three years he cannot expect to acquire a thorough knowledge of his profession, or even as much as he did in a term of seven years; but I think he has a right to expect that he should have free access to all that goes on in the office; and that, further, his master should give him such instruction as he can, and should, in all cases, advise him in the course he should take in obtaining further knowledge unobtainable in an office from such classes and lectures as are provided at the Royal Academy, Royal Institute of British Architects, King's and University Colleges, and last, but not least, the Architectural Association; that he should be expected to give them one or two hours' personal instruction every day appears to me absolutely impracticable for an architect in active practice, however desirable it might be.

Before going to my second point let me say a word as to the relation between master and pupil. This should be one of mutual confidence and respect. The latter has the free run of the office of the former, and can, if he pleases, become intimately acquainted with all the details of his master's business. The pupil sees his master at work, and, perhaps, finds he is not infallible, and as it is said no man is a hero to his own valet, perhaps the same may be said of a master and pupil, though the pupil should remember that Carlyle suggested this might be the fault of the valet. On the other hand, though the architect must not be considered as a schoolmaster, the pupil has an undoubted right to look to him for advice and help in all matters connected with his architectural education, and to expect that he should put him in the way of acquiring a special technical education which can be far better learned outside than inside the office. The great advantage of the office training is that a pupil has the opportunity of seeing how work is actually performed, and how an architect, with his clients, builders, and others connected with the building trades, conducts his business in real life, and none of these matters can a young architect afford to neglect. On the other hand, if he is a wise young fellow he will endeavour to gain as much information from the office as he can on his own account without expecting his master, should he be in full practice, to be constantly especially instructing him.

Mr. Blashill read a paper on this subject before the Association ten years ago, and in that he expressed an opinion that pupils should be allowed to read all the office correspondence. This is a detail that was somewhat contested at the time, though I think there can be no question they should be enabled to do so.

Next come to the disadvantages or grievances which one hears most frequently from articulated pupils and the best way out of them. Now, I have talked with a great many pupils, and these are some of the most general that I hear.

First and foremost of all, that they have too much tracing to do, or that there are too many pupils in the office, and not enough draughtsmen; or that (if they are in a London office) they do too much office work and do not go on buildings enough; or that (if they are in the country) *vice versa*; or, that their master has too much work to do and cannot teach them; or, that their master has no work to do and cannot teach them; or, that the work is all of one class; or, that it was all surveying and specifications; or, that they never see any surveying or specifications; and many more such like.

Well, I agree with you that these are to some extent grievances and should be ventilated, and I should hope in time will be ameliorated, but they will not be in your time; and what I want to do, if I can, is to suggest some ways by which you can help yourselves to get over these difficulties. No sensible man can doubt that there are many cases in which a pupil has every reason to complain, or that others complain without any just reason.

It is difficult, for instance, to sympathise with those who complain that they are in so large an office with a great deal of work and so many to do it that there is no opportunity for them, while it is very easy to sympathise with those who find themselves in an office where their master is much employed out of it, and where the principal work is copying specifications and schedules of dilapidations, and their sole companion an office boy, while the tedium of the long days in the little elevated office is only relieved by the occasional tramp in the creaking stairs of the inevitable cadder.

Now, to take the grievances in detail: the first is tracing, and I say at once I think pupils often have too much of this to do. On the other hand, it is undoubtedly one of the best means by which a pupil can get into the habit of architectural drawing. Some acquire it very quickly, others take years before they trace properly; some learn while they trace, all could if they would by thinking about it. It also gets a pupil into the way of delineating work and placing it on the paper in an intelligible manner, which he would probably not otherwise learn, and if all these sources of satisfaction should fail him, then is the one left experienced by Carlyle in "honest journey-work well done for want of better." Mr. Christian, I think it was, told a story here once of a pupil who came to him and mentioned, amongst other things, that if he was articulated he should like to do nothing derogatory to a gentleman; and being asked to explain, said he should not like to do anything which he could not do with his gloves on, and I believe it was added that this young gentleman came to no good. Of course you cannot trace with gloves on, and you will have to take them off, and your coat too, if you are going to study architecture thoroughly, and not be too squeamish at the work that is set you either. The next grievance was that there were too many pupils in the office, and there again I agree to some extent. I know some architects who think it would be beneficial to limit the number of pupils to be taken by an architect to two, as is already done in the law, and though this might be well in the majority of cases, we all know some offices where it is eminently to the advantage of architecture that the largest number of pupils should be trained that the master is willing to instruct. It would be invidious to mention them, but you know them without it.

Then, again, those who are in London offices complain that they see little of executed work, and no doubt much of the work designed in many London offices is executed in the country; and where this is so I would say to the pupil, avail yourself to the full of the Architectural Association Saturday afternoon visits, and the numerous opportunities there are always open in London to inspect works in progress. Surely, of all places in the world, London is the place where this complaint should not be made, while the immense advance lately made in the work carried out in the offices out of London, shows that here also, if a pupil is so minded, he may see good work and improve himself by it. With respect to the grievance that one master has too much to do and another too little, it should be remembered that while in the first case a pupil must have the opportunity of seeing much work go through the office, in the other he will probably have the advantage of more personal attention from his master, and it is practically impossible to have it both ways.

I should now like to show how, in my opinion, a pupil may make the best use of his opportunities in whatever office he may happen to be; that is to say, how he can best learn an architect's business, without which he will never be able to develop or exercise whatever power of design he may be possessed of.

The first year of his pupillage he should have some personal instructions from his master, and take part in whatever subordinate work in the office he may be set to; taking all the time as much interest as he can in the business that is going on. In the second year he should join

the Association, and do other work outside, which it is not my province to-night to describe. Then he should start what I would call a commonplace book; in other words, an illustrated note-book, in which he should put down the leading points of drawings passing through the office, and especially those coming under his immediate notice to ink in, finish off, or trace. All points of construction, scantlings of roofs, and such varied items as dimensions of a stable, details of a church, school seating, sanitary traps, or whatever it may be, should be carefully noted down and arranged for easy reference, and if he steadily did this during his pupillage he would amass an amount of practical information that would prove to be of inestimable advantage to him afterwards, and if this paper of mine to-night is but the cause of a few of you starting such a book it will not have been thrown away; and, while on the subject of this commonplace book, I would suggest to those who complain of the want of variety of work in the office they are in that they might easily arrange with others to exchange information with those in other offices, and thus add to their own stock of knowledge and that of others at the same time; and though this presupposes a very considerable amount of interest on the part of pupils, it is surely not too much to expect. I do not believe there is a master in London who would grudge his pupil the time to do this if he found he was doing it thoroughly, but if he did I should feel almost justified in giving you the somewhat dangerous advice given by a statesman to Ulster a short time ago when he said that if certain circumstances arose "Ulster would fight and Ulster would be right."

Then, as to specifications and contracts: some pupils at the end of their articles are perfectly innocent of these things, but if they have never taken the trouble to copy those that are always in use in the office they must not lay all the blame on their master. They are in the office for the purpose of seeing these instruments in actual use, and I would recommend this as an admirable exercise to any young man who would take the trouble, viz., to take a set of contract drawings in the office and write a specification from them without help, and afterwards compare it with the working office copy.

Again, you should occasionally take your own cube of buildings being erected in the office, and find out their cost and note it in the commonplace book at per foot cube; but I have said enough to show you what I am driving at, viz., that it is to the advantage of every pupil to take an intelligent interest in the work going through the office, and that not merely in the interest of his master, but for his own sake.

Another point which is somewhat outside, perhaps, the regular office work, but for which, I think, opportunities should be given, is architectural sketching. I am sure it is possible to collect a large number of sketches in so lazy a way that they are practically no good to the student. Water-colour sketching, for instance, is a delightful relaxation, but is of comparatively little value for the purpose of study.

I believe that nothing would help the student more than the habit of sketching from memory, both old examples and new. There is no greater test of how far you have really understood anything you have sketched than by trying when you get home to redraw it without reference to your sketch-book.

You will be surprised at first how little you remember, and afterwards how the practice strengthens your memory. If any of the pupils I am speaking to would try when they get home to sketch a bay of any building they know well they will be surprised, I fancy, to find how little they really know about it. The same practice is equally useful in respect of modern buildings, and if you select any fairly good building you pass on the way to your office, look at it carefully, and try to draw it from memory, returning time after time until you have it complete, and then another, and so on, you will not find the time spent thrown away.

The advantage to be derived by friendships formed with those articulated in other offices is obvious for the purpose of the exchange of information such as I have already referred to, and this Association presents the opportunity of forming these friendships, which, made now, will probably lead to some of the pleasantest hours in your professional life. The friendly rivalry excited by the competition for prizes here and elsewhere is, I believe, carried on with an entire absence of that bitterness not

altogether unknown to those who have entered on the real struggle of life.

Another question every pupil should consider, and which he should pre-eminently expect advice upon from his master, is the books he should read. Now, this might form a subject for a paper alone, and I can only touch upon it to-night, though every pupil should make up his mind to do a certain amount of systematic reading during his pupillage. I am inclined to think a pupil's reading should be unfettered with any idea of an examination, and must, of course, be regulated to some extent by the books he can get. The office library should be ransacked, while the libraries here, in the Institute, and South Kensington Museum enable a London student to consult any books he wants.

There are two books no pupil should be without as his own property. These are Ferguson's "Handbook" and Gwilt's "Encyclopædia." Their price is moderate and must be within the reach of all. Of course it is necessary not only to have them, but to read them. On this subject of books I do not think I can do better than refer you to the little pamphlet of advice published by the Institute. This suggests the best books under the various subjects, and though it has been somewhat found fault with as giving an impossible list of books, if you will read it carefully you will find it is not so. A pretty complete list is very properly given, but those essential are almost pointed out.

A habit of steady, continuous reading is not an easy thing to acquire, but it is worth the effort and must be made, and, like other things worth striving for, when acquired brings its own reward.

No pupil should neglect to consult the committee of advice started by this Association if he is in any difficulty and is unable to get help from his master.

One word to those pupils whose articles are just expiring. This is, perhaps, the most difficult time of all to a young man. He has views of taking an office, and perhaps chambers in town, and setting up a door-plate, &c. If he has only served for three years he should do nothing of the kind, but rather remain in the office where he was articulated, or enter another as a salaried assistant, and in his spare time read up for the Institute Examination, and try for one of the Travelling Studentships, with a fixed resolve to go abroad for six or twelve months when he has been five or six years in the profession. It is a mistake, in my opinion, to go sooner. If he is not fortunate enough to obtain a Travelling Studentship, and cannot go without one, he should at least endeavour to live very quietly and save up for the Italian excursion of this Association, not that you should return with the idea of erecting buildings in the Italian or Grecian taste in this country, but that you may have your eyes opened to the marvellous works which men of genius have been able to raise in other countries than your own.

All this you will say is a formidable programme for a young man to face, and it undoubtedly is so, but you must face it to attain a moderate proficiency in the profession you are entering, to succeed in it. You must give up many pleasant and attractive occupations, you must "scorn delights and live laborious days," and look for your reward in the future not in money or in position, but in the satisfaction to be derived from all work honestly done to the best of your ability.

Gentlemen, to you is left a glorious heritage, and which no doubt some among you will take advantage of. Architecture just now seems to have arrived at a point (after running through all the styles as an education) when she is only waiting for the man to make a new departure and mark an epoch in her history; our great living architects have done their duty in advancing the art, men of, say, my generation are now hardly likely to carry it much further; but for you, with a career still to run, everything is open, no profession in the world offers greater possibilities than ours at the present time. Under the present system of Architectural Education "self-help" must be your motto, and the gods help those, remember, who help themselves.

[A report of the discussion which followed will be found on another page.]

Obituary.—The death is announced of Mr. Parke Neville, C.E., the City Engineer of Dublin, in his seventy-fifth year.

LOCAL GOVERNMENT INQUIRY AT RICHMOND.

MR. ARNOLD TAYLOR, Inspector of the Local Government Board, held an inquiry at Richmond, on Wednesday last, respecting an application of the Richmond Vestry and the Rural Sanitary Authority, for sanction to borrow 100,000*l.* for the construction of works of sewage disposal.

Mr. Burt explained in detail the various attempts which had been made by the Richmond and neighbouring authorities to deal with their sewage, and so comply with the law, pointing out that Richmond had spent about 11,000*l.* in futile sewage schemes, 8,500*l.* of which was paid to the Main Thames Valley Board, now dissolved, but which spent 44,600*l.* during its eight years' existence. The only result of that Board (beyond spending the ratepayers' money) was the staving off of the penalties of the Thames Conservancy Board for allowing crude sewage to continue to flow into the river. The scheme of the Richmond Authorities was designed by Mr. Melliss, C.E., and was practically on the same lines as the scheme put forward before the Committee of the House of Commons, when the joint board was dissolved, but the site of the sewage works was now at Mortlake instead of Barnes. They had been governed by four considerations:—That they had absolutely to cut off their sewage from the Thames; that they should collect and clarify the sewage so as to make it free from nuisance in the river; that they had to do it without nuisance in their own locality; and to do it with as little disturbance of existing sewers as possible. They had made an arrangement with the Duke of Devonshire, Mr. Popham, and the Pullman Trustees by which they had undertaken not to oppose the scheme. The site of the pumping station at Mortlake will be surrounded with trees so as to hide it from public view. Mr. Burt read the correspondence with the Local Government, in which the Rural Sanitary Authority asked, in November, 1885, if a scheme with a small filtration area of prepared beds through which the clarified sewage should be made to pass before being discharged into the river would satisfy the requirements which sanitary authorities had to meet. He read the reply from the Local Government Board in the affirmative. In this scheme the clarified effluent passed not through earth but through specially prepared filter beds. The total area to be dealt with in the scheme is 6,103 acres. It is proposed that each contributing authority shall be rated equally, on the basis of their rateable value. The scheme provides for the separation or exclusion as far as possible of rainfall and subsoil water from the sewers.

Mr. Melliss, C.E., the designer of the scheme, a Member of the Institution of Civil Engineers, of the Geological and of Chemical Industry, gave evidence stating that he had estimated the future population of the district at 79,044, as against the present population, 33,630. The inhabited and uninhabited houses in the district were 8,053, giving an average number of 4.56 persons to each house. He had taken 43 gallons per head, allowing for rainfall and subsoil on the roofs and yards of the buildings, every twenty-four hours, as the basis for the capacity of the sewers, one-half to flow off in six hours, and the whole in twelve hours. The total carrying capacity of the intercepting sewers is 10,912,180 gallons. It was originally intended that the main, starting from the boundary of Petersham, should pass through the grounds of Richmond House, but that had been diverted to the route along the Lower-road. The principal main sewer will start from Petersham boundary in Wilderness-lane, where its invert will be 1'4.3 below ordnance datum; thence to the point where it joins the towing-path a distance of 243½ yards. It will be a 16-inch circular stoneware pipe surrounded with concrete, having a gradient of 1 in 550. This sewer, with the same size and gradient, will be continued along the towing-path towards Richmond Bridge for a distance of 351 yards, but it will be an iron circular pipe surrounded with concrete. From thence along the towing-path the sewer will be continued to the Friar's-lane outfall, a distance of 541½ yards, being an 18-inch iron circular pipe surrounded with concrete, with a gradient of about 1 in 600. A sewer will start from Aggill-lane outfall, where its invert will be 3 ft. above datum, and terminate at Friar's-lane outfall, a distance of 275 yards. An 18-inch iron circular

pipe surrounded with concrete, having a gradient of 1 in 400. The foregoing sewers will intercept the existing Richmond sewer outlets into the Thames. A sewer will start from Friar's-lane outfall, where its invert will be 7.45 ft. below ordnance datum, along the lane, the eastern side of Richmond-green, across the station yard, to the Kew-road and Mortlake-road to within fifty yards of the Mortlake boundary, a distance of 1,979 yards. It will be egg-shaped 3 ft. 3 in. by 2 ft. constructed of blue Staffordshire and Gault brick, in cement and concrete, having a gradient of 1 in 950. This sewer will be continued along the Lower Richmond-road towards West Lodge, and the size will be increased to 3 ft. 6 in. by 2 ft. 4 in., having a gradient of 1 in 1,100. The invert at the lower end of this sewer will be 18 ft. below datum; from thence the sewer will be enlarged for the purpose of securing the Barnes and Mortlake sewer, 4 ft. 3 in. by 2 ft. 10 in., and follow the pathway from Mortlake to Kew, then along the roadway to the pumping-chambers and precipitation works where the invert will be 19.19 ft. below datum, and 31 ft. below the surface of the ground, having a gradient of 1 in 1,200. The Barnes and Kew sewer will be laid independently to the pumping station.

The air-shafts are to be erected seventy yards apart. It is intended to provide at the pumping station three compound horizontal condensing engines, with three boilers 100-horse-power each. One of these engines would be a reserve. The precipitation works would be raised 1 ft. above the highest flood level of the Thames; the floors of the buildings being 18 ft. above datum. The sludge presses would consist of thirty chambers, 36 in. circular presses, one set of hydro-pneumatic forcing reservoirs, one sludge-pump, air-pump, and a steel air-receiver. The works will generally provide for twenty per cent. more than present requirements. The effluent water flowing over the weirs to the tanks, as well as that drawn off by flood-valves to a depth of 3 ft. 9 in. in the tanks, will discharge on to the high-level filters, consisting of coarse sand, shingle, and fine sand and carbon, the remaining 2 ft. of effluent water overlying the sludge, when it is required to empty the tank will discharge on to the lower level filters, composed of the same materials as the higher. The surface of the high-level filters is 13.5 ft. above datum, and the floor 10 ft. above datum; the surface of the low-level filters is 11.12 ft. above datum, and the floor 9.12 ft. above datum. The water after passing through the filters will discharge from the high-level filter when ebb tide is 10 ft. above datum, and from the low-level filters when it falls to 9 ft. above datum. The filters contain storage-room for about 388,000 gallons, or about two hours' fine weather flow, but when the filters cannot be emptied by gravitation because of the state of the tide, the water will be lifted and discharged at a level of 18 in. above datum by steam pumps provided for that purpose.

Mr. Montague Shearman, in opposing the scheme, said that it did not comply with the recommendations of the Royal Commission on the Disposal of Sewage, inasmuch as it did not provide for the filtration of the effluent water through earth.

Mr. Burt said that it was impossible to get land of sufficient area to deal with the sewage in that way. The filters occupied 11 acres, and the site 11 acres. The recommendation of the Commission was contingent on the possibility of procuring sufficient land.

Mr. Melliss, asked in regard to the complaints in reference to the Chiswick works, said he was not surprised at these complaints, as the sludge had been allowed to lie in large bulk even when it had not been pressed. Mr. Melliss said that the chemicals to be used, milk of lime, salts of alumina, and carbon, would be effective so far as the chemical process was concerned. The decision of the Local Government Board will be given in due course.

Penarth.—The memorial stones of the Presbyterian Chapel here, which is now being rebuilt, were laid on the 1st instant. The building is in a free treatment of Romanesque, and is being carried out from the designs and under the supervision of Mr. J. H. Phillips, of Cardiff. Accommodation is provided for about 380, and the cost will be about 800.

STAPLE INN, HOLBORN.

The conditions of sale of these premises, which are to be sold by auction by Mr. Robert Reid, on the 26th instant, have just been issued. The property to be sold, which does not include the block of chambers at the south angle of the Inn, which were recently purchased by Her Majesty's Commissioners of Works and Buildings, occupies a superficial area of 33,364 square feet, and has a frontage of 124 ft. towards Holborn. The whole of the buildings on the site will become the property of the purchaser, including the fittings of the hall, with its open-timbered roof, the wall-panelling, minstrels' gallery, stained glass, &c. The purchaser is to undertake to keep an approach from Holborn to the Land Registry Office, in the rear of the Inn, and the premises adjoining, but will not be bound to keep the approach in its present position, but may at any time substitute for the same a passage-way, 8 ft. wide, over any part of the premises. The purchaser is further to undertake not to erect any buildings within a distance of 35 ft. from the front of the Land Registry Office; but, subject to these restrictions, it would appear that the whole of the ground may be occupied by buildings, and from the character of the site and of the buildings now erected upon it there would be very little difficulty in entirely covering it.

The title to the property commences with an indenture of feoffment perfected by livery of seisin, and dated the 18th of December, 1811, and a fine duly levied pursuant to a covenant contained in such indenture. The property is extra-parochial; one of the vendors has hitherto been appointed overseer, and has paid the rates by means of payments called Inn dues, and a payment by Her Majesty's Commissioners of Works in respect of the property referred to as sold to them. The amount so paid is collected from the tenants. Staple Inn is one of the extra-parochial places mentioned in Schedule C of the Metropolitan Local Management Act, 18 & 19 Vict., c. 120, s. 175, as not being liable to be rated under that Act except for the purpose of contributing to the expense of the main drainage of the metropolis. By the Metropolitan Board of Works (Loans) Act, 1869, s. 25, the places mentioned in Schedule C of the above Act were made liable to the Metropolitan Consolidated Rate, except so far as they may be entitled under the General Improvement Acts to any exemption from any rate or assessment. All abstracted deeds will be delivered to the purchaser on completion, together with a book containing the record of the admissions of the members of Staple Inn. These documents are subject to be produced to the Commissioners of Works and Buildings under a statutory acknowledgment and undertaking given by the vendors, and the book is also liable to be produced and copies of it furnished to any of the Ancients of Staple Inn who were parties to the conveyance to the vendors, and to be delivered up at the end of fifteen years from the date of such conveyance to the then pensioner (if any) of the Society of Staple Inn. The shops and chambers are let temporarily, subject to three months' notice, and produce a net income of 1,600l. per annum, or about 2 per cent. on the purchase-money of 80,000l., at which price it was bought by Messrs. Trollope.

The Society for the Protection of Ancient Buildings are about to present a memorial to the Corporation of London on the subject of the proposed sale of Staple Inn, praying the Corporation to take steps for its preservation as a civic antiquity of great interest.

MR. STANLEY G. BIRD.

MR. STANLEY G. BIRD was entertained at dinner on the 8th instant at the Café Royal by his colleagues of the Institute of Builders, the Builders' Accident Insurance (Limited), and the Central Association of Master Builders of London, previously to his departure on a visit to India.


Mr. George Burt, J.P., presided. The health of "The Queen" having been loyally responded to, the Chairman said that in proposing the toast of the evening it was unnecessary for him to make a long speech, but he would just give a short outline of Mr. Bird's connexion with the building trade. Previously to 1872 he was connected with the Builders' Society, and in that year took a prominent part in the revival of the Central Association of Master Builders

of London upon a permanent basis, and was appointed honorary secretary, which office he filled till the termination of the masons' strike in 1878. When the Employers' Liability Act was passed in 1880, Mr. Bird took a prominent part in the formation of the Builders' Accident Insurance, Limited, of which he is at present chairman; and he served for four years as President of the National Association of Builders, which society he assisted to form in order to secure united action in trade matters among the various local associations, and he was now vice-president. In 1884, the incorporation of the Institute of Builders was accomplished mainly through his exertions, and he was now President of the same, as well as vice-president of the Central Association. He was a past-president of the Builders', and Builders' Clerks', Benevolent Institutions, and had filled the office of Master of the Tylers' and Bricklayers' Company, in addition to which he was the Colonel of one of the best-known of our Volunteer regiments. The services Mr. Bird had rendered the building trade would be seen from what he had already stated, and it was with the greatest pleasure he (Mr. Burt) presided that night, when they were all assembled to wish their good friend "God speed," and a safe and pleasant journey.

The toast having been most cordially responded to, Mr. Bird thanked his colleagues for the honour they had conferred on him in entertaining him at dinner previously to his departure.

Illustrations.

TOWN HALL AND MUNICIPAL BUILDINGS, EASTBOURNE.

 WE give a view, detailed view, and plan, of this building, which was opened on October 20.

The site has an extensive frontage; four thoroughfares meet there, viz., Grange-road, Meads-road, Grove-road, and South-street; and the buildings are some 200 ft. in length.

The design is described by the architect, Mr. W. Tadmor Fonkes, as an adaptation of the Renaissance style of architecture. The materials used for all the elevations are best dark red bricks, with a liberal use of Portland stone dressings. The roofs are covered with Westmoreland green slates, the cresting and roof terminations being of ornamental iron-work.

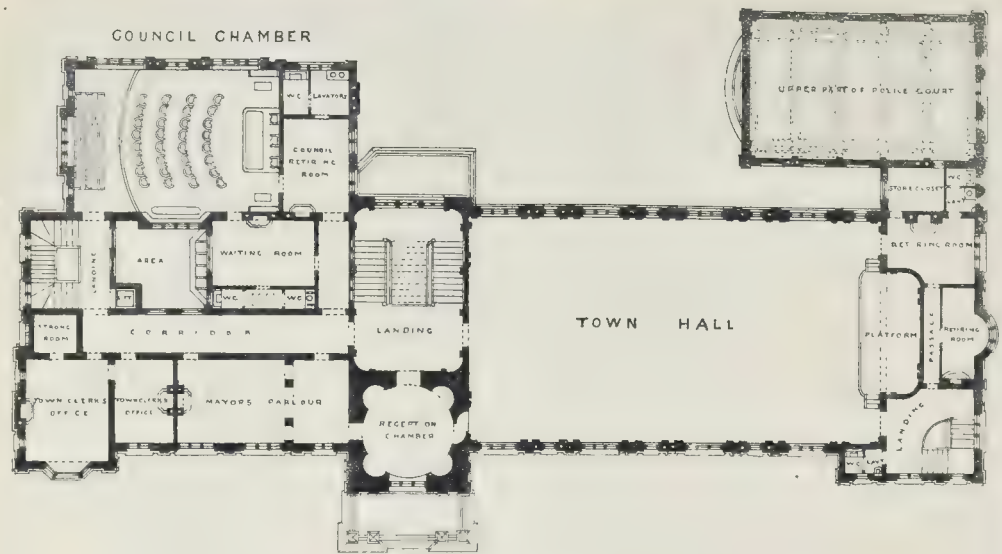
The main entrance is beneath the tower, which rises to a height of 130 ft. above the ground level, and provision is made therein for a set of Cambridge chimneys and a clock having four faces, illuminated at night, but not yet provided.

The ground-floor on the Grove-road side provides for a police or county court, large general waiting-hall, female witnesses' room, barristers' and solicitors' retiring-rooms, magistrates' clerks' room, county court offices, and also a judge's and magistrates' retiring-room, with ante communicating direct with the court and bench. The basement of the court is occupied by the police offices and cells, whilst a superintendent's house is shortly to be erected in the rear. In the main longitudinal corridor on the one side are the rate collector's, inspector of nuisances', the medical officer's, and the building surveyor's offices.

The principal entrance gives access to the grand staircase hall, with marble pilasters and enriched ceiling, and in the rear of the grand staircase are the public cloak-rooms and lavatories.

On the first or principal floor is the Town-hall, approached from the principal staircase-landing, at one end, and also by a secondary entrance and staircase, with retiring-rooms, at the platform end. The hall is 83 ft. long by 45 ft. wide, exclusive of orchestra and organ-gallery, and it is 26 ft. in height in the coved and enriched compartments of the ceiling. The walls between the windows have engaged marble pilasters and panelled oak dado, and the floor is laid with oak. The windows are arranged on each side of the hall, and are recessed.

From the principal landing and from the town-hall doors communicate with the reception-chamber, which is under the tower. The floor is laid with Arrowsmith's parquet. There is also a Mayor's parlour and ante-room, and contiguous to these are the town clerk's offices and munition-room.



— FIRST FLOOR PLAN —



— GROUND FLOOR PLAN —

EASTBOURNE TOWN HALL.

The council-chamber is also on the first floor, with waiting, retiring, and robing rooms, and approached by the public by a staircase from the official entrance. The chamber has panelled walls and ceiling, and the floor is all in oak. Thus the chief civic apartments are *en suite* and on one floor.

The upper portions of the buildings are devoted to spare offices and store-rooms, whilst in the tower are the clock-room and belfry.

The whole of the floors are of fireproof construction, and all the joinery throughout is of

wainscot oak. All the external walls, which are of very substantial thicknesses, are built hollow, and tied with Jennings's vitrified brick ties.

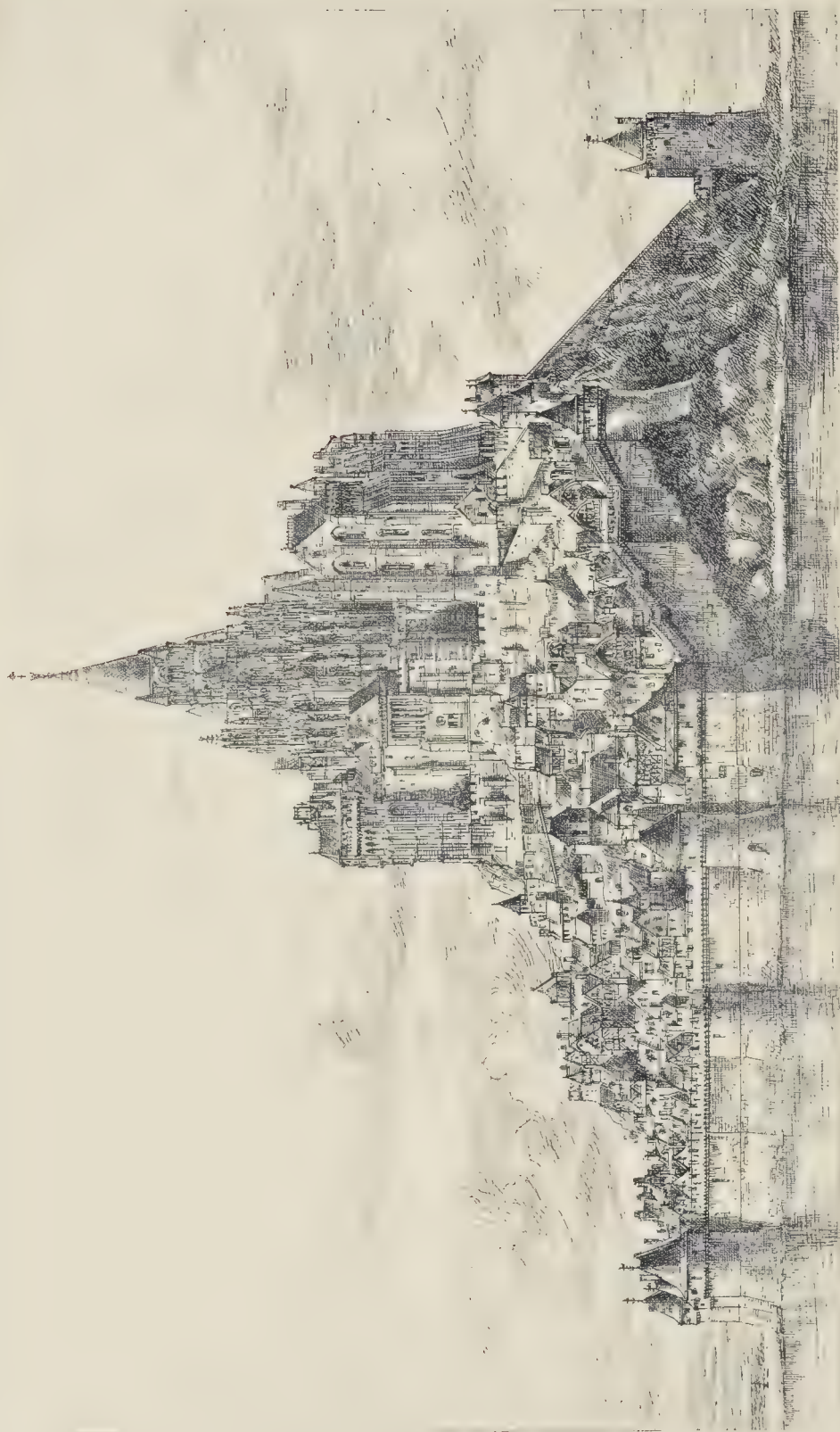
The walls of the basements are for the most part lined with best white glazed bricks. All the staircases are of stone; and the halls, corridors, and passages are laid with marble mosaic tiles supplied by Messrs. Diespeker & Co., Holborn Viaduct, London; the walls of all lavatories, &c., being lined with Minton tiles. The stained glass and lead glazing have

been manufactured by Mr. Swaine Bourne, of Birmingham; and the window of the grand staircase contains heraldic devices. The carving of stone and wood work has been very excellently executed by Messrs. Naylor Bros., of Aston, Birmingham.

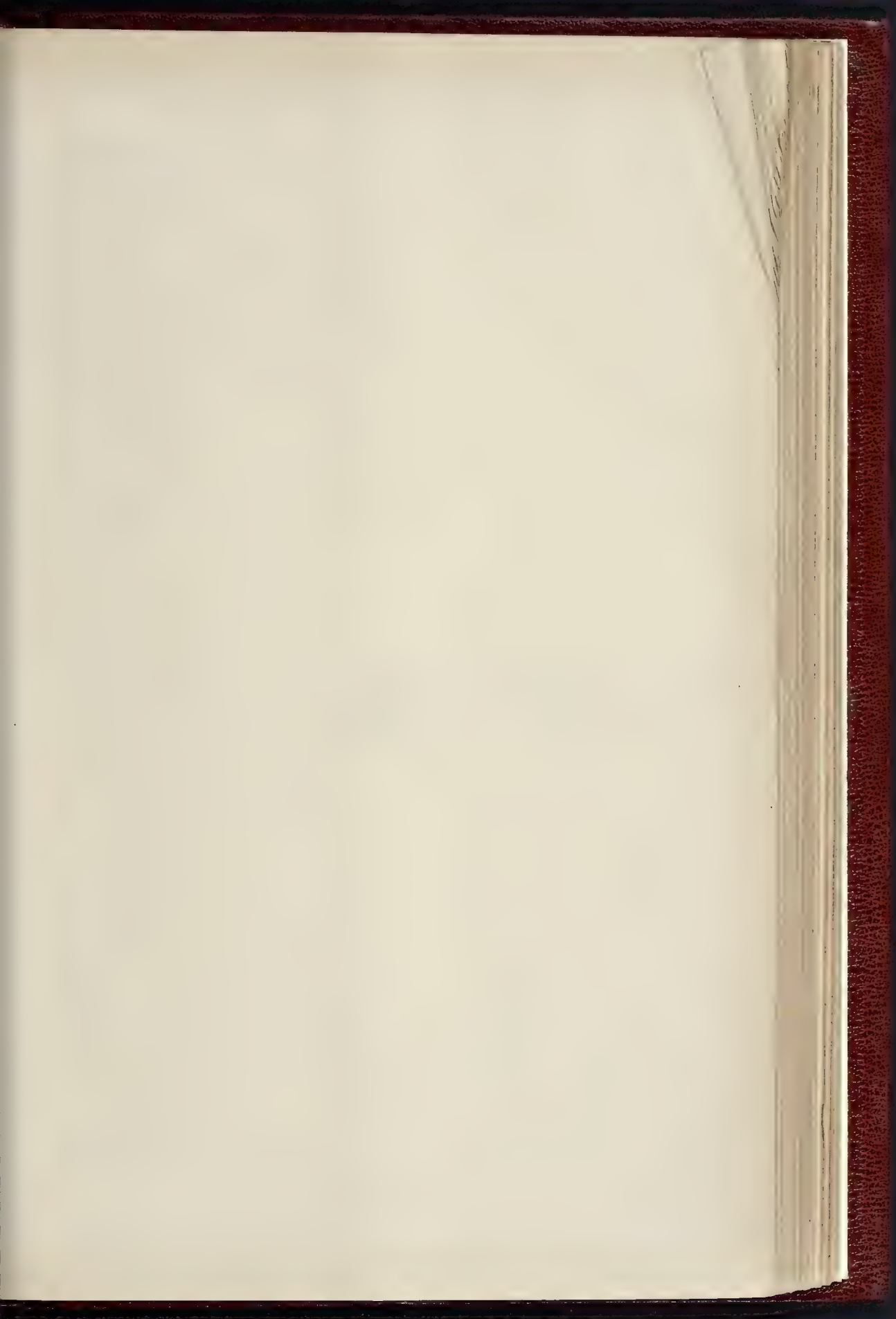
Special attention has been given to the thorough ventilation of every apartment, and the latest improvements in that direction have been introduced; the heating, independently of the use of open fires, is effected by means of low-pressure hot-water pipes on the gravit



THE BUILDER, NOVEMBER 13 1886



MONT ST. MICHEL: PROPOSED RESTORATION.— M. CORROYER, ARCHITECT.



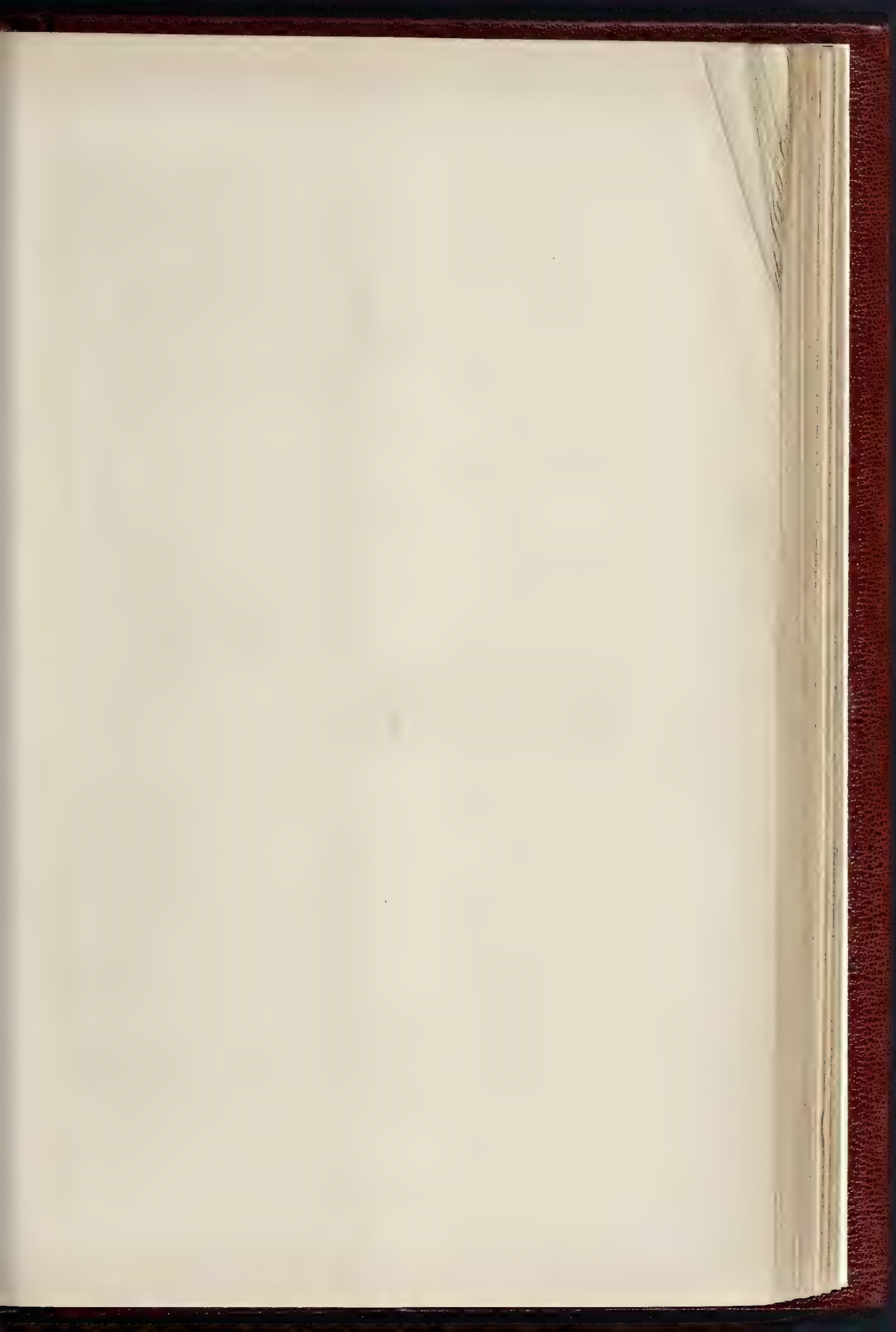
THE BUILDER, NOVEMBER 13, 1886



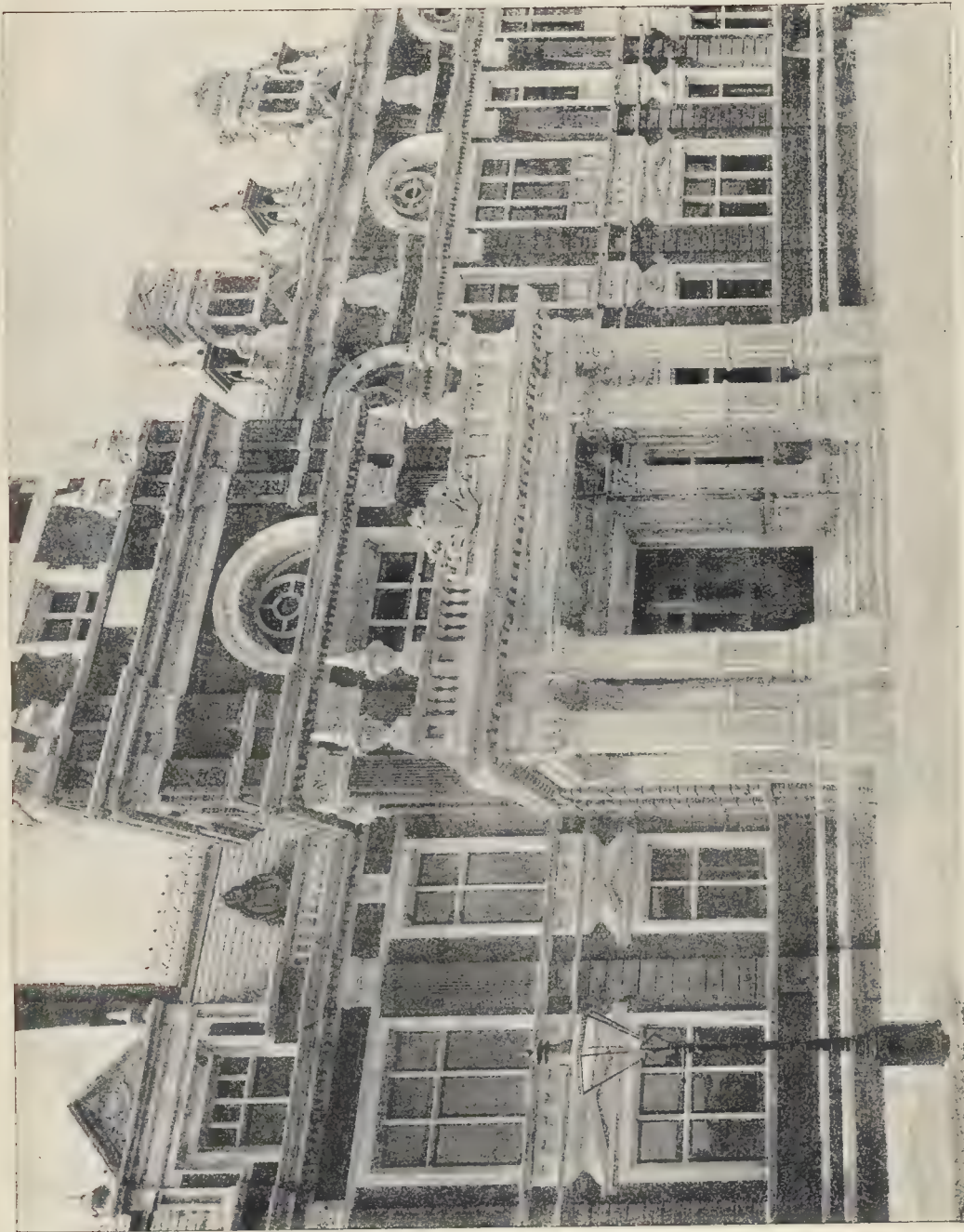
W. & S. Photo-Litho

TOWN HALL, EASTBOURNE: PRINCIPAL FRONT.—MR. W. T. FOULKES, ARCHITECT.

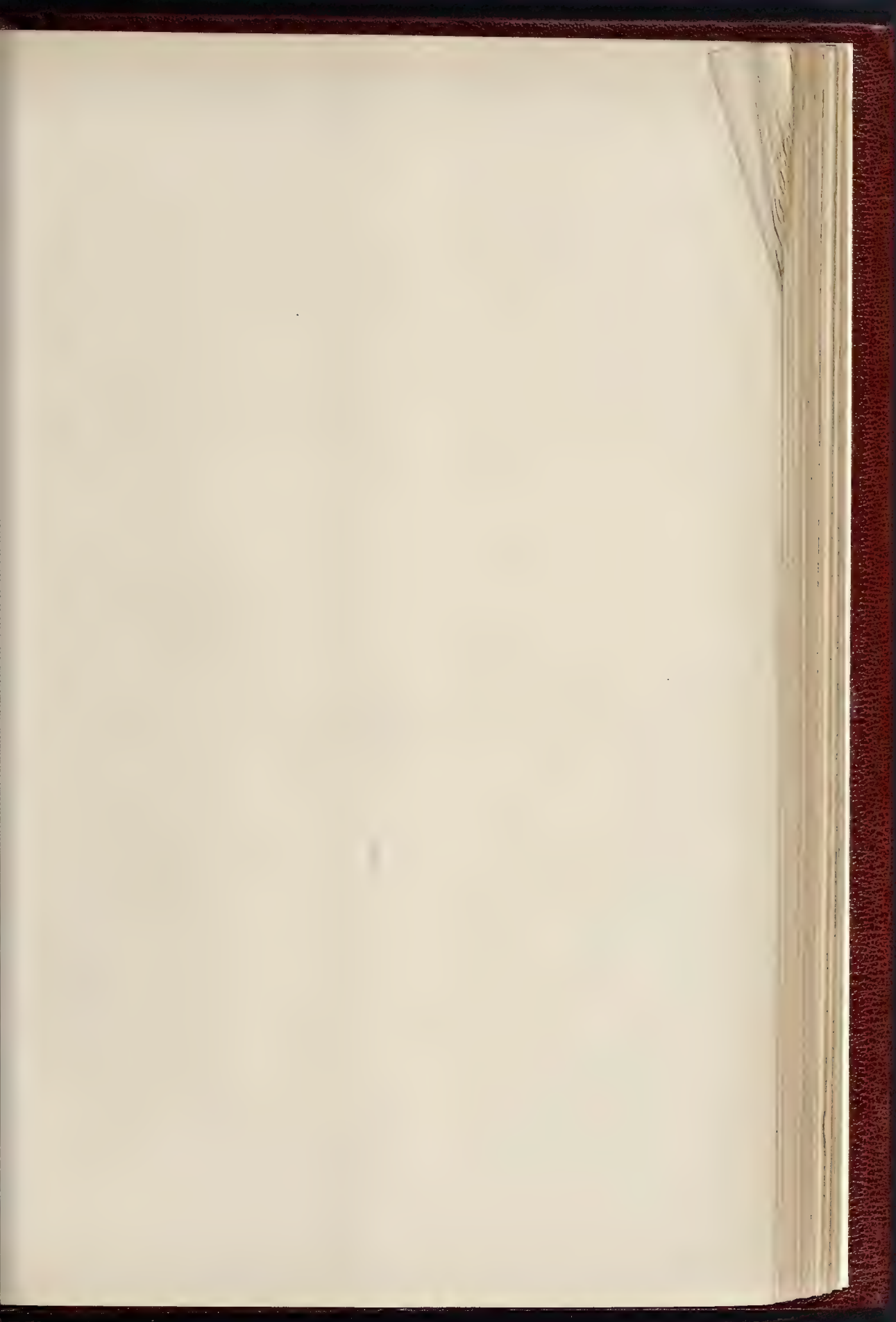
C. Queen, St. London, W.C.



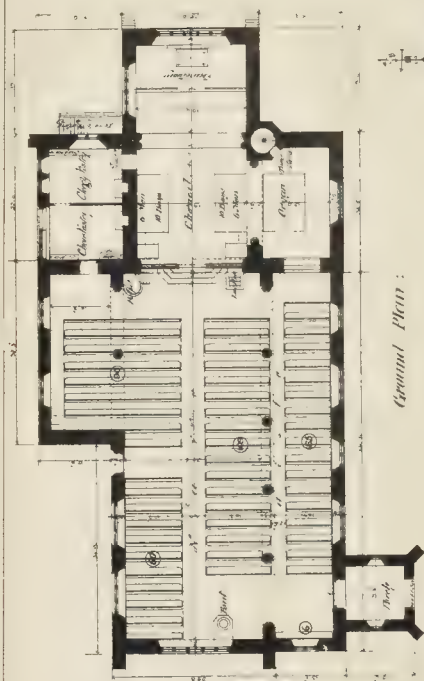
THE BUILDER. NOVEMBER 13, 1886



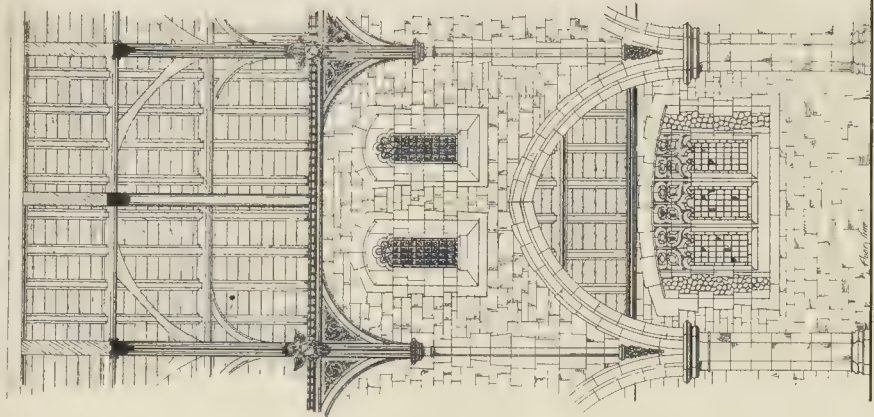
TOWN HALL, EASTBOURNE. CENTRE PORTION OF PRINCIPAL FRONT.—MR. W. T. FOULKES, ARCHITECT.



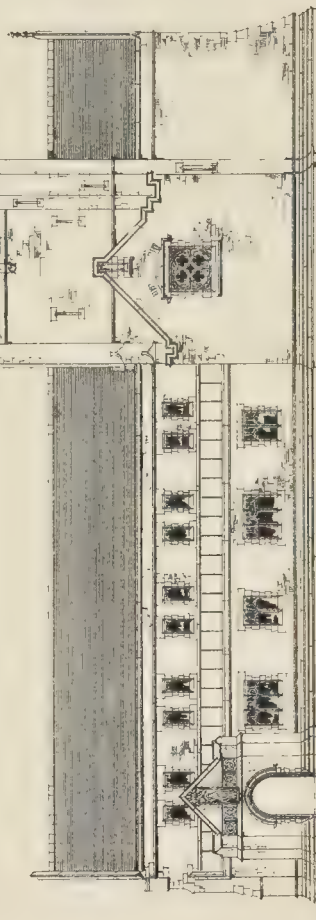
THE BUILDER, NOVEMBER 13, 1886.



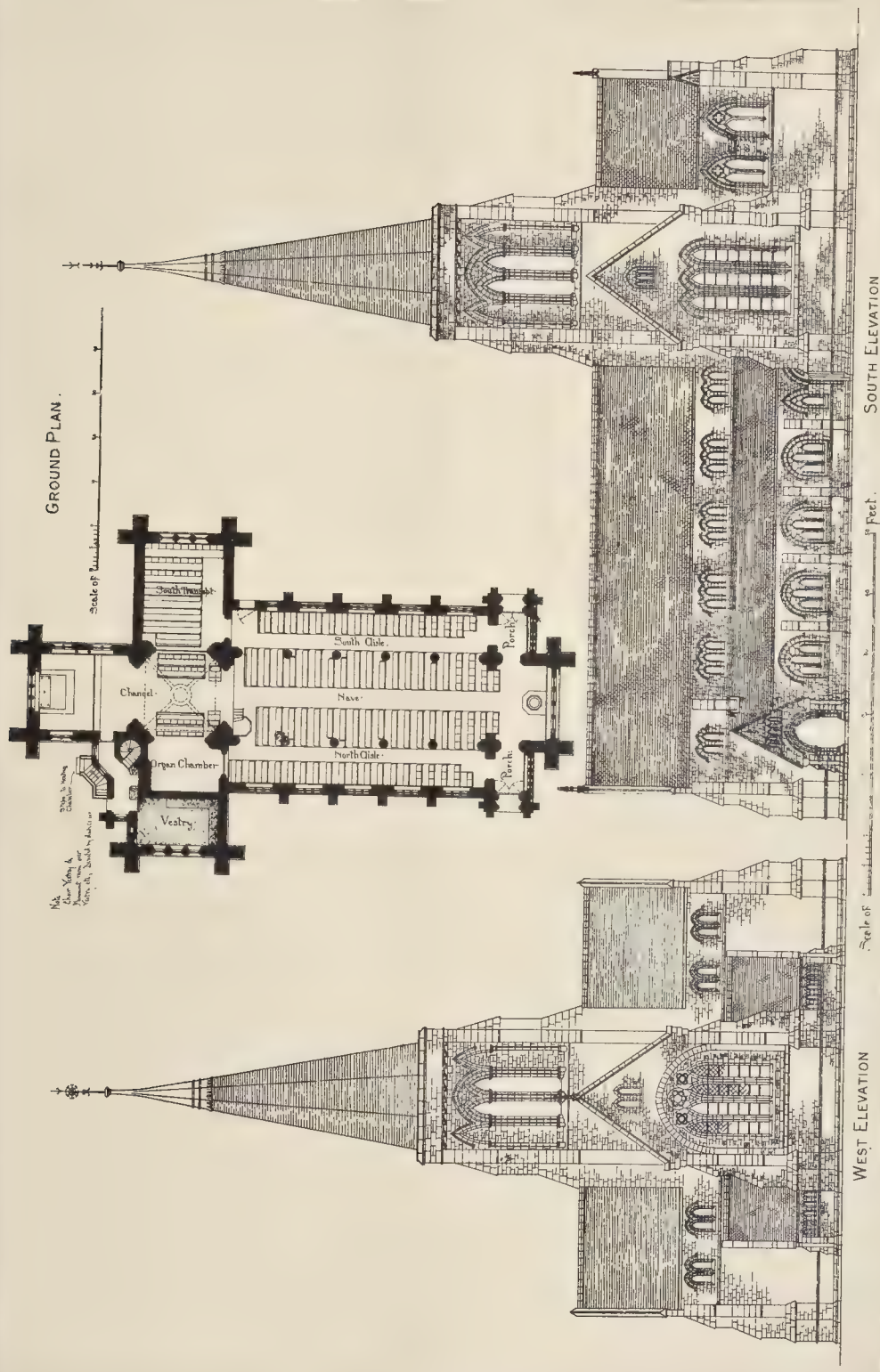
Ground Plan :



A BAY OF THE NAVE.



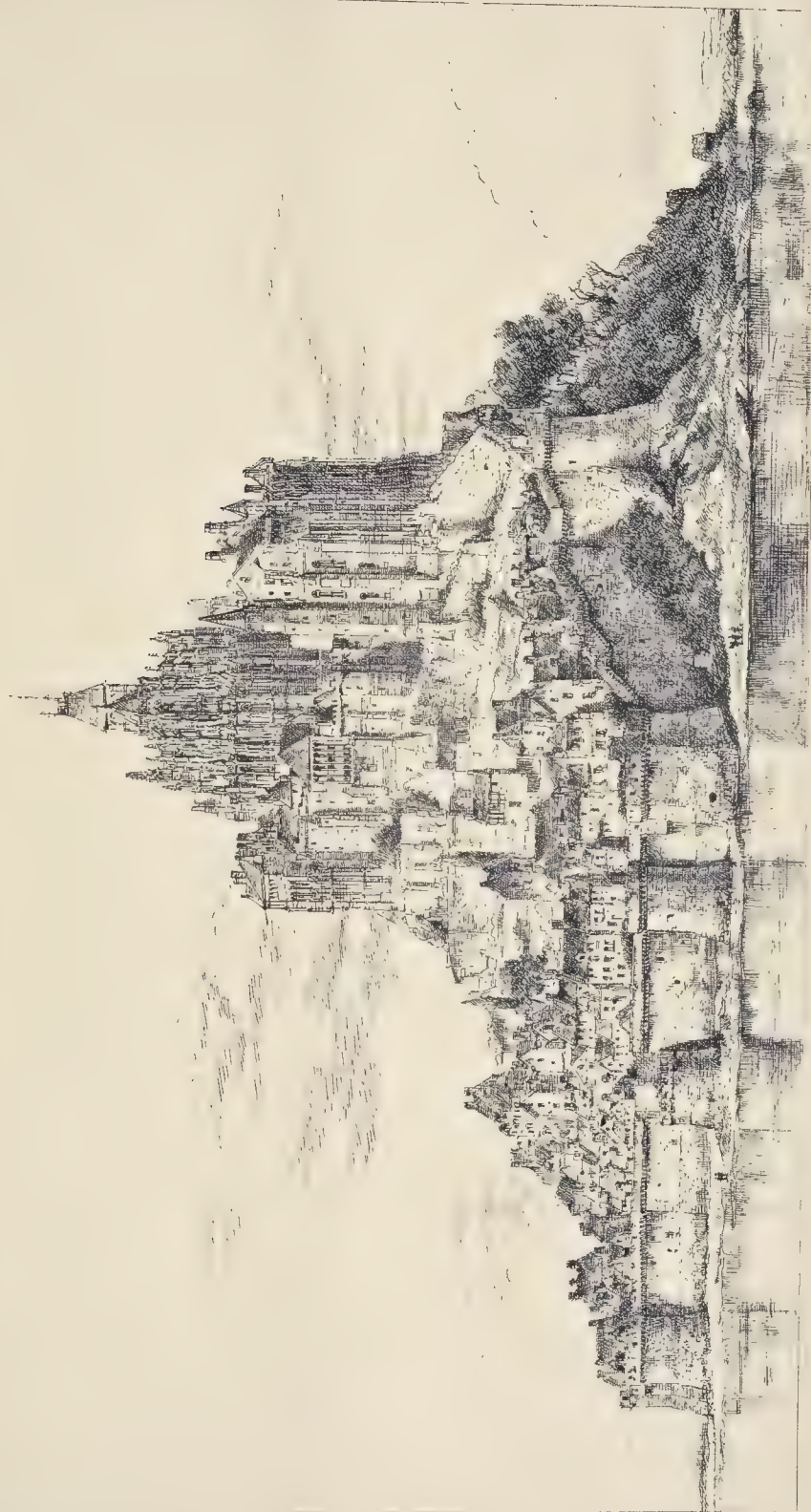
SOUTH ELEVATION.



DESIGN FOR A VILLAGE CHURCH BY MR. W. HARGREAVES RAFFLES



-INDUSTRIAL DWELLINGS - Wentworth - Street - Whitechapel - E.
Mr. E. Hoole, F.R.I.B.A., ARCHT.
Wyman & Sons Photo Lith.
© Queen St London WC



MONT ST MICHEL. PRESENT STATE.

system; the work has been carried out by Messrs. Benham & Sons, of Wigmore-street, London.

The whole of the builder's work has been carried out by Mr. James Peerless, contractor, of Eastbourne, Mr. W. T. Vale, of London, being the clerk of works.

The cost, exclusive of the site and furniture, will be upwards of 33,000*l*. The architect is Mr. W. Tadmor Foulkes, of Birmingham, whose original plans were selected for the first premium in a competition as far back as April, 1880.

The whole of the lighting arrangements are electric, gas being employed as supplementary. The Eastbourne Electric Light Company have laid in the mains and apparatus, and the electroliers and brackets, which are of wrought-iron, hand-made, have been supplied by Messrs. Winfield & Co., of Birmingham. The furniture and fittings, which are chiefly made from the designs of the architect, have been executed by local firms.

PROPOSED NEW PREMISES, CORPORATION-STREET, BIRMINGHAM.

THESE premises are to be erected on a plot of land at the corner of Corporation-street and Little Cannon-street, if terms can be arranged with the Corporation of Birmingham, to whom the land belongs.

The ground-floor will be used for retail shops (as required by the Corporation), with spacious well-lighted basements, and with goods entrance to each at the back.

The first-floor will be devoted to first-class offices handsomely finished.

The second and third floors are intended to be used as residential chambers, with entrance from Little Cannon-street. For the convenience of the residents a passenger-lift is provided from the ground-floor upwards.

The fourth floor will be utilised as caretaker's room and store-rooms.

The two street elevations will be built with red and buff terra-cotta, and the walls of the areas throughout will be faced with white glazed bricks. The front roofs will be covered with tiles.

The estimated cost is 13,500*l*., and if fire-proof throughout 15,000*l*.

The architect is Mr. William Read, of West Kensington and Birmingham.

DESIGNS FOR A VILLAGE CHURCH.

THE two designs which we publish this week were submitted in competition for the Architectural Association Medal this year; subject, "Design for a Village Church." That by Mr. Arthur Webb was the successful one. The designer seems to have sought to emphasise the "village church" character by low proportions and square-headed windows, avoiding the aspiring effect of the more lofty pointed window; and this is no doubt one way of doing it, though it would be impossible to give any kind of special receipt for the character of a village church. Not infrequently the village church of Medieval times was marked by low walls, but a comparatively very lofty roof; in other words, it is more timber than stone; and there are many buildings of this type the rustic effect of which is unmistakable; they would seem quite out of place in a town. Mr. Webb's design might do well enough in a town, but it is sufficiently simple in expression to be quite suitable, perhaps more suitable, in a village. The alternation of two-light and three-light windows in the aisles is a pretty incident; so is the band of quatrefoiled panels over the porch door; the clearstory windows repeat rather unnecessarily the square forms of the ground story, and look a little too much like house windows externally. In the main, however, the design conveys the expression aimed at.

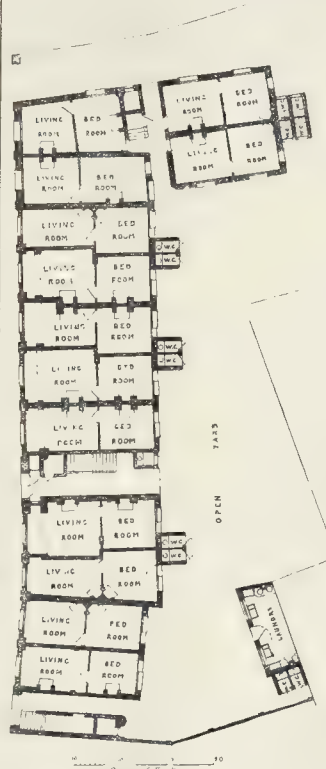
The second design, by Mr. Hargreaves Raffles, received honourable mention in the same competition, but was considered, we understand, to go a little beyond the architectural scope of a "village church": a judgment in which we concur. The author says:—

"The design of the church is kept rigidly simple, as being more suitable for a country church. Accommodation is provided for 350 persons, exclusive of the chancel. The clergy vestry is placed on the ground-floor, and a choir vestry and small muniment-room are provided

immediately over the clergy vestry. The church is designed to be in stone, both externally and internally. Tiles would be used for the roofs."

INDUSTRIAL DWELLINGS, WENTWORTH STREET, WHITECHAPEL, E.

THESE dwellings, now in course of erection from designs by Mr. E. Hoole, form parts of the Goulston-street and Flower and Dean street scheme of the Metropolitan Board of Works. Wentworth-street has been widened, and the dwellings replace the old common lodging-houses which formerly stood on the site. One hundred and thirty rooms are provided in tenements of three, two, and one rooms, and are approached by stone staircases, which also lead to the flat roofs, and communicate on each floor with the offices. Laundries are constructed on the flat roofs, which serve as drying-grounds.



Industrial Dwellings, Wentworth-street,
Whitechapel.—Plan.

Each living-room is fitted up with sideboard, coal-locker, and cooking-range, and has at hand a dust-shoot and pail service. An attempt has been made to avoid the barrack-like appearance too often characteristic of this class of dwelling, as it is found that the rooms let more readily when a more cheerful appearance is given to the exteriors. Red bricks have been used for facing, and Lascelles's slabs for the balustrades to balconies; the roofs, where not flat, being covered with red tiles. The works are being executed by Messrs. Williams & Son, builders, of Thornhill-square, Islington, N.

General Steam Supply in Berlin.—A scheme is on foot in Berlin for supplying factories and dwellings with steam just as gas and water are now furnished. It is proposed to erect a building of five stories, containing 100 boilers, whence steam will be distributed throughout the town. It is believed that such an arrangement would result in a cheaper supply of steam than at present, but it may be doubted whether the inevitable condensation of steam would not offer too great obstacles to the carrying out of the plan.

THE SURVEYORS' INSTITUTION:

PRESIDENT'S ADDRESS.

At the opening meeting of this Institution for the present session, held on Monday evening last, a crowded audience of members assembled to hear the opening address by the President, Mr. W. J. Beadel, M.P. We quote some passages of it:—

For our Institution it may fairly be urged that if it has one distinguishing characteristic it is that its aims are rigidly practical, and it is for this reason, in all probability, that its success has been so rapid and assured: its "Transactions" are a storehouse of valuable information, which we seniors should have been glad of in our younger days. Owing, however, to the form of the "Transactions," and to the necessary conditions of contribution, they have the defect, common to all publications of the kind, of failing to elicit the opinions of those members who are prevented, either by distance from London or by the pressure of their engagements, from attending the evening meetings. It is to remedy this defect that the Council have introduced the new publication entitled "Professional Notes," to which I earnestly invite the attention of members. The lines of the "Notes" being so varied, no member can complain that he is without an opportunity of contributing to the common stock of knowledge, and if adequately supported they will become of the utmost value for purposes of reference upon almost every subject in which surveyors are interested. I, therefore, urge members to do their utmost to make this new departure a success by contributing short papers and paragraphs, comments upon subjects dealt with at the ordinary general meetings, abstract reports of cases under the Agricultural Holdings Act, requests for information upon points of practice, or matters difficult of inter-retation.

There can be no doubt that the Institution now includes among its members the great majority of the leading land agents and surveyors in England and Wales. The actual membership at the present time (including all classes) is, I understand, over 1,200. But it is also the case that there are some whom we should be glad to welcome among us, and who have not associated themselves with the Institution. The time is rapidly approaching when, under the provisions of the Charter, the passing of the Examinations will become the only means of admission, and I venture to express a hope that, in the interval, all the practising surveyors who have not yet joined us may see their way to do so.

In reviewing the past year, what must be first and foremost in our minds is that, instead of a revival of confidence in land as an investment, there is still a very widespread indisposition, notwithstanding the great accumulations of wealth which are known to exist, to purchase it, the old charm connected with its possession having, for a time at least, been dissipated. How soon, or in what way, things will be altered for the better it is impossible to say; that they must alter for the better I not only hope but believe. The land of this country is restricted in area. Its user for residential purposes is limited, while the population is yearly increasing. From the earth proceed all riches, and, sooner or later, a revival must come. As an eloquent writer puts it, though with objects far different from mine, "Land is the habitation of man, the storehouse upon which he must draw for all his needs, the material to which his labours must be applied for the supply of all his desires; for even the products of the sea cannot be taken, the light of the sun enjoyed, or any of the forces of nature utilised, without the use of land or its products. On the land we are born, from it we live, to it we return again,—children of the soil as truly as the blade of grass or the flower of the field. Take away from man all that belongs to land, and he is but a disembodied spirit. Material progress cannot rid us of our dependence upon land. It can but add to the power of producing wealth from land."

This being so (and who can deny it?) I presume there is no one so unwise as to seek to minimise its importance or pretend to regard the interests of land as subservient to any other. In its essential relations to human progress, and indeed to human existence, its place must be ever paramount. To put it in a way that must command assent, one of the densest populations on the globe will not dwell for any length

of time in the midst of a wilderness. Meanwhile, we are under the cloud, how dark and unpropitious cannot be better illustrated than by actual statistics.

The records of the Estate Exchange, an organisation now of some years' standing, throw such a light upon the altered state of things as I should scarcely have expected to find, and it has occurred to me that some figures as to the dealings in country estates and agricultural land may be interesting, comparing the year 1875 with the year 1885. It appears that in 1875, 95,891 acres were disposed of, the purchase-money being 4,969,783*l.* (say 5,000,000*l.*), or at the rate of 52*l.* per acre, while in 1885, 31,070 acres only were disposed of for 986,253*l.*, or an average of 32*l.* per acre,—in round figures less than one-third of the quantity, one-fifth of the total amount in money, and a reduction in the acreage price of 40 per cent.

For the purpose of making this information more reliable as a test, all properties in London and within fifteen miles, market and fruit gardens, and residential estates under 100 acres, or where the value of the house preponderated, are excluded.

So far as this year has gone, the record to the present time is as follows:—Land sold, 13,496 acres; purchase-money, 356,427*l.*; average price per acre, 26*l.*. The lowest price which has come under my observation was the sale by auction of a farm in Essex, containing 132 acres (30 acres grass), with dwelling-house, farm-buildings, and three cottages. With the exception of 21 acres cophold, the property is freehold, with a new railway passing through, and a station projected upon it. The price realised was 850*l.*, not representing anything like the cost of the building and fencing, leaving out of consideration altogether the land itself. This, no doubt, is an exceptional case, but tends to illustrate the severity of the crisis.

In City properties values (warehouses, somewhat over-built, excluded) have been fairly maintained. In the suburbs, houses and land (except in specially-favoured districts) have been depreciated partly by over-building and partly by reduced spending power. This former should very speedily cure itself with our rapidly-increasing population; and the improvement in trade, which would appear to have already begun, should remedy the latter.

With the increased rail and tramway facilities for reaching suburban districts, new estates will be opened up, and it is important that in their development regard should be had to considerations of health, by allowing a more liberal extent of garden ground than has been in many cases heretofore the practice.

The quinquennial valuation of the metropolis under the Act of 1869 having been completed, the result is a rateable value of about 80½ millions, showing an increase of about 1½ million during the last, as against an increase of nearly 3 millions in the previous five years, while the present smaller increase appears to have been chiefly made up by an extra charge upon railways and other public undertakings.

A new feature arose under the Act in the case of "The Parish of Fulham v. The Assessment Committee of St. Mary Abbots, Kensington," in which the outlying parish appealed against the assessment of the railways, public works, and other large buildings in the parish of Kensington, on the ground that they were inadequately charged, the parish thereby evading part of its fair contribution to the general rate. The result was that a compromise was effected; but, it being too late to increase the individual cases of assessment, the whole of the additional rate will have to be levied upon the ratepayers of the parish generally, those fully assessed having to contribute to make up the deficiency of the others until the next valuation takes place. This will necessitate in the future more care on the part of assessment committees, who will be well advised by calling in professional assistance.

The value of property in Liverpool, Manchester, and other provincial cities has also been affected to a greater or less degree by the depression which has been felt in commercial and trading circles.

The circumstances to which I have referred, combined with the absence of applications to Parliament in connexion with schemes for public undertakings, and a reluctance on the part of the public to subscribe towards carrying out those already sanctioned (notwithstanding payment of interest out of capital has been authorised), have rendered the past year specially

unsatisfactory, not only to our own profession, but also to that of our Associates learned in the law, who are equally interested in anything affecting the welfare of the surveyor.

In the interest of all classes, most of all in that of the unemployed poor, it is desirable that the carrying out of public works should be facilitated by the removal of every unnecessary obstacle. Among these obstacles may be included the present arrangement, whereby promoters are compelled to undertake expensive inquiries before Committees both of the Lords and Commons. Some modifications are needed in this direction, possibly by substituting a single hearing before a joint Committee of both Houses for the present double inquiry, and by some inexpensive method of preventing purely factions opposition.

In Parliament matters relating to land have lately occupied and are destined apparently more than ever to hold a prominent position, although recent events have somewhat checked the more revolutionary proposals which had been suggested, and which need only be ventilated to be condemned. It is the duty of members of this Institution to watch the course of legislation, and use all means at their command to prevent the passing of impracticable and mischievous enactments.

On the motion of Mr. Thomas Huskinson, seconded by Mr. J. Shivers Will, Q.C., M.P. (Associate), a vote of thanks was given to Mr. Beadel for his address.

BUILDERS' BENEVOLENT INSTITUTION. ANNUAL DINNER.

THE thirty-ninth anniversary dinner in aid of the funds of this Institution was held (as briefly announced in our last, p. 684) on the 4th inst. at Carpenters' Hall, London Wall. Mr. Basil E. Peto, the President, occupied the chair, and was supported by Mr. E. L'Anson (President of the Royal Institute of British Architects), Mr. Kennard (Master of the Carpenters' Company), Sir Morton Peto, Bart., Alderman W. Lawrence, Mr. H. Colls, Mr. F. J. Dove, Mr. T. F. Rider, Mr. George Plucknett, J.P., Mr. Banister Fletcher, F.R.I.B.A., and other friends of the Institution.

The usual loyal and patriotic toasts were given by the chairman, Major Button replying for the "Army and Navy," and Major J. T. Bolding for the "Reserve Forces."

The Chairman, in proposing the toast of the evening, "Success to the Builders' Benevolent Institution," commended the charity to the hearty support of the trade. None of his hearers could have failed to have been struck, from time to time, by the fact that the ever-increasing keenness of competition, besides all its other evils, had unfortunately undermined the good fellowship which used to exist in trade by isolating them one from another. The old fellowship was shown in a hundred ways by the numerous trade societies which had their existence in the past, while nowadays there was seldom an opportunity afforded of uniting together for the good of even any portion of the trade. Such an opportunity as the present was, therefore, to be hailed with satisfaction. He supposed that, at the end of all, the business of most of them would seem but an unsatisfactory, unsocial, and even selfish affair, and were it not for such opportunities as the present perhaps some of their greatest successes might turn out to be but Pyrrhic victories after all. It should, therefore, be a matter of congratulation that they were enabled to make a united endeavour to do something for their less fortunate brethren.

Men who had set out at the beginning of life with no greater ambition than honestly to support themselves, their wives, and families, were, as a rule, those whom the Institution helped, and who, when old age approached, in many cases found their trade and business gradually slipping away and going to their more successful competitors. It was in this spirit that the Institution was able to help such persons, and even to do something more, by showing that they were not forgotten and lost in the world, but still had the sympathy and kindly interest of those connected with their trade. The Institution during the year had lost a magnificent supporter by the death of Lord Penrhyn, whilst, he regretted to say, there had been several defections of old subscribers to the charity. The interests of the Institution and its powers of usefulness depended entirely on the annual

income being regularly maintained. From his point of view, indeed, donations were all very well; but if the regular income was not kept up the management did not know what to depend upon. He felt, therefore, he should not appeal to them in vain to fill up the gap that had been made in the annual subscriptions, and he would ask them to join him in drinking success to an Institution whose interests they all had so much at heart.

The Chairman also gave "The Health of the Carpenters' Company," who, besides granting the use of their fine Hall, had, by their munificence, greatly promoted the usefulness of the Institution. He coupled with the toast the name of Mr. Kennard, the Master.

Mr. Kennard, in replying, expressed the pleasure felt by the Carpenters' Company in granting the use of their Hall. When the Company was first formed, the carpenters were really the builders of London, inasmuch as the houses were then constructed of wood, but "the old order chaugeth," and bricks and mortar had taken its place. The great thing that brought about the change was probably the Fire of London, as from that time the Carpenters' Company ceased to exercise control over the London builders. The old rivalry between the builders and carpenters had happily, long ceased to exist; and he hoped they would for many years continue to be the guests of the Carpenters' Company on these festive and charitable occasions.

Mr. Kennard next proposed "The Chairman and President." It must be a great satisfaction, he believed, to Sir Morton Peto, to have a son capable of presiding so ably at a gathering of this description.

The Chairman, in responding, expressed his pleasure at being able to do something for the Institution.

Mr. Banister Fletcher gave "The Vice-Presidents and Trustees," coupling the toast with the name of Sir Morton Peto, Bart., who thirty-three years since occupied the chair so well filled by his son that evening.

Sir Morton Peto, in replying, dwelt upon the great changes that had come to pass in the building trade. In the struggle for "the survival of the fittest" that Institution commended itself specially to their liberality. They used to imagine things were difficult in his day, when only five or six firms were invited to compete for a large work, but nowadays it must be a harder struggle still. Inasmuch as there were many of their brethren who had not marched with the times, who had not recognised the new order of things, and who had, therefore, fallen by the way-side, their business that evening should be to give succour to such as had been unfortunate in the battle of life.

Alderman William Lawrence proposed "The Treasurer" (Mr. George Plucknett, J.P.). It seemed like old times to see Mr. Plucknett at these dinners, reminding him of the days when the Pipers, the Lucases, the Cubitts, and the Petos used to meet, and even then complain of the severeness of the struggle.

Mr. Plucknett replied, and referred to the fact that the Institution had now been established for about forty years, during which time it had continued to progress satisfactorily. The pensioners had largely increased in number, and their stipends had also been considerably augmented. He had always regretted that many of the new firms established in London did not subscribe to the Institution, and he hoped they would do so in future. He would also like to add that Sir Morton Peto, when President thirty-three years ago, was the largest contributor the Institution had ever had.

Mr. T. F. Rider gave "The Architects and Surveyors." The architectural profession of London, he said, was a body of intelligent and worthy gentlemen, whom it was an honour to meet and a pleasure to be connected with in business. They had with them that evening the President of the Royal Institute of British Architects, whose name was a household word both in the profession and in the trade. The quantity-surveyors, again, were gentlemen who performed a more prosaic work, and who acted as buffers between the architect and the builder. He coupled with the toast the names of Mr. E. L'Anson and Mr. A. J. Hunt.

Mr. L'Anson expressed the deep interest he felt in the welfare of the Institution. It seemed to him that no work required so much organisation, with such mastery of detail and control over financial matters, as that of the builder.

The architect's work was also laborious and anxious, and he believed he might say for the great body of his profession that in all their dealings they endeavoured to do what was just and fair for the builders, as well as right for their clients.

Mr. A. J. Hunt, who also responded, said that the province of the surveyor was somewhere between that of the architect and the builder. In that province he trusted the surveyors would always hold their own, and not be swayed either by any exaggerated claims on the part of the builders or by parsimony on that of the architects or their clients.

Mr. E. Woodthorpe gave the concluding toast "The Committee and Stewards," which was responded to by Messrs. T. G. Smith and J. W. Hobbs.

In the course of the evening subscriptions and donations amounting to 678s. were announced.

ARCHITECTURAL ASSOCIATION.

The second meeting of this Association for the present session was held at 9, Conduit-street, on the 5th inst., Mr. J. A. Gotch (President) in the chair.

The following gentlemen were elected members of the Association, viz.:—Messrs. C. S. Haywood, E. H. Dawson, S. C. Baker, Harry Sanders, R. M. Hammond, Ernest Wyon, John Andrews, A. H. Noble, A. C. Smart, H. St. John Knight, L. J. Kempster, W. J. Martin, J. H. Jacques, H. J. C. Cordeau, W. F. Marshall, Paul Foucart, R. B. Pemberton, A. W. Jarvis, F. L. Scaly, Abraham Mosley, W. Jane, Andrew Ford, Henry Waterson, T. W. Gray, E. A. Nott, W. A. Lewis, E. R. Barrow, H. A. Woodington, G. F. Terry, S. R. Greenslade, James Ellwood, A. H. Pearce, Harry Berry, L. J. Veit, G. F. Collinson, H. V. Fanchester, Richard Hall, V. E. Young, W. C. Howgate, Henry Emerick, Arthur Rollins, J. S. D. Ahmed, H. H. Fox, P. H. Currey, B. S. Wagstaff, H. J. Leaming, J. W. Drewington, C. A. Garrett, T. H. Hall, J. A. S. Jones, F. Batchelor, A. McGarel-Hogg, J. A. Verini, F. A. Coles, R. S. Harrison, F. J. Jones, P. L. Forbes.

It was announced that Mr. J. L. Robinson, of Dublin, had presented several photographs of the last excursion; also three sheets of views, entitled "Three Days in France with a Camera." Mr. William White had also presented a paper on "Church Restoration." Votes of thanks were accorded to the donors.

Mr. John Slater next moved the formal adoption of the annual report, as contained in the "Brown Book."

This was seconded by Mr. S. F. Clarkson and agreed to *nem. con.*

Mr. Aston Webb then read a paper on "Pupilage," which we print on another page.

The Chairman, in opening the discussion, expressed the great interest with which he had listened to the paper, and his admiration of the spirit in which it had been conceived,—a spirit all should endeavour to imitate. They ought to realise distinctly that the way to obtain education in the architectural profession nowadays was by means of pupilage, and to resolve, therefore, to make use of their opportunities to the best of their ability, at the same time endeavouring to introduce improvements in the method of education. The progress made must depend very much upon what sort of office the pupil entered, because in many offices he was merely left to pick up what he could. The master should, however, take a very different view of the relationship which ought to exist between himself and his pupil, and should afford the latter every assistance in the way of advice. On the other hand, there were many careless pupils, and nothing could be more useless than to pour floods of advice into an inattentive ear. The shorter length of term was a distinct advantage, three years being quite sufficient for a pupil to be in one office, and for grounding him in the rudiments of his profession, while nothing could be so beneficial as a change of office and scene, where one could find different work, and that done in a different manner. If the business letters were accessible to the pupil, it would be of great advantage to him; but, on the other hand, he would have to be a person of considerable discretion, as things were sometimes written to an architect that were not pleasant reading. Tracing, if done intelligently, was undoubtedly a most instructive operation, and there was no more ready way of acquiring a practical knowledge of good drawing than by

tracing. The suggestion as to keeping a common-place book was an excellent one. In the present day there was so much to learn, and the work of life was so complex and multifarious, that one man's memory was not enough to carry him through; it was, therefore, important to be able to lay one's hand on every bit of information required. Pupils in London had immense advantages compared with those who were brought up in the country. In a great many provincial towns there were no other members of the profession with whom to exchange confidences, and no work of great interest to be seen; while in London the pupil had everything at his fingers' ends, and ample opportunity for cementing advantageous friendships in the way mentioned by Mr. Webb. Then, again, in the course of the work at the office, difficulties of one kind or another were constantly cropping up, and becoming, as it were, the general property of those engaged there, and the pupil should thoroughly thrash out such subjects on his own account. For instance, if a case of dry-rot occurred, and was brought into the office, it would be well to go thoroughly into the subject of dry-rot for the time, and in this way information would be obtained on such points, which could not fail to prove highly useful in future years. Very few pupils would think of setting up after three years of office work; indeed, it would prove more advantageous to the country if they did so after thirty years' experience. If there should be any country pupils who read this paper, who found themselves in difficulties, and who could not get advice from their masters, they should write to any member of the Association's Committee of Advice, who would be glad to help them, even though they were not members.

Mr. R. Phéné Spiers remarked that his life had been pretty well spent in giving advice, though he had not passed through the pupilage stage on which Mr. Webb had dwelt. His father, acting on the advice of one or two distinguished architects, decided that it would be better to send him to study in the *École des Beaux Arts* at Paris, so that on leaving King's College he went direct there, returning to England as an "improver." In other words, he had passed aside the pupilage stage, and had no cause to regret having done so. Mr. Webb seemed to have preferred to confine himself to the subject as if his hearers had already passed through the period of pupilage, and there was nothing more to be done. At the same time, there were one or two other considerations worth looking at, even if it were now too late for any members of the Association to profit by them. It was impossible to lay too great a stress on the importance of a good previous education, as many pupils were really articulated before being in a position, by their age or knowledge, to understand what was done in the office. In compiling some statistics about twenty years ago, for a committee of the Institute, he found the number of pupils articulated during a certain period averaged from sixty to seventy per cent., at an average age of seventeen, and for the average time of four years. Fourteen was at one time the age for being articulated for seven years, and though at the commencement the pupil's education was somewhat incomplete, yet after being two years in the office, he would be better able to understand the work than if he had left school at sixteen. The speaker then dwelt upon the advantage to the pupil of studying for his profession at King's College preparatory to his being articulated. A sort of Architectural College had been from time to time suggested, but he did not believe there was any more chance of such an institution being started by the Government than there was of their agreeing to the requests of the "Architectural Federation Committee." Mr. Webb had referred to the best way of making use of the means afforded by the Association, and the moment the young man availed himself of its advantages, he began to think for himself. The pupil had a perfect right also to copy anything he could in the office, during the time he was engaged there. There was no copyright there so far as he was concerned, and being a pupil he had a right to copy everything for the purpose of study. With regard to the Royal Academy, he wished to correct a slight error made by the Secretary of the Institute, who, in a letter to the *Times*, had said that some two years ago the Gold Medal of the Academy was given for a drawing of a building, which would

fall to pieces if any one attempted to erect it, adding that it would be advisable for the Academy to have a Class of Construction. It must be remembered that the Academy was a school of design, and good design included construction. With regard to this special drawing it was most extraordinary, if Mr. White's remarks were correct, that its faults should have escaped not only the attention of the visitors and the critics, but of the other students of the Academy. Mr. Spiers concluded by proposing a vote of thanks to Mr. Aston Webb.

Mr. John Slater, B.A., in seconding the vote, said he agreed with the last speaker as to the great desirability of architectural students receiving a better education before entering an office. Until parents were convinced that as good an education was necessary for an architect as for the profession of the law, the status of the former would never be raised. As to an architectural college they did not know what might happen. He was the Secretary of the Committee on Education sitting upstairs, and he hoped before long they would be able to make a report which might do some good. They might also look to the City Guilds' Institute at Kensington, where there were good opportunities for teaching the constructional part of architecture. He agreed with Mr. Webb that pupils should not only be allowed to have the run of the office letters, but should also be taught to answer them. When dwelling upon the common-place book Mr. Webb had not mentioned the great desirability of cultivating a habit of accurate observation and of putting down things at the time. As a general rule, a young man should not be discouraged from following his penchant for any particular phase of work. Some men had skill in designing, others in sketching, and others again in the constructional parts of architecture; and though it was important to get a thorough knowledge of the profession and be able to do all its parts with more or less skill, yet a man would soon discover in what particular direction his own bent lay, which should be more especially cultivated. This was an age of specialists, and though much was to be said against them, yet the man who could do one part of his work extremely well was more likely to get on than the man who could do many parts of it, but only in a mediocre way. He could not too strongly insist upon the desirability of getting a knowledge of books, and the list given by the Institute was an extremely good one to select from, though no one who came for examination would be expected to get up the whole list.

Mr. Lawrence Harvey said he had been through two of the Continental schools, though not through a term of pupilage. He was of opinion that the system in London was not in any way inferior to the system adopted abroad, and he believed that with the slight improvements which were taking place it would be much superior to the Continental plan. The improvements must necessarily supplement what could be learned in the office, and the Association had done a great deal towards this end; so that probably in a year or two the pupils would be able in the evening to get that knowledge which was given in the foreign schools. He did not see why the work done in the Paris ateliers could not to some extent be done in English offices, and it would encourage masters to help their pupils were their names mentioned in connection with those of their pupils who were successful in any of the Association's or Institute's competitions. In regard to sketching from memory, some people seemed to think it was a hard thing to do, but he had acquired the habit abroad without much difficulty. A great many people, again, read without deriving any benefit from their reading; he would therefore advise such persons when they had finished a chapter to write out from memory an account of what they had read. Referring to the Class of Masonry initiated by the Association, he intimated that the first class would commence on the Tuesday following, and the subsidiary class on the 14th of December. Those who wished to join the latter should give their names in the course of the week, as the necessary tools had to be ordered.

Mr. Sydney Vacher said he believed that Mr. Webb had given valuable advice to those who, having passed through the pupilage stage, might have occasion to take pupils themselves. The young man on his becoming a pupil should at

once join the Elementary Class of Design, and it would also be advisable to enter the Royal Academy at a later age than was generally the custom.

Mr. Arthur Baker recommended all pupils, after serving their articles, to go as assistant clerks of works, for there could be no better eye-opener to the young architect. It would also aid the pupil if, on getting hold of bills of quantities, he examined them carefully and kept a common-place book of prices. For himself, he had always entered the quantities in his own price-book, which he depended upon more than upon Laxton. Mr. Slater appeared to be in favour of specialists, but he (Mr. Vacher) considered that a one-sided man ought to be prepared to share his profits with somebody else who could make up for his own deficiencies.

Mr. H. O. Cresswell said he thought pupils could not start working for a Studentship too soon, and if a man were lucky enough to get the Association Studentship, he would probably follow by securing two or three others. Tracing appeared to be the chief bugar of all the young men, but there was a great deal to be learned from it. There were two ways of tracing,—with the head and with the pen,—and if the pupil was merely doing the latter he would learn little or nothing. He agreed with Mr. Webb that a man should not worry himself about the Examination in Architecture for the first two or three years. It was far better to confine one's attention to one's own bent, and when the Examination came it would not be found so dreadful as its anticipation. Indeed, he hoped their experience in that respect would be as pleasant as his own; while, as to the number of books recommended in the Institute list, he could only say that he had not read them.

Mr. C. H. Brodie said that Mr. Webb's remarks were so good and just, both to the masters and pupils, that if they would only accept the advice that had been given, any acrimony or discussion would be out of the question. The pupil should certainly be afforded every opportunity of obtaining experience out of the office, and in some articles it was set forth that the young man should have a half-day weekly to visit buildings, or to do as he liked. Another good plan was that each pupil in an office should, more or less, have charge of one building, and learn everything connected with it, all communications referring to it passing through his hands. He agreed also that there was a great deal to be learned from tracing, and believed that Rivington's three volumes on Building Construction would be found even more useful than Gwilt's Encyclopedia.

Mr. Leonard Stokes said he considered that whether the pupil was engaged in a large or small office he could, if he liked, pick up knowledge every minute of the day.

Mr. F. T. W. Miller said that three persons were concerned in the matter of pupilage,—the parent, the architect, and the pupil himself,—though about the parent very little had been said. He did not know whether Mr. Webb's paper was likely to get into the hands of parents, but if so, it would have been well to have said something about the advisability of parents exercising more discretion as to the kind of architects with whom they put their sons. They were all familiar with the old advertisement of "a pupil wanted; premium expected," which might in many cases be taken to read,—“Premium wanted; pupil expected,” for the pupil was often the secondary consideration. Mr. Webb had suggested that the pupil should be allowed to look at the letters, and generally to see the way in which his master carried on his business. He believed, however, that the pupil would often like to know something else, viz., how the master got his business.

Mr. Herbert Baker said he thought it was of the utmost importance that the young man should go as a clerk of works, thereby learning how details were actually carried out, and at the same time seeing what the workmen were like.

Mr. M. Clarke said he had observed that the Institute gave tickets to its members to inspect the various buildings abroad. Was it possible that the members of the Association could be supplied with similar tickets, enabling them to inspect buildings in course of erection?

Mr. H. D. Appleton (Hon. Sec.) replied that the "Brown Book" gave all particulars as to the arrangements made with the architects of buildings in progress, but unfortunately at present there were no buildings they could

visit. In fact, architects were rather shy of granting the permission, and he was afraid they would not recognise anything like a general order from the Association.

Mr. W. R. Mallett said he believed that a little well-directed encouragement on the part of the master would go a long way to help the pupil.

The vote of thanks to Mr. Webb was then put, and carried by acclamation.

Mr. Aston Webb, in replying, said he had not dwelt upon the matter of general education because it was a little hard upon a man, after he had done a thing, to say that he ought to have done something different before he came into the profession. No doubt for those who could manage to have a University education first it would be an immense advantage before entering the office. The master should allow the pupil to attend a course of day lectures, but it must be so regulated that the pupil should get into business habits. As to the office letters, of course all architects received unpleasant communications occasionally, but it was an error to suppose that the pupils did not know their masters' little mistakes. The suggestion that the pupil should be trained to write letters was an admirable one. Mr. Harvey's suggestion that the master's name should be published with that of his successful pupil would lead to a man doing a great deal more than was possible in these days. The master who wished to do his duty would do it without this incentive. He agreed with Mr. Miller that the parents were sometimes extremely unfortunate in their choice of the masters with whom they placed their sons, but he did not see how this was to be remedied.

THE TYLERS' AND BRICKLAYERS' COMPANY.

By invitation of the Master and Wardens of this Company, a large number of the leading members of the building trade in and around the metropolis dined together at the Albion, Aldersgate-street, on Wednesday evening last. The Master for the present year is Mr. R. L. Curtis, principal of the firm of R. L. Curtis & Sons, quantity surveyors. (Mr. Curtis has, by the way, just been elected an Alderman of the newly-constituted Borough of West Ham.) The Upper Warden is Mr. Richard Moreland, jun., the Renter Warden is Mr. Harry Mansfield, and the Clerk is Mr. Arthur Bird. The invitation of the Master and Wardens to Wednesday's banquet was accepted by about 110 gentlemen, including Mr. Richard Moreland, sen. (the Father of the Company), Col. Hughes, M.P., Mr. Deputy Brass, Mr. George Burt, J.P. (Mowlem & Co.), Mr. H. H. Statham (Editor of the Builder), Mr. Herbert Bartlett (Perry & Co.), Mr. J. T. Chappell, Mr. George Dean (Smeed, Dean, & Co.), Mr. B. E. Nightingale, Mr. James Smith (T. Wontner Smith & Sons), Mr. Charles Bird, Mr. Samuel Bird, Mr. Walter Bird, Mr. W. S. Horner (Ashby & Horner), Mr. Thos. F. Rider, Mr. J. Howard Colls, Mr. Stanley George Bird, Mr. Douglas Foundriner, Mr. Mark Manley, Mr. James Greenwood (J. & J. Greenwood & Son), Mr. Joseph Randall (Kirk & Randall), Mr. J. B. Moreland, Mr. Thomas Patrick, Mr. Frank Morter, Mr. E. Lucas, Mr. W. Grollier, Mr. Charles Mansfield, Mr. Robert Downs, Mr. John Marsland, Mr. John Dudley (Sutton & Dudley), Mr. J. Atherton Latta (Atherton & Latta), Mr. Alfred Stoner, Mr. Thomas Stirling, Mr. H. F. Dickens, Mr. James Brown (Brown, Son, & Blomfield), Mr. Joseph Hill (Higgs & Hill), Mr. George Williams, Mr. William Shepherd, Mr. G. S. Pritchard, Mr. G. H. Trollope (Trollope & Sons), Mr. A. Kinnimont, Mr. J. A. Bartram, Mr. Josiah Jackson (J. Jackson & Co.), Mr. W. Scrivenor, Mr. J. Parker (Patman & Fotheringham), and others. The usual loyal and patriotic toasts having been disposed of.

The Master proposed "The Building Trade and the Visitors," expressing his satisfaction at seeing so many representative men present. He said that perhaps the Tylers' and Bricklayers' Company was more closely identified with the building trade than any of the other City guilds, and would always be glad to be of service to the trade in any way. He also spoke of the onerous conditions under which the trade was carried on. Mr. Ex-sheriff Burt responded.

The other toasts included "The Worshipful Company of Tylers and Bricklayers, and the Master of the Company," proposed by Mr.

Deputy Brass; "The Wardens and Auditors, and the Clerk of the Company," proposed by Mr. H. H. Statham, and replied to by Mr. Richard Moreland, junior, the Upper Warden; and "The Treasurer of the Almshouses" (Mr. Stanley G. Bird), proposed by Mr. H. F. Dickens, who mentioned that Mr. Bird was about to start on a visit to India, and in the name of the visitors wished him *bon voyage*. Mr. Bird, in replying, said that more than half of the limited income of the Tylers' and Bricklayers' Company was spent on the almshouses and their inmates. He defended the City guilds against the accusations made against them by Mr. Firth and others.

THE ASSOCIATION OF PUBLIC SANITARY INSPECTORS.

On Saturday last the fourth annual session of this Association was held at Adam-street, Adelphi, the President of the Council, Mr. Geo. B. Jerram, A.M. Inst. C.E., delivering the inaugural address to a large audience of members. In reviewing the work of the Association, the President admitted feeling disappointed at the little fruit which had so far attended their efforts to secure for "sanitation" an adequate share of the attention of the nation and its legislators. They had discussed much, and had brought forward many valuable practical proposals. At the close of the Health Exhibition many sound recommendations had been made, and great things had been promised. Something had been done, certainly. Two sanitary Acts had been passed, though they had unfortunately not been subsequently put into force by the Local Sanitary Authorities. They had still at their head their respected President, Mr. Chadwick, and they would, with him, still keep on working and hoping, without permitting themselves to be discouraged. Inspectors in increasing numbers were joining their ranks, and attending their meetings; the statesmen in office promised early attention to amendments in Local Government measures, and the head of the Government, who introduced one of the Acts recently passed, took great interest in the important subject of public health, as he had shown by his presence on the late Royal Commission on the Housing of the Poor. They were encouraged by such signs to feel that perhaps the time was not so very far off when their hopes and aspirations would be realised. With respect to one of the most important of the practical matters still demanding their attention, the question of examinations and certificates, the Chairman expressed an opinion that it was impossible that any man destitute of previous practical training could, by simply reading up, properly qualify himself to undertake a public office of the importance of the sanitary inspector's. An experiment of the kind which had been tried and failed had led to the establishment of the Government College at Cooper's Hill for the Indian Civil Service, and without desiring to make of the Association a trade union, they wanted to promote measures tending to the adoption of a system of training for sanitary inspectors, such as was always now exacted in the case of civil engineers, architects, and lawyers. Mr. Jerram then proceeded to deal in a practical way with the question of sanitary pipes, the methods and materials of their manufacture, and the modes of laying them in connexion with house-drainage. After a retrospective glance at the history of the earthenware drain-pipe, from the first patent taken out by William Edwards in 1725 to those for socketed pipes by Samuel Hill (1810) and Ch. Jacobs (1849), reference was made to a correspondence which had taken place in the Builder in 1885, and by which the question, long in dispute, as to when the first salt-glazed stoneware pipes were used, was finally settled. It was clear from that correspondence that, at the suggestion of Mr. Edwin Chadwick, who was, in 1813, engaged under a Royal Commission in taking evidence on the sanitary condition of the people, Mr. John Roe, of Newwood, gave the first order for glazed sanitary pipes to be made. Messrs. Doulton, Messrs. Stiff, Messrs. Cliff & Co., with Messrs. Wragg and the Boulton Pipe Company, had produced, during the interval, many models of pipes made from Dorsetshire, Devonshire, Staffordshire, Yorkshire, and Leicestershire clays, specimens of which were on the table, together with models of pipes made at East Greenwich by the Imperial Stone Company, which gave promise in the

future of a very perfect conduit. Mr. Jerram recommended that the weight of pipes should be specified, as well as the other particulars, and that the thickness should not be less than one-tenth or one-twelfth of the diameter. They should be as highly glazed as possible, but care should be taken that the glaze should be proof against the acids and other chemical elements found in sewage. The common methods of jointing pipes were condemned. The joints must be made gas-tight. Stanford's water-tight joint, introduced in 1873, and the ground joint and "telescopic joint" successively introduced by Messrs. Doulton, were greatly in advance of the older joints. In concluding his paper, Mr. Jerram referred to and described the following as being among the most improved forms of joints:—Doulton's composite joint, self-adjusting joint, Pritchard's spigot joint, the Donaldson, the Jackson, and the Hassall joints, and one which had recently received great commendation, invented by Mr. Mawbey, Engineer to the Corporation of King's Lynn.

A vote of thanks was accorded to Mr. Jerram, on the motion of Mr. Hearne (Paddington Vestry) and supported by Messrs. Adams (Frome), Clarke (Barnet), Alexander (Shoreditch), Rains (St. George's-in-the-East), Middleweek (Kensington), Mr. Drake, Engineer of the Foundling Hospital; and Mr. Chamberlen (Hammersmith). The necessity for the closest supervision of the jointing and laying of pipes, the absence of legal means for compelling proper workmanship, and the desirability of giving to the metropolitan sanitary authorities the power of making by-laws which is possessed by provincial Local Boards, were among the principal points touched upon in the discussion.

ARCHITECTURAL SOCIETIES.

Northern Architectural Association.—The first meeting of this Association for the present session was held on Monday evening at the Old Castle, Newcastle, when the President, Mr. G. G. Hoskins, F.R.I.B.A., delivered an address. On the subject of architectural federation he said:—"Although a member of the Architectural Federation Committee, of which Mr. Edgar Farman is honorary secretary, I have refused to sign the form of declaration which proposes to admit into our ranks as architects local board surveyors and land surveyors. The framers of this document might have gone a little further, and included inspectors of nuisances. Unfortunately, our profession is at present one in which any man, no matter how ignorant or how unqualified,—can enter, his diploma consisting simply of his door-plate, and his qualification the impudence with which he dubs himself 'architect'; and I for one will therefore welcome most cordially any scheme of federation which is likely to bring about a better state of things, and I believe that the true and proper solution of the difficulty,—a solution in which the interests of the profession and the status of its members will be best taken care of,—will result from the labours of the R.I.B.A. Federation Committee, upon which I have the honour of representing you."

Oxford Architectural and Historical Society.—The members of this Society recently paid a visit to the ruins of the Nunnery at Godstow, and Wolvercote Church. Mr. James Parker acted as *cicerone*, and illustrated his description of the Nunnery with a series of drawings. Allusion was made to the fact that in 1718 the Earl of Abingdon obtained Godstow from the Duke of Marlborough, and used some of the materials for Wytham Church. At Wolvercote the vicar gave an account of the principal objects of interest in the church, and he also referred to Toll Bridge.

THE BLOCK SYSTEM FOR WORKHOUSES.

MR.—Mr. Snell's courteous letter in your last issue [p. 682] is perfectly satisfactory to me, except that he is in error in stating that the corridors at the Wandsworth and Clapham New Workhouse are closed. They are open corridors, and, so far as those leading from the "Aged" departments are concerned, it is found, in practice, that it will be necessary to close them in, otherwise one-half of the old folks will soon be in the Infirmary. The new Workhouse at Mitcham being for the Able-Bodied Poor only, this difficulty will not arise.

THOS. W. ALDWICKLE.

AREA OF A SAXON CATHEDRAL.

SIR,—I noticed in your interesting article of last week ["Building Records of the Domesday Book," p. 653, ante], on the subject of Anglo-Saxon churches, a statement that there is no evidence of any church of large dimensions of that date, instancing the church at Bradford-on-Avon and the chapel at Deerhurst as examples of the usual small area covered by the builders of those days.

But at St. Aldhelm's Cathedral at Sherborne we have proof that churches of a much larger scale were sometimes erected.

At Sherborne, the Saxon western doorway of the north aisle exists entire as regards its jambs and imposts, and part of the arch, with the projecting moulding so frequently found all round arches or doorways of this date. On the south side there also exists the southern jamb of the Saxon arch or doorway, with a simpler projecting moulding (the northern jamb was removed by the Normans under Bishop Roger, who made use of the southern jamb for their wider archway).

In the centre of the nave was a great porch of the same date, of which the moulded plinths remain on the south side.

These details show that the width of the Cathedral was between 55 ft. and 60 ft.

There must have been arches or openings of some sort, forming nave and aisles. And as to the length,—the bones of the brothers of King Alfred were found in the eastern ambulatory, where history says they were buried. This gives us nearly 200 ft. for the Anglo-Saxon Cathedral in length, exclusive of the western porch, by nearly 60 ft. wide.

The west wall, in which these archways are, is only 2 ft. 6 in. thick, of rough rubble masonry.

R. HERBERT CARPENTER.

THE "ECCLESIOIA" IN DOMESDAY.

SIR,—Your query, "Of what dimensions could these little churches have been?" leads me to refer to a view I entertain that many so-called early Norman churches are enlargements of some pre-existing Saxon buildings. In some cases the respective outlines are clearly traceable,—for instance, Walmer, near Deal; but in most cases the earlier work is called Norman, because we have no standard by which to fix Saxon work.

In some cases I should call the primitive structure a mere shrine or oratory, where the existing parish church has absorbed and concealed or distorted the original plan.

Such, I think, is the case at Patricabourne, near Canterbury, where the nucleus is most diminutive.

Some such idea may, I think, be formed of Barfreston, in the same locality, and also of St. Margaret's at Cliffe.

A. H.

The Student's Column.

STONE QUARRIES.—XX.

LIMESTONES (continued).

DOLTING QUARRIES.—The quarries in the Doulting freestone are geologically on the same level as those of Bath, viz., the Great Oolite, being situated near Shepton Mallet, in Somersetshire. There can be no doubt that it is one of the best limestones for building purposes, whilst the fact that tramways have been laid down to connect the different workings with a siding recently constructed by the Great Western Railway Company to communicate with their line at Crummore Station, causes the carriage of the stone to be effected with economy.

The quarries are worked with an open face of about 25 ft., and there are two different kinds of stone, one being much finer in the grain than the other. The finer variety appears to be uniform in texture, and of a light yellow colour, and is known in some quarries in the district as the *Brambleditch* stone. The coarser kind has a rather high specific gravity, is tolerably crystalline in texture, and is of a very light brown colour. It averages from 3 ft. 6 in. to 4 ft. 6 in. in thickness.

Both are shelly oolites. Blocks are occasionally obtained from 20 ft. to 30 ft. in length, and we are informed that 23 tons have been raised in a single block. It must be remembered, however, that this size is abnormal. The published chemical analysis is derived from an average of two different samples, the two

results having been almost identical. It is as follows:—

Carbonate of lime.....	95.89
Carbonate of magnesia ...	0.11
Alumina.....	0.79
Sesquioxide of iron	0.85
Silica	2.04
Water.....	0.32

100.00

A glance at this analysis shows that the characteristic feature in the stone is the comparatively high percentage of silica, and the student is aware, by this time, of the value of this remark. The specific gravity ranges from 2.4 to 2.5, being the result of numerous observations. Its average power of absorption of water is stated to be 0.164 part of its bulk.

We are pleased to be able to give the results of the experiments as to its resistance to a gradually increased thrusting stress, both on and against the natural bed of the stone.* They were made by Mr. Kinkaid, on eight different specimens, each being bedded against pieces of pine a quarter of an inch in thickness:—

Tested AGAINST the bed.

1.—6'04 × 6'05 = 36.54 super, height 6 in.	
Cracked slightly.....	75,240 lb., or 2,067 lb. per sq. in.
Crushed	89,189 lb., or 2,441 lb. per sq. in.
2.—6'04 × 6'02 = 36.36 super, height 12 in.	
Crushed	75,829 lb., or 2,189 lb. per sq. in.
3.—6'73 × 6'02 = 38.33 super, height 18 in.	
Crushed	75,870 lb., or 2,192 lb. per sq. in.
4.—5'98 × 6'00 = 35.88 super, height 24 in.	
Cracked slightly.....	62,270 lb., or 1,735 lb. per sq. in.
Crushed.....	65,890 lb., or 1,836 lb. per sq. in.

Tested ON the bed.

5.—5'98 × 6'00 = 35.88 super, height 6 in.	
Crushed	89,380 lb., or 2,480 lb. per sq. in.
6.—4'07 × 6'08 = 36.91 super, height 12 in.	
Cracked slightly.....	86,240 lb., or 2,373 lb. per sq. in.
Crushed	83,620 lb., or 2,265 lb. per sq. in.
7.—6'08 × 6'04 = 36.72 super, height 18 in.	
Cracked slightly.....	72,770 lb., or 1,982 lb. per sq. in.
Crushed	70,860 lb., or 2,174 lb. per sq. in.
8.—6'04 × 6'06 = 36.60 super, height 24 in.	
Crushed	77,957 lb., or 2,108 lb. per sq. in.

The stone has been quarried for several centuries, a notable example of its use being found at Glastonbury Abbey, built in the twelfth century, in the ruins of which mouldings of it are still preserved. Wells Cathedral, dating from the thirteenth century, was also built of this stone. Examples of edifices in which it has more recently been used are,—St. Bonet's Church, Stepney; the Panorama, Westminster; No. 156, Cannon-street, E.C.; Christchurch, Merton, and Trinity Colleges, Oxford; new pinnacles at Exeter Cathedral; Truro Cathedral; new nave of Bristol Cathedral; Llandaff Cathedral; and it is now being used in the construction of St. Peter's Church, St. Leonard's; Corpus Christi College, Oxford; the Town-hall, Minehead; Mont Doré, Bournemouth, &c.

Large quarries in these lower Oolites exist at *Stinchcombe* and *Minchinhampton*, near Stroud; *Charlbury*, near Oxford, where the stone only contains from 83 to 91 per cent. of carbonate of lime—this latter was used in the Oxford barracks; *Tainton*, near Burford, Oxfordshire, of a variable brown colour, absorbs much water (used in the interior of St. Paul's Cathedral, Blenheim House, &c.). There are several quarries near Yeovil, where the stone is a greenish grey and brownish yellow colour, which, besides supplying many buildings in the neighbourhood with a good material, was largely used for bridges over the Worcester, Shropshire, and Wolverhampton Railway.

Inferior Oolite Stones.

The quarries in this stone are chiefly situated in the Cotswold Hills, Gloucestershire. The principal ones are at Bourton, Broadway, Brockhampton, Cleve Cloud, Guiting, Loughborough, Painswick Hill, Sheepscote Hill, Stanway Hill, and Syreford. The general section at Leckhampton Hill shows that there are two principal kinds of stone used:—1. The *Upper Freestone*, which is a white or light yellow oolitic limestone, used for ordinary buildings. It is about 34 ft. thick. 2. The *Lower Freestone*, which is fine-grained, compact, and oolitic, varying in colour from white to light yellow. The upper portion of this is stated to form the best building stone, and has been very extensively quarried, being a little more than 30 ft. in thickness. The lower part is coarser and more variable in texture and hence is more rarely quarried.

* See the *Builder*, vol. xix, (1877), p. 8.

† See "Geol. of Cheltenham," *Mem. Geol. Surv.*, 1857, and *Quart. Journ. Geol. Soc.*, vol. vi, (185), p. 232.

This part of the series is 75 ft. thick, being locally known by the name of "roestone." Ferruginous beds of coarse oolite underlie this, which, in its turn, rests on a "pisolite" (or peagrit). Professor Hull makes the thickness of the workable part of the lower freestone 147 ft.* He also states that the stone from Painswick approaches in texture the Caen stone of Normandy. The presence of this oolitic limestone has imparted a special character to the domestic architecture of the hilly districts, as contrasted with that of the plains, which are formed of Lias clay, and in which brick houses, set in wooden frameworks, abound.

We may mention that the *Painswick Quarries* are about three miles and a half from the nearest station—Stroud, and five miles from Gloucester station, but it is proposed to make a branch to Painswick. The stone is mostly used for fonts, pulpits, reredosses, pillars, arches, &c. Examples may be seen in the reredosses of Gloucester Cathedral; the Shire Hall at Gloucester, built about seventy years since; Painswick old church and chapel; police station at Stroud; and many large public buildings in the vicinity. It was also used in the Houses of Parliament.

The remainder of the quarries which we propose to describe in the inferior oolite, and which are situated chiefly in the counties of Lincoln, Rutland, and Northampton, were included in that division called "Great Oolite," until Professor Judd showed that they really belonged to that part of the series in which we have now included them. He shows that all these quarries are in the "Lincolnshire limestone."

Ancaster Quarries.—These are situated near Sleaford. The stone is creamy-white, pink, and brown in colour. The beds vary from 6 in. to 3 ft. in thickness, and the bottom bed of a brown colour is said to be the most durable, being known as the "weather" bed. Blocks from 3 to 5 tons may be raised from these beds. It is worked with comparative ease. Specific gravity of dry specimens, 2.182. Amount of absorption of water, 0.180 of its bulk. Chemical analysis:—

Silica	0.0
Carbonate of lime.....	93.59
Carbonate of magnesia ..	2.90
Iron, alumina	0.60
Water and loss	2.71
Bitumen (a trace)	—

100.00

Crushing weight of 2 in. cubes, 83 cwt. It has been used at the Midland Hotel and Station, St. Pancras; St. Sepulchre's Church, Holborn Viaduct; St. Alban's Abbey restoration; Lincoln Cathedral; Brighton Aquarium; New Sessions House, Liverpool; New Masonic Hall, Dublin; and many public and private edifices in and around Lincoln and Grantham.

Barnack Mill Quarries.—These are near Stamford. It is a shelly oolite, of a whitish brown colour. The thickness of freestone is said to be 4 ft. and of common wall stone 6 ft., and the size of the blocks procurable, 30 ft.

The specific gravity of Barnack freestone is 2.090, amount of absorption of water 0.204, and crushing weight of 2 in. cubes, 65 cwt.

The chemical analysis is as follows:—

Silica	0.0
Carbonate of lime.....	93.4
Carbonate of magnesia ..	3.8
Iron, alumina	1.3
Water and loss	1.5
Bitumen (a trace)	—

100.0

It has been chiefly worked since 1835, when the quarries were opened in close proximity to some old workings. The following buildings have been constructed with the Barnack Mill stone:—Barleigh House, Peterborough Cathedral, Croyland Abbey, and several churches in Lincolnshire and Cambridge.

Ketton Quarries.—These are near Stamford. The stone is an oolite of a dark cream colour; the little spherules are of a moderate size, slightly cemented by carbonate of lime. The workable bed of stone is said to be 4 ft. thick and to form, sometimes one, and at other times two courses, and the size of the blocks that can be procured is said to reach 100 ft.† The Commissioners' Report shows that the "Rag beds" (which lie above the freestone) are of a white tint, and the grains are cemented with highly crystalline carbonate of lime; the "Crash" (above the Rag) is of a dark brown colour, very

coarse, very ferruginous, and full of shells. Many quarries in the neighbourhood have now ceased working.

The specific gravity of the Ketton freestone is 2.045, rag 2.190. Absorbent power, freestone 0.245, rag 0.075. This is a good illustration of the difference caused by the state of the cementing material; in both the freestone and the rag, it is of carbonate of lime, but whilst the former is earthy, the latter is more crystalline, and consequently less absorbent. We see also the very great difference caused in the "crushing-weights" from the same cause. The "crushing-weight" for Ketton rag is stated by the Commissioners to be higher than that of any other stone reported upon; 321 cwt. was required to crush a 2 in. cube of it, whilst a similar cube of the freestone required 91 cwt. only.

The following is the chemical analysis:—

Silica	0.00
Carbonate of lime	92.17
Carbonate of magnesia ..	4.10
Iron, alumina	0.90
Water and loss	2.83
Bitumen (a trace)	—

100.00

The Ketton stone has been used in St. Dunstan's Church, Fleet-street; the modern works in Peterborough and Ely Cathedrals, &c.

Haydon Quarries.—These are near Grantham. The stone is of a brownish-cream colour. Its specific gravity is 2.040, and absorbent power 0.241. Large blocks can be raised, a very essential point to observe being that the stone should be set upon its natural bed. It has been used in Lincoln Cathedral, Boston, Grantham, and Newark parish churches; Culverthorpe House and Belvoir Castle.*

Kentish Rag is a hard siliceous limestone from the Hythe beds of the lower greensand formation, where it is associated with a soft calcareous sandstone, known locally as "hassock." The rag stone is extensively used in the south-eastern parts of England. The student will find an excellent work on this material by J. Whichcord, entitled "Observations on Kentish Ragstone." From this the following is chiefly derived.

The Ragstone varies from 6 in. to 3 ft. in thickness, as shown by the various quarries near Maidstone, Aylesford, and Boughton. It is a compact heavy stone, and absorbs but little water, and resists the weather well. It is used chiefly for rubble work (being very difficult to dress), paving steps, curbs, and ashlar. The ragstone is not suitable for internal work, as, being non-absorbent to a great extent, the moisture of the air condenses upon its surface, causing what is known as sweating. On exposure to the weather, it generally shows that iron is present, whilst it is important to observe that little patches of iron do not occur on the exposed face.

The Hassock alternates with the rag, and is compact enough in places to be quarried, being frequently used as a lining to walls built of ragstone.

Totternhoe Stone has been largely quarried in many places, chiefly in Cambridgeshire. It has been largely used in the construction of many of the old churches in that county, and, being easily cut and carved, it does fairly well for some interior work. Great care must be exercised in its selection if used externally, and we need hardly mention that it would only be fit for country residences.

It occurs, geologically, above the chalk marl, and is, in fact, a compact sandy chalk of a light greyish brown or buff colour. At Burwell, Cambs., where there are large quarries, the lower portion of the rock is only used for inside work, but the upper part, or "bond," if properly dried, becomes very hard, and is said to make a good building stone.† A cubic foot of it is calculated to weigh 1 cwt.

The following is an analysis of a specimen of Totternhoe stone from Burwell, by Dr. Frankland, F.R.S.:

Composition in 100 parts,

Moisture at 100 degrees	0.66
Alumina	0.53
Sesquioxide of iron (partly protoxide)	4.38
Calcic carbonate	85.91
Magnesian carbonate, trace ..	—
.....	87.78

* Gwilt, "Encyc. Arch." p. 466.

† See "Geol. of Neighbourhood of Cambridge," Mem. Geol. Surv., p. 50.

Insoluble residue (clay).

Silica	8.5
Alumina and protoxide of iron	0.82
Lime	1.19
Magnesia	0.29
Organic matter	0.44
.....	11.02

Total..... 98.80

The stone has been used in Dunstable Priory, Fonthill House, Woburn Abbey, and in other edifices.

The *Carboniferous Limestone* produces good building material, and is quarried for that purpose locally, especially in Yorkshire and Derbyshire. That from the *Hopton Wood Quarry*, near Wirksworth, Derbyshire, has also been used in London, in the construction of Belvoir Castle, and at Chatsworth. This limestone, however, produces in almost every district where it is worked the most beautiful marbles, and the Hopton quarry is justly celebrated for them.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,292, Ornamental Ironwork. K. L. Gocht (Chemnitz).

The object of this invention is to facilitate the use of iron in the building trades. The ornamental iron, in one or more pieces screwed or riveted together, is secured by nails driven through the material to which it is to be fastened with the ends of the iron, which are specially prepared to receive them,—for instance, as when an iron pattern overlies a wooden beam. The ends of the nail or fastening are deflected by notches or serrations in the iron, and are thus made to form a hook or staple by which the iron is more securely fixed.

12,508, Water-closet Cistern. A. Kerr.

A small cistern is fitted inside the supply-cistern, and the superiority claimed for it is that it remains empty only when in action, and is thereby proof against frost, and is a waste-water preventer. On moving the lever the inside cistern cants and delivers its supply, returning by the action of withdrawing the lever or connexion causing the initial movement.

15,044, Room Doors and Doorways. D. Gill.

The object is to isolate the air of the rooms from that contained in the passages and staircases in dwelling-houses, and to prevent the entry of air from such sources, providing, at the same time, for admission of warm or medicated air, or air charged with disinfectants. A hollow space is formed in the lower part of the door on the room side, fitted with a door or valve which can be opened or closed at will. This hollow space is connected with an under groove by passages or jets made thereto. At the rear of this door or valve a grating is fixed, in front of which is a flap or loose piece of silk or other suitable material. A similar hollow space is formed in the lintel, which is also connected with grooves for the regulation and admission of air. As the door is opened and closed a valve is opened at one of the air-passages or grooves opens and shuts, while the admission of air through any other aperture is, at the same time, cut off.

8,556, Improved Brace-bit. A. Price.

This bit is designed for boring round holes with the bottoms of the holes quite level, without either the usual indentations made by a point or screw in the centre or cutter marks round the circumference. The bit is made of steel or suitable metal, in the form of a hollow tube, with a cutter or cutters extending from the outside to the centre, the cutting edge projecting from the end of the tube the thickness of the shaving to be taken. The waste wood, when using the bit, passes up the tube to an outlet provided for its exit.

10,915, Parquetry. C. Gärtner (Hamburg).

This invention consists in so shaping and fixing the various pieces that no glue is required, and so that the nails and screws used are not visible on the finished parquetry. The squares, or pieces of which the parquetry consists, are fixed in a peculiar manner by means of flanged filets or lists, these last being nailed to the flooring and covered by other pieces of parquetry, so that the heads of the nails are not seen. The shrinkage or expansion of the floor has no influence on the parquetry, and woods of various degrees of hardness may be used.

NEW APPLICATIONS FOR PATENTS.

Oct. 29.—13,579, J. Craig, Combined Latch and Lock.—13,898, J. Bower, Step Ladders.

Oct. 30.—13,937, E. Taylor, Attaching Door-knobs or Handles to Spindles.—13,944, W. Macville and Others, Adjusting Door-knobs and Handles to Spindles.—13,953, M. Muechel, Sash Fastener, Guard, or Check.—13,959, J. Howie and T. Groves, Open Kitchens.—13,964, J. Watson, Silica Brick.—13,984, W. Lindsay, Moulding Bricks or Blocks.

* Hull's "Build. and Ornam. Stones," p. 297.

† See Judd's "Geol. of Rutland, &c." (1878), p. 18.

The Dangers of New Dwellings.—Recently Dr. H. Hülmann, a German authority on sanitation, gave a lecture at Halle on the dangers attending residence in new dwellings. The doctor pointed out that the chief dangers to occupants of new dwellings were:—The wetness of walls; the closeness of doors, windows, and floors; and the presence of hydrate of lime in the mortar, which, in old houses, has been transformed into carbonate of lime or silicate of lime. It was generally known, he stated, that the renewal of fresh air in dwellings, to a great extent, took place through the pores which exist in all dried walls and through the chinks and fissures caused by the shrinking of the wood in doors, windows, and floors. This renewal of air through pores is, at first, entirely absent in new houses, and is only complete when a house is two or three years old, as that is the period generally required for a wall to become perfectly dry; for as long as the pores are filled with water, no air can pass through them. Consequently, if air be not communicated in other ways, the atmosphere in the inhabited rooms of new dwellings must be bad, as it is deprived of oxygen, whilst carbonic acid and hydrogen are added to it with every breath of the occupants, and with every fire and light within. This deterioration of the atmosphere increases with inhabitation. The evil effects of living in new houses are wholly caused by the too great moisture in the walls. The stoppage of the passage of air through the pores in the walls generates the formation of fungi, and causes the former to remain cold, whereby the temperature in such rooms is greatly lowered. In order to avert these dangers, new houses, the Doctor said, ought to be left to dry completely before habitation, or the process executed by artificial means. In conclusion, he added that the transformation of hydrate of lime into carbonate of lime might be accelerated by placing burning charcoal in basins in closed rooms. In connexion therewith it may be mentioned that there is a law in force in Berlin under which the sanitary authorities may prohibit the occupation of new houses until nine months after their completion; and that in consequence of some recent investigations several leading authorities propose to abolish this law and enact another making a complete system of ventilation compulsory in all buildings.

Restoration of the Upsala and Lund Cathedrals.—The restoration of the old cathedrals of Upsala and Lund has for some time been in progress. It was the intention to restore the former to its appearance before its destruction by fire in 1702. As, however, the appearance of the cathedral was much changed from the original at that period, this plan will now be modified. This cathedral, one of the oldest in Sweden, was built in 1287 by Etienne de Bouvenil, a French architect, who had undertaken to make it similar to the cathedral of Notre Dame in Paris, then just finished. It appears from old seals that this was also done, but subsequent fires and restorations had the effect of spoiling its style. The architect who has charge of the restoration, which will occupy some years,—is the Government architect, Herr Langlet. Of the important work of the restoration of the Cathedral of Lund, just finished, are the fresco paintings in the central dome. They represent the life of Christ from birth to death, and have been executed by Herr F. Thulin. The cost of the frescos is 2,500l.

Wood Carving in Norway.—As an addendum to our recent article on Scandinavian Art at the South Kensington Museum, it may be of interest to mention that the Museum of Arts and Industries of Christiania have established a school for wood carving in Lesjeskogen and one in Hardanger. The course of teaching lasts from November to May, tools and wood being supplied free, but all the articles finished, except those during the last month, become the property of the school. The number of pupils will be about twenty-five, the fee for six months' teaching 12s. 6d. This is the first time that State aid has been granted for teaching wood-carving in Norway, and it is hoped that the step may have the effect of reviving this ancient Scandinavian industry. The Museum has also caused a number of old-fashioned patterns of Norse wood-carving and sculpture, drawn by Herr W. S. Bergström, to be issued for the use of the schools and others who desire to prosecute this art.

The New Independent Church at Stand, near Manchester, has just been opened. The church is designed by Mr. J. P. Pritchett, of Darlington, and was illustrated in the *Builder* for December 19, 1885. It is in the Perpendicular style of Gothic, and comprises nave with aisles having entrance porches at the front, chancel with minister's vestry on one side, choir vestry and organ chamber over it on the other. The ground-floor is raised above the level of the churchyard, and a crypt is provided underneath for dryness and for the re-interment of those who had to be removed in making the enlargement of the building,—a roof of cement concrete and iron joists forming a complete separation between the crypt and the church. Externally it is to be noted the total absence of buttresses, the churchyard being limited in area, and having graves close up to the walls. This absence of buttresses being a "fixed point," the architect had to rely upon the arrangement of his masses and size and design of his windows for effect; and the committee decided to abandon the old-fashioned chapel style, and to have nave and aisles, clearstory, chancel, and everything good that could be adopted from the Mediaeval arrangement of the English church. The work has been superintended by the architect, assisted by Mr. Smirke as clerk of works, and the contractors were:—For mason's work, Mr. Thomas Beck, Matlock Bridge; slater's work, Mr. John Smith Radcliffe; carpenter's and joiner's, plasterer's and painter's works, Mr. John Alles, Radcliffe; plumber's work, Mr. Edward Hilton, Prestwich; glazier's work, Mr. W. H. Atkinson, Newcastle-on-Tyne; heating apparatus, Mr. Gibbs, Liverpool; wood block flooring, Mr. Lowe, Farnworth; art metal work, Messrs. Thomason, Birmingham.

Plan for Making Brussels a Seaport.—The Municipal Authorities of Brussels are at present negotiating with an English Syndicate for making that city a seaport. It is proposed to connect the capital with the sea by means of a canal 20·3 ft. in depth and wide enough to enable vessels of 2,000 or 3,000 tons burthen to reach the town. Another canal is to connect the capital with the Scheldt, and thus with the Port of Antwerp. The port to be constructed at Brussels will be situated on the Plain of Montplaisir, in the suburb of Schaerbeek, and will hold twenty ships of 2,000 or 3,000 tons. There will also be constructed docks and warehouses, which will be connected by rail with the great coal-mines at Charleroi. For the reception of cereals a warehouse, 200 ft. long, 100 ft. wide, and 100 ft. high, will be built, provided with all modern appliances, whilst tanks, pumps, &c., for holding and discharging petroleum will also be erected. The cost of the whole scheme is estimated at 5,000,000l., for which the city of Brussels pays an annual sum from the day of the completion of the canal, beginning with 700,000l. the first year and continued as the receipts increase until the canal has become the property of the town. In the meanwhile the city will receive a share of the receipts. The King of the Belgians is much interested in this project, as he hopes to divert by it all the Continental trade of the Congo State to Belgium.

The Proposed Eiffel Tower, Paris.—The Paris correspondent of the *Daily News* telegraphs:—"M. Lockroy, as Chairman of the Committee of Management of the Universal Exhibition, has been served with a writ by the Comtesse de Poix, who demands that he shall cease from building the Eiffel Tower. The Countess some years ago bought ground of the City of Paris in the wasteland near the Champs de Mars, and she and her tenants were in the deed of sale assured for ever the enjoyment of that open space as a pleasure ground. She holds that the building of the Eiffel Tower is not only a menace to her house, but that it will block up for many years the most agreeable part of the Champs de Mars, and the one in which she has been accustomed to take daily exercise. M. Alphand, the director of the city gardens, and M. Poubelle, the Prefect of the Seine, are also served with writs by Madame de Poix. A number of residents in the neighbourhood of the Champs de Mars feel as nervous as that lady about the high tower, which will be nearly ten times higher than the hill of Montmartre."

National Agricultural Hall.—We are informed that Messrs. Isler & Co. have been commissioned to fix their improved patent registering turnstiles at the National Agricultural Hall, Kensington.

The Enlargement of Aston Workhouse. The *Birmingham Gazette* says that the Aston Board of Guardians have held a special meeting for the purpose of selecting the plans for the proposed enlargement of the workhouse. A few months ago a number of Birmingham architects were invited to submit plans in competition for the following buildings:—A new block of imbecile wards to accommodate ninety male and ninety female inmates, an extension of the bakehouse and pantry to twice their present size, a new laundry, additional Board and committee room accommodation, and extension of the receiving wards and tramp wards and engine-house, additional water-tanks, as a protection against fire, and other minor alterations. The Guardians, in consultation with Messrs. Henley and Jenner Fast, Local Government Board Inspectors, have now selected the plans bearing the motto "Prudence," as being the best, and have appointed the authors of these plans (Messrs. John G. Dunn and F. W. Hipkiss, of Waterloo-street), architects for the new buildings. Messrs. Henley and Jenner Fast have recommended that new schools should be erected on some site at a considerable distance from the workhouse, and that the present schools should be utilised for the new imbecile wards.

Society of Arts.—A first meeting of the 133rd session of the Society of Arts will be held on Wednesday next, November 17, when the opening address will be delivered by Captain Douglas Galtoun, C.B., D.O.L., LL.D., F.R.S., Chairman of the Council. Previous to Christmas there will be four ordinary meetings, in addition to the opening meeting. The following are the probable arrangements for these meetings:—November 24, William Anderson, M. Inst. C.E., "Purification of Water, by Agitation with Iron and Sand Filtration." December 1, adjourned discussion on the paper by Dr. C. Meymott Tidy, on "Sewage Disposal." (Read April 14, 1886.) December 8, Major-General C. E. Webber, R.E., C.B., "Glow Lamps, their use and manufacture." December 15, J. B. Marsh, "Cameo Cutting as an Occupation." There will be five courses of Cantor Lectures during the session:—(1) "Principles and Practice of Ornamental Design," by Lewis Foreman Day. (2) "Diseases of Plants, with special reference to Agriculture and Forestry," by T. L. W. Thudichum, M.D. (3) "Building Materials," by W. Y. Dent, F.C.S., F.I.C. (4) "Machines for Testing Materials, especially Iron and Steel," by Prof. W. C. Unwin. (5) "The Structure of Textile Fibres," by Dr. Frederick H. Bowman, F.L.S., F.G.S.

Cardiff.—The Plas-Newydd-square School-room or Mission-hall was opened on Sunday, the 31st ult. The building is in the Gothic style, of a plain character, and built of local stone, and Yorkshire dressings. The plan consists of a large hall, accommodating about 400, a large lecture-room or class-room, and minister's vestry. At present the building will be used as a chapel, but, when funds permit, a large chapel will be built on the adjoining ground, which is being retained for that purpose. The cost of the building is 990l. The builder is Mr. D. Thomas; and the work has been carried out from the designs and under the supervision of Mr. J. H. Phillips, architect, of Cardiff.

The Office of Superintendent Architect, M.B.W.—A special meeting of this Board was convened on the 5th inst. to consider the questions of salary and age for this appointment, but owing to a member taking objection to the validity of the requisition calling the meeting, the Chairman ruled the requisition to be informal, and the Board adjourned. Judging by the reports of the proceedings at this meeting in some of the daily papers, the Board seems to be going from muddle to muddle in the matter of this appointment.

Fall of a Church Tower at Norwich.—On the evening of the 3rd inst. a great portion of the tower of the Church of St. Michael-at-Thorn, Norwich, fell down, seriously damaging the nave. It is stated that the tower had been for some time past in a shaky condition, and that its repair was "under consideration" at the time of the disaster.

The Mortgage Insurance Corporation (Limited).—The prospectus of this new company will be found in our advertising columns. The list of the directorate includes some good names. We understand that the minimum rate of premium they contemplate charging will be one-eighth per cent. per annum for first-class mortgage insurances.

Sheffield School of Art.—At the annual meeting of this school, held on the 8th inst., the report of Mr. J. T. Cook, head-master of the school, was presented. In the course of the report, Mr. Cook said:—"It is with considerable satisfaction that I draw your attention to another advance in the general results of the school. I am, however, afraid it will be for the last time, unless manufacturers agree to the suggestion I have so frequently made to them, viz., that they should require their apprentices to attend the school, or should offer to pay the whole or part of their fees; for whereas the general result of the school has been gradually increasing, the actual number of students attending has practically remained the same, and although this may be accounted for to some extent by the depression in trade, it, nevertheless, suggests that something should be done to remedy what must be a weakness." A large proportion of the students have received medals and prizes from the Science and Art Department, and six students went to London for examination, their expenses being defrayed by the Department, and five were successful. All the branches of the school have been well attended in comparison with former years. The wood-carving and chasing classes have both produced good work and obtained high awards.

PRICES CURRENT OF MATERIALS.

TIMBER.			
	£.	s.	d.
Greenheart, B.G.	6	10	0
Teak, E.I.	9	0	0
Sequoia, U.S.	0	2	4
Asi. Canada load	3	0	0
Birch "	2	6	0
Elm "	3	10	0
Fir, Danstic, &c.	1	10	0
Oak "	3	0	0
Canada "	2	0	0
Pine, Canada red	2	0	0
" yellow	2	5	0
Lath, Danish	3	0	0
St. Petersburg	4	0	0
Waincoat, Riga	2	15	0
" Odessa, crown	3	5	0
Doals, Finland, 2nd and 1st, std. 100	7	0	0
" 4th and 3rd	6	0	0
Riga	8	10	0
St. Petersburg, 1st yellow	8	10	0
" 2nd	7	0	0
" white	7	0	0
Swedish	6	0	0
White Sea	6	0	0
Canada, Pine, 1st	17	0	0
" 2nd	11	0	0
" 3rd, &c.	8	0	0
" Spruce, 1st	8	0	0
" 2nd	6	0	0
New Brunswick, &c.	5	0	0

TIMBER (continued).

	£.	s.	d.
Battens, all kinds	4	0	0
Flooring Boards, sq. 1 lb. Free	0	9	0
pared, first	0	7	0
Second	0	6	0
Other qualities	0	5	0
Cedar, Cuba	0	0	0
Honduras, &c.	0	0	0
Australian	0	0	0
Managany, Cuba	0	0	0
St. Domingo, cargo average	0	0	0
Honduras	0	0	0
Tobacco	0	0	0
Maple, Bird's-eye	0	0	0
Rose, Rio	7	0	0
Bahia	6	0	0
Box, Turkey	5	0	0
Satin, St. Domingo	0	0	0
Porto Rico	0	0	0
Walnut, Italian	0	0	0

METALS.

	£.	s.	d.
Iron—Pig, in Scotland	0	0	0
Bar, Welsh, in London	4	7	6
" " in Wales	4	2	6
" " in London	5	10	0
Sheets, single, in London	6	18	0
Hoops	6	0	0
Nail-roads	5	15	0
Copper—			
British, cake and ingot	44	0	0
Best selected	45	10	0
Sheets, strong	61	10	0
" India	49	10	0
Australian	0	0	0
Chili, bars	40	7	6
YELLOW METAL	0	4	0
LEAD—			
Pig, Spanish	12	15	0
English, common brands	13	0	0
Sheet, English	13	17	6
SPRINTZ—			
Silesian, special	14	5	0
Ordinary brands	14	2	6
TIN—			
Banco	0	0	0
Bilinton	0	0	0
Straits	100	0	0
Australian	100	0	0
English ingots	104	0	0
ZINC—			
English sheet	0	0	0

OILS.

	£.	s.	d.
Linseed	20	5	0
Cocconut, Cochin	38	0	0
Ceylon	28	10	0
Copra	0	0	0
Palm, Lagos	23	10	0
Palm-olive Kernel	0	0	0
Rapeseed, English pale	22	5	0
" brown	20	15	0
Cottonseed, refined	19	0	0
Tallow and Oleine	25	0	0
Lubricating, U.S.	8	0	0
" refined	8	0	0
TURPENTINE—			
American, in casks	1	8	0
TAR—			
Stockholm	0	15	0
Archangel	0	10	0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Additional Stables, Willesden	L. & N. W. Rail. Co.	Official	Nov. 17th	xviii.
Twenty-five Cottages, Newbury	Midland Railway Co.	Official	Nov. 18th	xviii.
Gumey Granite Spalls	Dartford Union	Official	Nov. 19th	xviii.
Post-Office and Residence, Stenage	Wandsworth Bd. of Wks	M. Pickett	Nov. 23rd	ii.
Making-up Roads	Greenwich Bd. of Wks	Official	do.	ii.
Widening and Improving Bridge, &c.	Tunbridge Wells Lcl Bd	W. Brentnall	Nov. 24th	ii.
Formation and Construction of Roads	Barrow-in-Furness Cor.	Official	Dec. 4th	ii.
Furnishing New Town-hall	Met. Board of Works	Official	Jan. 7th	ii.
Sewage Precipitation Works, Barking Creek	Acton Local Board	C. N. Lacey	Not stated	ii.
Blue Guernsey Granite, Lower Thames-st.	do.	W. S. Wainwright	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Fittings Inspector	Oxford City Waterworks	Not stated	Dec. 1st	xvi.

TENDERS.

BIRCHINGTON-ON-SEA.—For finishing two pairs of semi-detached villa residences in the Echelbert-road, Minnie Bay, Birchington-on-Sea, for Mr. Alfred Hunter. Mr. Henry Bushell, surveyor, Finsbury-pavement. No quantities:—

Lidstone, Finsbury Park	21,400	0	0
Booth, Hackney	1,287	0	0
Ridout, King's Cross	1,147	10	0
Church & Co., City	1,078	13	7
Waterman & Co., Thornton Heath	987	0	0
Forwalk, Hamgate	945	10	0
Dyke, Westgate-on-Sea	927	0	0

* Accepted subject to certain modifications.

[Surveyor's estimate, 1,000.]

BURNHAM (Essex).—For the construction of water works at Burnham, Essex, for the Maldon Union Rural Sanitary Authority. Mr. Alan Stewart, C.E., engineer:—

Bell, Tottenham	22,269	13	6
Bow & Co., London	1,907	0	0
Burd & Mackintosh, London	1,881	18	6
Cowdery, Newent, Gloucester	1,814	0	0
Potter, Lower Clapton	1,530	0	0
Gibson, Southall	1,619	6	2
Dise, Colchester	1,507	7	10
Cook, Burnham	1,468	0	0
Lewis, Witham	1,446	16	6
Knight, Morden, Surrey	1,428	0	0
Pit-ball, Yeovil	1,417	8	6
Hills, High Wycombe	1,362	18	0
Innes & Wood, Handsworth	1,360	0	0
Farrow, Chelmsford	1,360	0	0
Foster & Dickson, Rugby (accepted)	1,319	7	6

[Engineer's estimate, 1,383.]

BARNET.—For making up the roads, for the East Barnet Valley Local Board:—

	Station-road.	
J. Pizzev, Hornsey	£2,892	0
B. Cooke & Co., Battersea	2,843	0
H. Treherne & Co., Battersea	2,767	0
Rowland Bros., Fenny Stratford	2,718	0
J. Young, Skegness	2,702	16
G. Capper, St. Albans	2,690	0
J. Mowlem & Co., Milbank	2,622	0
R. Finnegan, Northampton	2,490	0
Nowell & Robson, Kensington*	2,425	0
W. Nicholls, Wood Green	2,414	12
G. J. B. Marshall, Brighton	2,390	0
Marriott Bros., High Barnet	2,223	0
T. Adams, Kingsland	2,060	0
J. Jackson, Enfield	1,989	18
J. Reeves, Walthamstow	1,968	0

* Accepted subject to the sanction of the Local Government Board.

	East Barnet-road.	
J. Pizzev	£2,997	0
J. Reeves	2,910	0
H. Treherne & Co.	2,904	0
G. Capper	2,750	0
J. Young	2,748	16
Marriott Bros.	2,689	0
Rowland Bros.	2,613	10
W. Nicholls	2,606	8
R. Finnegan	2,475	0
J. Mowlem & Co.	2,460	0
Nowell & Robson*	2,317	0
G. J. B. Marshall	2,280	0
T. Adams	2,197	0
J. Jackson	2,170	16

* Accepted subject to the sanction of the Local Government Board.

Erving and Channelling Ten Roads.

Rowland Bros.	£4,692	14	6
J. Pizzev	3,072	16	0
H. Treherne & Co.	3,046	1	6
Marriott Bros.	2,922	16	0
R. Finnegan	2,873	17	5
J. Mowlem & Co.	2,792	8	10
J. Reeves	2,690	11	2
T. Adams	2,572	2	2
B. Cooke & Co.	2,565	0	0
G. Capper	2,500	0	0
Nowell & Robson*	2,498	0	0
G. J. B. Marshall	2,465	2	6
W. Nicholls	2,324	18	3
J. Jackson	2,164	18	0

* Accepted subject to the sanction of the Local Government Board.

CAVERSHAM (Oxon).—For new house and shop, Prospect-street, for Mr. N. Geen. Mr. William Wing, architect:—

Simonds	£778	0	0
Dodd	635	0	0
Brown	616	0	0
Wernham	440	0	0
Hutton, Caversham (accepted)	392	10	0

CAVERSHAM.—For additions to house for Mr. G. West. Mr. William Wing, architect. Quantities supplied:—

Grover, Reading (accepted)	£180	0	0
----------------------------	------	---	---

CHISLEHURST.—For re-erecting stables at Tamar, Chislehurst, for Mr. D. Clarkson. Messrs. T. Chaffell Clark & Son, architects. Quantities by Messrs. Leonard & Clarke:—

Clarke & Bracey	£1,210	0	0
Morter	1,198	0	0
H. J. Greenwood	1,185	0	0
Colls & Son	1,174	0	0
Hall, Bedall, & Co.	1,143	0	0
Nightingale	1,125	0	0
Lawrence	1,080	0	0
Grover, Reading	1,079	0	0
Money Marland, Chislehurst*	1,078	0	0

* Accepted.

CHIAWICK.—For sewer, Woodstock-road, for the Chiawick Local Board:—

Wilson	£200	0	0
Trehearne	303	0	0
Cooke & Co.	500	0	0
Saunders	498	0	0
Jes	490	0	0
Nowell & Robson	489	0	0
Ball	433	0	0
Rhodes	423	0	0
Tomes & Wimpey (accepted)	354	0	0

FOREST GATE.—For four houses and shops in Vanitast-road, Forest Gate, for Mr. R. J. Ames. Mr. H. F. Simmonds, architect, Cambridge Heath:—

Blow & Co.	£2,385	0	0
Thomson & Sons	2,030	0	0
G. W. Beale	1,965	0	0
Nicholls	1,596	0	0
Baker	1,689	0	0
Fuller	1,660	0	0
Hughes	1,518	0	0
Long	1,410	0	0
Burgin	1,345	0	0
Simpson	1,176	0	0

HARROW-ON-THE-HILL.—For the erection of boundary walls, &c., in the Rorborough Park-road, Harrow, for Mr. F. B. Winkley. Mr. Joseph Gibson, surveyor, Cannon-street, City:—

Webb, Harrow	£271	0	0
Batchelor, Harrow	365	0	0
Rowland Bros., Fenny Stratford	335	0	0
Sears, Harrow	335	0	0
Haines, Alpertown	310	0	0

[Surveyor's estimate, 3684. 16s. 3d.]

HENLEY-ON-THAMES.—For new mineral water factory at Henley Brewery, for Messrs. W. H. Brakepear & Sons. Mr. William Wing, architect, Caversham, Oxon. Quantities supplied:—

J. Weyman	£1,280	0	0
A. W. Dodd	1,259	0	0
Holly & Butler, Nettlebed*	1,025	0	0

* Accepted.

HENLEY-ON-THAMES.—For new stabling and alterations to stable block at Henley brewery, for Messrs. W. Brashear & Sons, Mr. William Wing, architect, Cavendish, Quantities supplied.—
Holly & Butler £315 0 0
J. Weyman, Henley (accepted) 314 0 0

LONDON.—For alterations to Nos. 26, 27, and 28, Warwick-street, for Messrs. Liberty. Mr. Arthur Vernon, architect.—
Hollands £1,590 0 0
Hatfield 1,150 0 0
Bywater (accepted) 1,098 0 0

LONDON.—For alterations at the King's Arms, Aldersgate-street. Mr. R. A. Lewcock, architect, Bishops-gate-street Within.—
Ivory £1,205 0 0
Jackson & Todd 839 0 0
Davison 738 0 0
Steel Bros. 720 0 0
Spencer & Co. 715 0 0
Stephenson 691 0 0
D. Brown & Co. 677 0 0

LONDON.—For decorative work and general repairs internally at No. 13, Portland-place, for Mr. W. Q. Orchardson, R.A. Mr. Charles F. Moxon, architect, Furnival's-lane. Mr. Henry Bushell, surveyor, Finsbury-pavement. No quantities.—
R. Jennings (accepted) £245 0 0
[Surveyor's estimate, 434. 8s. 6d.]

Sanitary Works.
B. Jennings £319 0 0
Layton & Son 275 0 0
L. C. Roper (accepted) 273 0 0
[Surveyor's estimate, 267. 10s.]

LONDON.—For alterations and repairs at 116, London-wall, for the Churchwardens of St. Stephen's, Coleman-street. Mr. J. E. Saunders, architect.—
Richardson & Son £475 0 0
Clarke & Bracy 391 0 0
Colls & Sons 370 0 0
Reeps 367 0 0

LONDON.—For alteration to Nos. 149 and 150, Regent-street, for Messrs. Liberty & Co. Mr. Arthur Vernon, architect, Great George-street, Westminster.—
Hollands £290 0 0
Hatfield 345 0 0
Bywater (accepted) 348 0 0

PUTNEY.—For the embankment of the River Thames (south side) from Putney New Bridge and Dock to the Beverley Brook, for the Wandsworth District Board of Works. Mr. J. C. Radford, C.E., architect.—
Williams, Son, & Wallington £7,385 0 0
Geo. Munday & Sons 6,986 0 0
S. Chafen 6,494 0 0
B. Cooke & Co. 6,543 0 0
John Mowlen & Co. 6,500 0 0
Charles Killiback 6,250 0 0
George Neal 6,589 0 0
John Waddell & Sons (accepted) 4,890 0 0
[Surveyor's estimate, 4,962.]

STOKE NEWINGTON.—For fittings at No. 169, High-street, Stoke Newington. Mr. R. A. Lewcock, architect, Bishops-gate-street Within.—
Hill £173 0 0
Pringle 183 0 0
Batchelder 163 0 0

WILLESDEN.—For completing twelve houses in Dean-road and two houses in Poplar-avenue, Willesden Park, for Mr. H. W. Wilson. Mr. F. Shaw, architect, Harlesden.—
J. Ransom, Westbourne Park £5,438 0 0
Church & Co., Coleman-street 4,777 0 0
G. Hardy, Harlesden 4,553 0 0
A. E. Addis, Houslow 4,500 0 0
E. & E. Evans, Fencham 4,400 0 0
J. Greenwood, Mansfield 4,300 0 0
A. Clissold, Raling 4,250 0 0
Cowley & Drake, Willesden Green 4,225 0 0
Hatcher & Green, Islington 3,998 0 0
Webb & Rosser, Hammersmith 3,975 0 0
T. W. Knight, Finsbury Park 3,902 13 6
E. L. Wood, East Greenwich 3,775 0 0
W. Martin, Willesden Green 3,714 0 0
* Accepted.

Home for Police-Recruits, Kennington.—Mr. F. H. Dawes, of King's Lynn, writes, "On perusing your edition of the 6th, in list of tenders 'Home for Recruits, Kennington-lane,' I note you give the name of Down, 5, 1894; it should be Dawes, 5, 1891."

WALTHAMSTOW.—For New school for boys, Gamnel-road, for the Walthamstow School Board. Mr. W. A. Longmore, architect, Great Alie-street. Quantities by Messrs. J. E. Goodall & Son.—

Simpson £2,240 0 0
Malton & Wallace 4,223 0 0
Read 4,180 0 0
W. Wood 4,100 0 0
Good 3,898 0 0
Sayer 3,808 0 0
Garrod 3,685 0 0
Martin 3,680 0 0
Bell & Son 3,591 0 0
E. C. Howell & Son 3,598 0 0
Church & Co. 3,547 0 0
Robson 3,499 0 0
Scott 3,493 0 0
Tagg 3,485 0 0
G. Parker 3,459 0 0
G. & J. Green 3,393 0 0
M. A. Palmer & Co. 3,375 0 0
Stevenson 3,368 0 0
Evans 3,195 0 0
J. Godfrey & Son 3,180 0 0

For New Class Rooms for the above.
Good £945 0 0
Simpson 870 0 0
W. Wood 870 0 0
Malton & Wallace 849 0 0
Bell & Son 849 0 0
Church & Co. 829 0 0
Read 810 0 0
Sayer 808 0 0
E. C. Howell & Son 797 0 0
Martin 769 0 0
Robson 735 0 0
Eds & Son 745 0 0
M. A. Palmer & Co. 745 0 0
Scott 743 0 0
G. Parker 735 0 0
Stevenson 734 0 0
Evans 712 0 0
G. & J. Green 694 0 0
J. Godfrey & Son 694 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.
SITUATIONS VACANT, PARTNERSHIPS, APPOINTMENTS, TRADE, AND GENERAL ADVERTISEMENTS.
Six lines (about fifty words) or under 6d.
Each additional line (about ten words) 6d.
Terms for Series of Trade Advertisements, also for special Advertisements on front page, Competitions, Contracts, Sale by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.
FOUR Lines (about thirty words) or under 2s. 6d.
Each additional line (about ten words) 6d.
PREPAYMENT IS ABSOLUTELY NECESSARY.

* Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Postoffice, Covent garden, W.C. to

DOUGLAS FOURDRYER, Publisher,
Addressed to No. 46, Catherine-street, W.C.
Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that the latter COPIES ONLY should be sent.

SPECIAL—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY morning.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent garden, W.C. Free of charge. Letters forwarded if addressed envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
"THE BUILDER" is supplied gratis from the Office to residents in any part of the United Kingdom at the rate of 10s. per annum *PREPAID*. To all parts of Europe, America, Australia, and New Zealand, 25s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittance payable to DOUGLAS FOURDRYER, Publisher, No. 46, Catherine-street, W.C.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

F. H. (the architect) whose design has been selected are the best judges of the material in which their work should be carried out.—T. L. M.—W. B. F.—J. H. P.—J. T. C.—W. B. P. (the journal which you quote is not a reliable authority).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

Note.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Best Bath Stone.
CORSHAM DOWN, } SUMMER DRIED.
FARLEIGH DOWN, }

BOX GROUND. COMBE DOWN.
WESTWOOD GROUND.
RANDELL, SAUNDERS, & CO., LD.,
CORHAM, WILTS.

Bath Stone.
BEST QUALITY OF ALL KINDS.
PICTOR & SONS,
Box, WILTS. [ADVT.]

Douling Freestone and Ham Hill Stone of best quality, in blocks, or prepared ready for fixing. An inspection of the Douling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADVT.]

Douling Free Stone For prices, &c., address S. J. STAPLE, HAM HILL STONE, Quarry Owners, Stone and Lime Merchants, Stoke - under - Ham, Ilminster. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 38, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and milk-rooms, granaries, tun-rooms, and terraces. [ADVT.]

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADVT.]

MICHELMORE & REAP,
Manufacturers of

CHARLES COLLINGE'S PATENT.

COLLINGE'S PATENT HINGES,
LEVER, SCREW, & BARREL BOLTS,
Self-acting "FALL DOWN" GATE STOP,
and IMPROVED GATE FITTINGS of every description
36A, BOROUGH ROAD,
DISCOUNT TO BUILDERS. LONDON, S.E.

GOLD AND SILVER MEDALS AT AMSTERDAM EXHIBITION.
IRON CASTERS.
F. BRABY & CO.
LONDON, LIVERPOOL, GLASGOW.
VERY PROMPT SUPPLY.
LARGE STOCK READY.
CYLINDERS FOR HOT-WATER CIRCULATION.
Particulars on application.
Chief Office: 360, EUSTON ROAD, LONDON.

The Builder.

VOL. LI. No. 273.

SATURDAY, NOVEMBER 21, 1896.

ILLUSTRATIONS.

Selected Design for All Saints' Church, Peterborough: Interior and Exterior Views.—Mr. Temple L. Moore, Architect	734, 735
Competitive Design for All Saints' Church, Peterborough.—Mr. J. Martin Brooks, A.R.I.B.A., Architect	738
Woodlands Park, Stoke D'Abernon, Surrey: View of Dining-room.—Mr. Rowland Plunbe, F.R.I.B.A., Architect	739
View from Garden and View facing Road of Woodlands Park, Stoke D'Abernon, Surrey	742, 743
St. Augustine's Monastery, Canterbury: Details, &c., of Entrance Gateway.—Drawn by Mr. H. J. White	746, 747

CONTENTS.

Arlington Street	729	Gateway, St. Augustine's Monastery, Canterbury	746	Church Building News	764
The late Mr. George Vulliamy	724	Competitions	749	The Student's Column: Stone Quarry.—XXI.	764
Notes	725	Scottish Ecclesiastical Architecture	749	Books: Archaeological Cantiana (Mitchell & Hughes); Smith's	
Tests for Cement	727	A Sanitary Retrospect	752	Law of Bills, &c. (Edgingham Wilson); Church's Food	
Spa Fields (or Northampton) Chapel	727	Architectural Societies	752	Grains of India (Chapman & Hall); Bright's Agricultural	
The British School at Athens	727	Obituary	753	and Tenant Right Valuer's Assistant Crosby Lockwood.	765
Royal Institute of British Architects	728	A New Stone	753	Recent Patents	756
The Institution of Civil Engineers	731	Cork Cathedral	753	Recent Sales of Property	756
Lectures at South Kensington	732	The Dangers of New Buildings	753	Meetings	756
Selected Design for All Saints' Church, Peterborough	749	A Query	753	The Superintending Architectship, Met. Board of Works	756
Competitive Design for All Saints' Church, Peterborough	749	F.R.	753	Masallians	756
Woodlands Park, Stoke D'Abernon	749	Sanitary Institute of Great Britain	753	Prices Current of Building Materials	767

Arlington Street.



HERE are historic sites in our metropolis the disappearance of which is well calculated to rouse the regrets of those interested in the memories of the past; there are other sites, however, the demolition of which, though their interest is, in a measure, scarcely less, need in no way excite the susceptibilities of the antiquary. Among these latter may be classed the clearing which is now being effected at a characteristic corner of Piccadilly, that abutting on to the north-east corner of the Green Park, carrying with it two important houses in Arlington-street. The historical associations connected with Arlington-street are many and interesting. Horace Walpole, long one of its residents, termed it, more than a century ago, "the Ministerial Street," but since his time political associations have gathered even more thickly in the quiet little thoroughfare in which is situated the well-known London home of our present Prime Minister. It would seem as if the influence of the first Earl of Arlington had exercised its charm over the street which bears the name of Charles II.'s Minister, familiar to readers of Pepys's and Evelyn's diaries as "Mr. Secretary Bennet," and associated for all time with the ill-famed "Cabal Ministry."

When about 1690 or so Arlington-street was built on property belonging to the Earl of Arlington it seems immediately to have been occupied by fashionable residents, among whom stands foremost the Duchess of Buckingham, the widow of Charles's ill-chosen companion. With the last years of the seventeenth-century the Ministerial associations of the street commence, among the residents being the Earl of Kingston, Lord Guildford, Lord Cholmondeley, the Earl of Peterborough, and Lord Brooke, joined a little later by the Duke of Richmond. The Earl of Kingston was long a resident, the house remaining in the family till 1770, when it was sold. An interest attaches to the place from its association with the early successes of pretty Lady Mary Pierrepont, before the days when the later eccentricities of Lady Mary Montague amused London society and inspired the witty pen of Horace Walpole. With Arlington-street the Walpoles are indelibly associated, and, thanks to the care of the Society of Arts, a tablet marks the site of the house so long occupied by the stout old Norfolk squire, who, in the venal days of the early Georges, governed England, as he said, by bad Latin.

Sir Robert lived in Arlington-street from 1715 till his death, and after him the house descended to his son, Horace Walpole, who from this address dated not a few of those delightful letters which give such an insight into the fashionable life of the last century. More intimately associated as Walpole may be with Strawberry Hill, to him Arlington-street had been familiar from his childhood; for there he had been born in his father's first house, opposite that now marked by the Society of Arts' tablet. Horace resided in Arlington-street till in 1779 he moved to Berkeley-square, where, as the scarcely recognisable "Lord Orford" of the Court Guides, he breathed his last.

The whole political interest of the earlier Georges' reign may be said to have centred in Arlington-street. Next door to Sir Robert Walpole lived his implacable rival, William Pulteney, later created Earl Bath, and here he remained till he moved to the well-known house in Piccadilly, now occupied by Lord Ashburton. Henry Pelham, the brother of the Duke of Newcastle, who played such an active part in the events of the Second George's reign, is another resident whose memory adds to the Ministerial associations of Arlington-street. The house (No. 17), one which has long been in possession of the family of its present occupant, the Earl of Yarborough, was originally designed by Kent, and, after passing through the hands of Henry Pelham, became the residence of the Duke of Grafton. It is worthy of remark that Henry Pelham's wife was the eldest daughter of the second Duke of Rutland, and his Grace we find a resident of the street in later years, and here again we come upon Ministerial associations, for it was through the Duke of Rutland that Pitt was first returned to Parliament. It was at this house that in 1827, it may be mentioned, died suddenly in his chair the Duke of York.

Further Ministerial associations in connexion with Arlington-street centre round the residence of that clever statesman Lord Carteret, later created Earl of Granville, whose active influence in the political history of the last century can be traced to this day, not only in the share he took in the institution of our existing septennial Parliaments, but who may be regarded as the founder of that traditionary policy of watchfulness of Russia's aggressiveness, which, from the time of Lord Carteret's first check to Peter the Great till the present moment, may be said to form one of the chief cares of our successive Foreign Ministers. Discourteous as he may have been, in spite of his elegance as a scholar; unpopular as he was with his colleagues, the Earl of Granville has left his mark on English history, and his residence in Arlington-street adds one more to

the many Ministerial associations of the thoroughfare.

With other actors in the political disturbances of the Georgian era, Arlington-street is closely associated. To Arlington-street, Frederick, Prince of Wales, retired to sulk; and from the roof of Lord Middlesex's house we have contemporary evidence that he and his Princess witnessed, in 1749, the fireworks in the Green Park on the occasion of the Peace of Aix-la-Chapelle.

Turning over the pages of the old Court Guides we find many other residents of Arlington-street intimately associated with our political past. The "Lord Yarborough" who, in 1797, the year of the first issue of Boyle's "Fashionable Court Guide," is mentioned as residing at No. 17 (still in possession of the family) was the father of the first earl, and from his close relationship with the Pelham family, associates Arlington-street still further with Ministerial memories, for his mother was sister to Charles Pelham and Thomas Pelham, the Minister who at the beginning of this century, it will be remembered, was, for his political services, created Earl of Chichester. The "Earl of Pembroke," residing at No. 9 in 1797, is George, the eleventh Earl, whose benefactions at historic Wilton have to this day left their memory. The "Lord Gage," residing in this same year, 1797, at No. 16, is the third Viscount, and son of the General Gage whose disastrous defeat at Bunker's Hill marks an epoch in the story of our separation from our American colonies. A few years later, in 1810, the *Court Guide* points out another Minister as residing in Arlington-street, "Lord Melville," who, it may be remembered, was impeached for malversation of funds while in office, but, like his whilom neighbour Carteret in a similar case, acquitted by his peers. The same year we find living at No. 24,—the house now being demolished,—"Earl Camden," not, it must be recalled, the great Lord Chancellor Pratt himself, but his son. It is worthy of remark that the house thus associated with the memory of one who holds a foremost place among the champions of the liberty of the press, should, till within a few weeks, have been the residence of a gentleman whose name in connexion with newspaper literature is of world-wide renown. Earl Gower, who, in 1799, was a resident at No. 21, was the second Earl, and grandfather of the well-known Duke of Sutherland of later days. Being the grandson of Lady Evelyn Pierrepont, his relationship to the family of the Kingstons points probably to this as the house long owned by the father of Lady Mary Wortley Montague.

Among other residents associated with our political history, Charles James Fox should

not be overlooked, short as was the time he lived in the street; as likewise Lord Nelson. A special interest, however, centres round the historic "No. 20," the town residence of the Marquises of Salisbury, and now occupied by our present Premier. To his once neighbour, Sir Robert Walpole, he and his predecessors since Walpole's time owe the pleasant house in Downing-street they occupy while in office; for when the house was offered as a gift to George I.'s old Minister on his resignation, he generously refused the attention, and begged it might be made the permanent residence of the successive "First Lords of the Treasury," and from that day to this the historic date, "No. 10, Downing-street," has headed the decrees issued by our Premiers.

For over a century Arlington-street has been associated with the owners of Hatfield. In 1786 the king and Queen Charlotte were sponsors to the little daughters of the first Marquis, and honoured by their presence the christening in Arlington-street. Lady Georgiana, in after years the wife of the well-known ambassador, Lord Cowley, adds one more Ministerial association to the street. With a few still among us the memory has not passed away of the Sunday receptions at "No. 20" given by "Old Sarum," as the Marchioness was somewhat disrespectfully termed in a certain circle of "society" half a century back. With fashion and its doings Arlington-street has for two centuries been associated. If, indeed, the array of stately sedan chairs, which visitors will remember in the spacious hall of the former Duke of Beaufort's well-known house in Arlington-street, could but tell a tale of their trotings about St. James's and Mayfair, with their aid not a few other memories,—some, too, with a pleasant dash of scandal in them,—might have been added to the many associations which cluster round Ministerial Arlington-street.

Architecturally speaking, there is a certain interest in the aspect of Arlington-street; its west side, at all events, presenting one of those characteristic bits of unstudied effect and variety which are found here and there unexpectedly in streets of that era in London. The east side is plainness itself, and the house decorated with the plate in memory of Sir Robert Walpole may suggest that Horace's vagaries at Strawberry Hill were a kind of reaction from the effect of the sober and prim aspect of the brick front which he inherited from his father. But the opposite side of the street has an air of old-fashioned and rather faded stateliness, which is pleasant enough. The setting back of two of the houses, with fairly large open court-yards before them, gives a spacious effect and an air of dignified reserve, putting the place quite apart from an ordinary street, even such as are found in the sacred neighbourhood of Mayfair. Then Lord Salisbury's house, with its palatial arrangement of the advance guard or entrance block, connected by a lower isthmus of building with the mainland of the mansion, and with a certain accidental or intentional reminiscence of Hatfield about it, forms a dignified group in itself, and a piquant contrast to the sober classicism of Lord Wimborne's house, No. 22, with its low proportions and the elegant colonnade of its *porte-cochère*. The intervening house, No. 21, assists the effect chiefly by contributing to the open space and general look of dignity of the group, and separating its neighbours on either hand, which might otherwise form too harsh an architectural contrast. The upper portion of the street, as all Londoners know, is a favourite imaginary (purely imaginary) "short cut" with cabmen between St. James's-street and Piccadilly, and probably few of those who are strangers to the place drive through this bit of street without giving a look at this group of residences as they pass, and admiring the little bit of effect upon which the passenger suddenly comes on turning the corner from Bennett-street or Piccadilly.

There is no probability, we imagine, of this part of the street being disturbed for many a day, but we understand that the Bath Hotel at the corner is to put off its sober livery of painted cement, and blossom into a new and more extensive and ornate brick house, from

the design of Mr. Tarver. The large clearance already made along Piccadilly, where by night the day's work is being carried on under a flare of light which produces a fine effect on turning the corner out of Bond-street, is to be the site of a very large block of residential chambers, designed by Mr. Milne, in a style very similar to the smaller block of residential chambers built not long since on the north side of Piccadilly, a little further west, and overlooking the Green Park. The elevation, not yet visible out of the ground, presents a building which will be an effective addition to Piccadilly architecture, though suggesting very different associations, architectural and social, from the group of houses which give to Arlington-street its special dignity and character.

THE LATE MR. GEORGE VULLIAMY.



WE record with sincere regret the death, on the 12th inst., of Mr. George Vulliamy, the Superintending Architect to the Metropolitan Board of Works, at his residence, Ingress House, Greenhithe, adjoining Ingress Abbey.

Mr. Vulliamy, who was in his seventieth year, having been born on the 19th of May 1817, was the second son of Mr. Benjamin Lewis Vulliamy, the eminent watch and clock maker, of Pall Mall. The family was of Swiss origin. In the year 1704 one Justin Vulliamy emigrated to England, and associated himself with John Gray, an English clockmaker of some celebrity, and established a business in Pall Mall, in the house in which it was continued until Mr. Benjamin Vulliamy's death in 1854. They obtained the appointment of clockmakers to the Crown, which was continued to their successors, with an annual grant of 500*l.* a year. On the accession of her present Majesty the grant was suppressed, but the title was permitted to be retained.

Mr. Vulliamy's father was a man of considerable ability, and amassed a comfortable fortune. He was the first clockmaker to employ the two-seconds pendulum, and he effected some important improvements in the construction of large public clocks. He sank also the first artesian well in this country at his estate at Norlands, at the foot of Notting-hill, which is now covered by Norland-square and the adjacent streets. This work was finished in November, 1794. The well still exists, although now only about 60 ft. deep, at the back of No. 4, Norland-terrace, Uxbridge-road, where the old engine-room is still to be seen. In the year 1849 Mr. Vulliamy was presented by the Court of the Clockmakers' Company (of which he was five times Master) with a service of plate, with a complimentary inscription, which is given at length in Mr. Overall's "Account of the Clockmakers' Company," page 176. Mr. Vulliamy's died January 8th, 1854, aged 74, and bequeathed by will to the Clockmakers' Company three portraits of members of his family, and one picture, which are preserved in the Guildhall,—the hall of the company not having been rebuilt after the Great Fire.

Mr. George John Vulliamy was born in Pall Mall in the house where his father had long carried on business. The house has been demolished, and the site, which was situated between Sir Mark Wood's house and Hammersley's Bank, is now partly occupied by the Marlborough Club, adjoining Marlborough House. There is an illustration of the house from an old print in Cassell's "Old and New London," vol. iv., page 139.

Mr. Vulliamy was educated at Westminster School, but appears to have left school early, and was articled first to Messrs. Joseph Bramah & Sons, the engineers, with whom he remained for three years. In July, 1836, being then in his nineteenth year, he was articled to the late Sir Charles Barry, who was at that time engaged upon the working drawings for the first contract for the Houses of Parliament. Mr. Vulliamy's first occupation with Sir Charles Barry was to square dimensions for the bills of quantities for the contract, which were taken

out in Barry's office by Mr. (afterwards Sir Henry Arthur) Hunt.

Mr. Vulliamy was articled to Barry for five years, and during the term of his apprenticeship, from 1836 to 1841, Sir Charles designed the Reform Club, Highclere House, Trentham Hall, Harewood House, and numerous other buildings, upon the drawings for which Mr. Vulliamy assisted. He also worked upon the drawings for the completion of the Palace of Westminster, and was Barry's favourite pupil, the most cordial relations subsisting between them up to Barry's death. In 1837 Sir Charles Barry gained the first premium for the Reform Club in a limited competition with Basevi, Blore, Smirke, Decimus Burton, and Cockerell. In 1840 he made some fine designs for converting Highclere, a seat of Lord Carnarvon's, into an irregular Italian villa; about the same time he completed the additions to University College, Oxford. In 1841 he designed Bridge-water House. Mr. Vulliamy superintended the works at the Reform Club and Highclere as the architect's clerk of the works.

On the completion of his articles with Barry, Mr. Vulliamy travelled abroad, and made an extensive tour in France, Italy, Greece, Asia Minor, and Upper and Lower Egypt, during the years 1841-3, his travels in Egypt extending as far as the second cataract of the Nile. He made numerous drawings, being at that time a most enthusiastic worker, and kept a journal. His travelling companions were Mr. W. Monckton Milnes (afterwards Lord Houghton, with whom he ascended the Nile), Mr. F. C. Penrose, Mr. Thos. Hayes, Mr. William Wild (now curator of Sir John Soane's Museum), Mr. (now Sir Horace) Jones, Mr. T. Hayter Lewis, Mr. Arthur Green (Sir Wm. Tite's nephew), Mr. C. Cattermole (the painter), Mr. Charles Vacher, Mr. Redford (a promising young artist, a *protégé* of Lord Kilmorey, who died young), Mr. B. O'Neill (afterwards R.A.), and others more or less distinguished in different walks of life.

During his residence abroad Mr. Vulliamy was employed by Mr. H. Gally Knight, to make drawings for his work on the Ecclesiastical Architecture of Italy. The plates representing the Duomo at Orvieto, and the general view of Orvieto, the latter reproduced in lithography by Mr. Edward Lear (vol. ii., plates 25 and 26) are from Mr. Vulliamy's drawings. He also during this time designed a Gothic villa for a Russian nobleman, to be built on the shores of the Baltic, which was subsequently carried out.

On his return to England in 1843 Mr. Vulliamy commenced business as an architect on the second floor of No. 26, Suffolk-street, at the corner of Pall Mall East, and soon acquired a considerable practice. He afterwards joined his uncle, Mr. Lewis Vulliamy, who had a very extensive connexion among the nobility and wealthy people, and assisted him for some years in his architectural work,—the whole of the drawings for Dorchester House, Mr. Holford's mansion in Park-lane, and other large buildings having been by his hand. In 1851 Mr. Vulliamy married.

In 1861 Mr. Marrabbe resigned his appointment of Superintending Architect to the Metropolitan Board of Works in consequence of the Board having declined to increase his salary, and Mr. Vulliamy, being dissatisfied with his uncle's treatment of him, became a candidate for the vacant appointment, and in March, 1861, he was elected Superintending Architect to the Board, mainly through the influence of Mr. (afterwards Sir William) Tite, who was at that time a prominent member of the Board.

This post Mr. Vulliamy occupied until his death, on Friday last, with universal acceptance. Very few people have passed through life with fewer enemies than Mr. Vulliamy: conciliatory and courteous to all, he discharged the duties of an extremely difficult and onerous position with general approval, and whatever scandals may have been whispered abroad about the Board and its other officers, there has never been a shade of suspicion attaching to the fair fame of the Superintending Architect.

Mr. Vulliamy's artistic career may be said

to have terminated in 1861 on his appointment as Architect to the Metropolitan Board, the work of the Board being mostly of a strictly utilitarian character. For the Metropolitan Board he designed the group of buildings on the south side of Queen Victoria-street, between Bucklersbury and Sise-lane, extensive additions in the rear of, and an additional story to, the offices of the Board in Spring-gardens; a block of stables in Park-lane, and several of the Fire

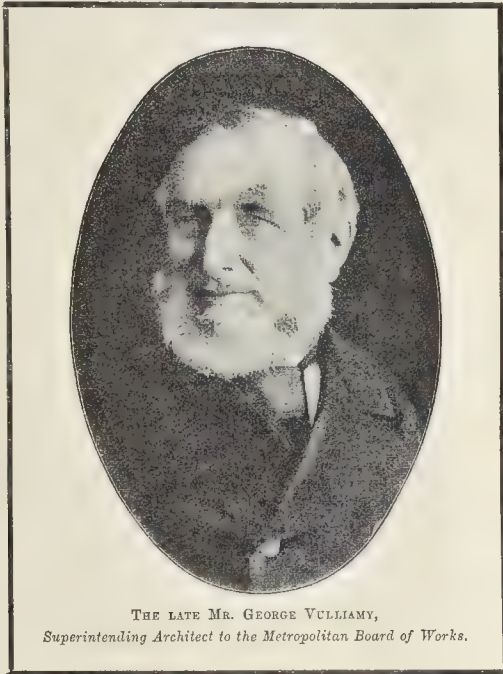
mere; a mansion at Dyffryn, in Merionethshire, for Mr. H. P. Powell, M.P., erected at a cost of 70,000*l.*; the restoration of the north transept of Rochester Cathedral; All Saints' Church, Ennismore-gardens, Knightsbridge; Fire Brigade buildings in different parts of the metropolis (in which he was largely assisted by Mr. Alfred Mott); Lodges, Tooting Bec-common, Bostal Heath, and Blackheath; the pedestal and sphinxes for

to be elaborated in all its many details, and a thousand other things which cannot be slurred over. The experience of the Exhibition accounts of the last three or four years, which are eminently unsatisfactory, will, it is to be hoped, be a standing warning that the new Institute should be conducted on strictly business principles. In the meantime, the London Chamber of Commerce has determined that a Commercial Museum will be of advantage to the mercantile community. We thoroughly agree with this conclusion, although to a certain extent it will clash with the Colonial undertaking. But we cannot have too much of a good thing, and as an additional link in the grand Federation movement we welcome it most heartily.

THE subject discussed at the meeting of the Statistical Society on Tuesday was the cost and conditions of working railway traffic in different countries. It was introduced by Mr. J. S. Jeans, who was followed by several eminent authorities upon the subject. Mr. Jeans complained that our railway companies do not furnish sufficient data for such calculations as the cost per ton-mile, &c., which, however, is certainly very much in excess of that of other countries. Mr. Mundella also thought that the public should have more information on the subject, and considered that, in view of future legislation, it would be wise for the companies to anticipate much that must be done in this direction. He also dwelt upon the foolish competition and lack of good arrangements among the companies. This explains, to a considerable extent, their inability to meet the wishes of their customers for cheaper rates, although, of course, the tremendous cost of promoting the lines in the first place,—setting aside cost of construction,—is a permanent clog upon their profits. This latter circumstance handicaps the British lines in comparison with those of other countries, and being, unfortunately, irremediable, it behoves the companies to avoid unnecessary competition, and make the most of every opportunity of acting in concert for the public benefit. One of the Railway Commissioners,—Mr. W. P. Price,—took part in the discussion, and drew attention to the great advantages we possess in respect of speed and comfort as compared with Continental railway travelling, showing that economy in working is not always an unmixed blessing.

THE recent decision of the Court of Appeal arising out of the over-issue of debentures in the Charnwood Forest Railway is of considerable commercial importance. The debentures in question were signed by two of the directors, and sealed in the presence of all. The company was wound up, and the ordinary creditors received nothing, but the lawful debenture-holders were paid in full. The plaintiff, who held the debentures in question, and was the contractor of the line, received, of course, nothing from the company, and an action was begun against the directors personally. It was held that the contractor,—or rather his executors, for he had died since the transaction,—was entitled to recover the full value of the debentures. It is clear that this was a case in which one of two innocent parties would have to suffer, and the old legal rule applies that the one to suffer must be the one through whose action the loss is incurred; that is to say, the directors, by issuing the debentures, caused the loss; for although the fraud was committed by the secretary, yet they were, so to say, the instruments to affect a third party. The legal rule was also given in the judgment of the Court. The practical point arising out of the case is that it shows how careful directors should be in looking into the affairs of joint-stock companies with which they are connected. The loss to the directors of this railway will doubtless be a useful warning to others.

SOME investigations have been made by Dr. C. Schumann with a view to determining the value of blast-furnace slag, or slag cement, in the composition of mortar. A vitreous slag, however finely powdered, will not set



THE LATE MR. GEORGE VULLIAMY,
Superintending Architect to the Metropolitan Board of Works.

Brigade stations. He also designed the lamp standards on the Victoria Embankment, which are very gracefully composed, and the large lamp at the entrance to Northumberland Avenue.

Among his other works may be mentioned the French Protestant Church, Bloomsbury-street, which has been recently laid bare by the demolition of houses for the construction of the new street from Piccadilly-circus to Tottenham Court-road; a church and schools at Queenhithe; a memorial tower to the Earl of Elles-

mere; the Cleopatra's Needle on the Victoria Embankment, &c.

A short time previously to his death he was engaged in making designs for laying out the ground at the corner of Piccadilly, for which he made several studies. He also made several drawings for proposed continuous elevations for the frontages in Northumberland-avenue, but these were not carried out. It may be added that Mr. Vulliamy was for many years the Secretary of the Royal Archaeological Institute of Great Britain and Ireland.

NOTES.

THE *American Architect* for October 30, which came to hand just after the publication of our last issue, devotes its first editorial paragraph to an appreciative notice of the life and labours of Mr. George Godwin, F.R.S., F.S.A., who was the conductor of this journal for nearly forty years, resigning that position three years ago. What is said of Mr. Godwin by our contemporary is all perfectly true, with the exception of the initial statement, which is an announcement of Mr. Godwin's death. Happily, as many of our readers know, and as all will be glad to hear, Mr. George Godwin is still in the land of the living, and only a few days ago he attended and spoke at the meeting held in the Library Committee Room, Guildhall, to promote the registration of all competent plumbers. The mistake is apparently due to a careless telegraphist. Curiously enough the same number of our contemporary makes reference to the death of the late Mr. E. W. Godwin, who, it says, "must not be confounded with Mr. George Godwin, lately the Editor of the *Builder*," which, however, appears to be

exactly what the *American Architect* has been betrayed into doing.

THE arrangements for the establishment of the Imperial Institute progress very slowly, and even the necessary preliminary of what form it should take, and when it should be built, is not in the faintest degree settled. It is to be hoped, however, that the Committee which the Prince of Wales has judiciously selected outside the South Kensington influence, will be able to arrive at some solution of the question, which may be satisfactory to the public and the distant world of Colonists for whom the Institute is chiefly designed. At present there are conflicting rumours, the latest being that the scheme of re-opening the "Colinderies" next year as a basis appears to be finding favour, and there can be no doubt but that the highest influence is being brought to bear to secure that object. One thing seems quite certain, viz., that there can be no pretence of having a building of any kind to show in time for the jubilee celebration; for before there can be any attempt at construction, there are the plans to be made, the money to be obtained, the scheme



under water, but if it be chilled in water as it flows it will, mixed with lime, form a hydraulic mortar. Slag granulated and ground up with lime and other ingredients is sold under the name of "Pozzuolana cement," and it was with this material that the tests in question were made. To test for porosity the slag cement was mixed with three times its weight of sand, and the cakes, 1.5 centimetre thick, were allowed to set for seven days, being placed either in water or in an atmosphere charged with moisture. A water pressure of 5 mètres was then put on them for a week. With the water-hardened pieces the amount of water passed when subjected to this test was 1.60 cubic centimetre, whilst cakes of Portland cement, prepared in an exactly similar manner, did not let any water pass through when subjected to a similar test. The cakes hardened in damp air permitted 6.05 cubic centimetres to percolate through, whilst Portland cement cakes similarly prepared passed 1.8 cubic centimetre. Slag cement will set very slowly, the increase in strength being slower than in Portland cement. A mixture of three of sand and one of slag cement had a strength of 6.6 kilograms per square centimetre against 17.1 kilograms for Portland cement mortar of the same proportions, whilst the crushing strength was 107.2 kilograms per square centimetre against 200.8 for similar Portland cement mortar. In this case the mixtures had remained under water for twenty-eight days, but the tests made after air exposure were still more striking, the slag cement mortar having a strength of 12.8 kilograms per square centimetre against 36.3 kilograms for Portland cement mortar. It should be noted also that the greater the quantity of water used the more marked was the superiority of Portland cement.

THE recent case of *Parker v. Inge* is a blow to landlords who object to sanitary improvements. A nuisance was found in existence in some premises in Birmingham arising from defective construction of the premises. The Local Authority thereupon served a notice on the owner to remedy the defect. He refused to do so on the ground that there was a tenant in possession, and that he could not properly enter on the premises except for certain reasons specified. But the Court decided that the owner was liable to do the work. He was the owner within the meaning of Section 94 of the Public Health Act. If he showed by evidence that he had asked to go on the premises, and could not do so by some act of the tenant, he could, under Section 93, show that he had "used all due diligence to carry out" the order, and would not be liable for any penalties. As Mr. Justice Cave said, it would be hard on an occupier that he should have to make good structural defects which arose from the act of the owner. Again, Baron Pollock observed, "It is not probable that the tenant in the great majority of instances would object to his landlord coming on the premises to abate a nuisance which was injurious to the health of the persons living there." We should think not. On the contrary, in most cases a landlord who would set up the objection that he was not bound to do structural work to remedy a nuisance because he was not the actual occupier of the premises, would equally refuse to do anything at the request of the tenant.

ACCORDING to some particulars contributed to the *Annales des Ponts et Chaussées* by M. Considère, it has been found that the wheels of a locomotive crossing the Puy l'Évêque bridge at the rate of 31 miles an hour, produced a pressure of about 13 tons on the top flange of one of the girders, which developed dynamical strains in the adjacent lattice bars of 1.59 tons per square inch in the normal section, and 2.1 tons in the weaker parts. If, however, the shock had been produced in the centre of the interval between the connexion of the lattice bars, instead of close to a point of connexion, a tensional strain of 3.24 tons would have been produced in the lower fibres of the flange.

THE first number of the "Dizionario Epigrafico di Antichità Romane," issued by the R. Accademia dei Lincei, has just appeared. Such a book has long been wanted, and we think an English translation would not be out of place. The mass of material constantly accumulating from Italian excavations makes it extremely difficult for any one except the specialist (and, indeed, even for him) to lay his hand on the precise material he wants. The object of the present dictionary is, as announced in the introduction, to "help the student of history, of archaeology, and even of law, to utilise the inscriptions discovered in excavations, by diminishing all merely practical and technical difficulties with respect to them, and chiefly by facilitating reference, and thus to bring into closer juxtaposition the evidence of Latin epigraphy with that of Roman antiquities in general." At present, full half the material turned up by the excavator never filters through even to the special student; it is absorbed in the "transactions" of learned societies. Our only fear for the present undertaking is that it may attempt to cover too wide a field, and so languish, as antiquarian dictionaries so often do, in the A's and B's. The Academy has decided to include (1) religion and mythology, taking in the priests, sacred rites, &c.; (2) politics, with the organisation of provinces and municipal towns; (3) fiscal, judicial, military regulations with all terms relating to mines, public works, the mint, &c.; (4) jurisprudence; (5) corporations and social institutions generally; (6) professions, arts, trades; (7) public games, festivals, &c. The first issue carries us from "Abacus" to "Achaia." The editor's name,—Professor Ruggiero,—is a guarantee for the quality of the work.

PERHAPS the most interesting paper in the new number of the *American Journal of Archaeology*, just out (1886, II, No. 3), is Mr. Joseph Thacker Clarke's account of the archaic Doric shaft and base unearthed in the Necropolis of Assos, the only known example of that order provided with an Egyptian base. For the architectural interest of this column we refer to Mr. Clarke's paper, which is illustrated fully, in which he embraces a theory of his own as to the origin of the stylobate, but we may note that the column has also especial interest, owing to the inscription running down two of the flutings. Unhappily, this is broken away, but enough remains to show that the column was in all probability no member of an architectural whole, but a monument itself, very probably surmounting a cenotaph. The column stands in the living rock, so that it is impossible that any bodies could have been buried beneath. Further, in all probability it was surmounted by some symbolic figure, like the Siren which stood on the tomb of the ruler Isocrates, near the Kynosarges. Such columns,—freestanding shafts, surmounted by figures,—frequently appear on vases, coins, &c. The loss of the remainder of the column is, indeed, matter for the deepest regret. The art of Assos was so provincial, that archaic peculiarities lingered on long after they became extinct in more forward states; and we might have had some early type of Siren hitherto unknown. It is, however, matter for thankfulness that any of the column is left as a good piece of the base had been hewn away to admit the corner of a Roman sarcophagus.

AN interesting paper has just been read by Mr. Topley, before the Geologists' Association, on the erosion of the sea coast, a subject which is of considerable importance to the country at large, and to coast landowners in particular. Most people are aware that in certain maritime counties there is more or less loss of land from the action of the sea, though comparatively few know how rapid that action sometimes is. In the commencement of 1877 not less than three yards were cut off from Norfolk for a distance of many miles, while at one spot called Bacton the loss was 15 yards. At certain localities and watering places, such as Cromer and Folkestone, the destruction of building ground is very

serious, the erosion at Copt Point, east of Folkestone Harbour, being so great, owing to the accumulation of shingle by the pier to the west, that the board declaring the excellence of the site for building purposes is well on its downward way to the sea. At the Blackrock end of Brighton, too, the danger notices are fast being extended, and it will not be long ere the Rottingdean-road is a thing of the past. It would be naturally supposed that the destruction of all England was merely a work of time; but on this point Mr. Topley is reassuring, showing that most of the eroded land was to be met with elsewhere in the shape of banks of sand or silt in some estuary. In the Humber and Wash, for instance, large accumulations have been met with, which, when reclaimed, proved to be most valuable agricultural land, and it has been calculated that these masses exceeded the area of that which had been lost to the Norfolk Coast. The conclusion to which he came on the whole question was, that England is pretty much as big as it was 500 years ago. This is encouraging to us as a nation, although not so much so, perhaps, to those landowners who see their property carried off to make property for other persons.

THE new workshop at the Jewish Orphan Asylum at West Norwood, which has been built and supplied with appliances by Mr. B. L. Cohen, was opened on Sunday last. When the necessity of technical education is so great, this workshop will be of the highest value. For, apart from the advantages of the technical education to the inmates of the Asylum in question, there can be very little doubt that it will have another kind of influence. It will probably cause similar workshops to be erected in other places and at other institutions, and its success,—for we cannot doubt that it will be one,—will probably cause educational bodies now hesitating on the subject to add workshops to their buildings. At the same time, it is impossible that private efforts such as this, however valuable in themselves, and to particular institutions, can do away with the need for a complete system of technical education in connexion with public elementary schools.

THE Louvre possesses one of the only two Greek strigils or scrapers, with engraved handles, which, so far, have been discovered. This interesting piece of bronze has been published by M. Reinach in the *Bulletin de Correspondance Hellénique*, 1886, III. It is well known we have a number of strigils with sculptured handles, but,—probably by a mere chance,—only two that are engraved. One appears in M. Collignon's popular *Manuel d'Archéologie*, a book of which we have had occasion to speak both in the original form and in the translation which appeared in Mr. Sparkes's Fine Art Library. This specimen was in the Varvakeion Museum; exactly in what Athenian Museum it now stands in the general re-arrangement of antiquities at Athens, we are unable to say. The Louvre specimen is engraved with exquisite delicacy, much in the style of the finest Greek mirror-work. The design represents a youthful Hermes wearing the petasos and standing on an Ionic column. Hermes was the patron of the palestra, and he stands on the column on the visible embodiment of the actual building. In the Berlin Museum there is a strigil with the caduceus of Hermes stamped on as the maker's mark.

THE sixty-four water-colour drawings by M. Gustave Moreau, in illustration of La Fontaine's fables, which are now on view at Messrs. Bousod & Valadon's rooms in New Bond-street, represent an eccentric form of art, and are open to a good deal of criticism in regard to figure-drawing; but there is the interest of a distinct style and individuality about them, and many of them are both poetical in conception and rich and powerful (sometimes exaggerated) in colour. They are, moreover, examples of a true water-colour method, with no attempt at effects which are foreign to the true scope of this branch of art. Six of the drawings have been etched by M.

Bracquemond; the etching gives a finish to the design which is hardly discernible in the originals; but the element of colour is so important in the original drawings that they can hardly be said to be fairly represented in black and white.

PHILADELPHIA will soon have the highest tower "in creation." The town-hall of that city, which is rapidly nearing completion, will have a tower 537 ft. high, consequently 27 ft. higher than that of Cologne Cathedral. Until the erection of Eiffel's Tower at Paris, Philadelphia will possess the highest building. The tower is to be surmounted by a bronze statue (36 ft. high) of William Penn. The new town-hall, the foundation-stone of which was laid in 1872, will cost the city the enormous sum of twenty million dollars, and with very little to show for it architecturally except in mere bulk, for it is a poor and vulgar design.

TESTS FOR CEMENT.

THE American Society of Civil Engineers recently appointed a committee to consider "A Uniform System for Tests of Cement." In their report this committee recommends a tensile test in preference to a crushing test; for although the latter is of great value the appliances required are cumbersome and expensive. In large contracts it would be advisable to make crushing tests also, when the ends of the broken briquettes, reduced to 1 in. cubes, might be used.

The time recommended for the hardening of the briquettes is seven days, although when a known brand is being used one day may be allowable, but only for testing as to average quality. The sectional breaking area of the tensile briquettes should be 1 square inch. The cement should be passed through a No. 100 sieve (10,000 meshes to the square inch), made of No. 40 wire, Stubbs's gauge. Duplicate tests should also be made with the material as received, so as to learn whether possible deficiencies in grinding may be compensated for by other advantages in the material.

To test for defects from cracking, two cakes of neat cement, 2 in. or 3 in. in diameter and $\frac{3}{4}$ in. thick, are made, the edges being thin. These cakes are subjected to General Gillmore's test, a 1-12th in. diameter wire being loaded with $\frac{1}{2}$ lb., and a 1-24th in. diameter wire being loaded with 1 lb., the time the cakes take to become hard enough to stand the test being noted. One cake is immersed in water and daily examined for cracks at the edges, whilst the other cake is exposed to the air, when its colour gives a guide as to the quality of the material.

In making tensile tests with "natural cements" one of cement by weight is mixed with one of sand; but with Portland cement only one of cement is used with three of sand. By natural cements are meant the lightly-burned American varieties. Portland cement includes the heavily-burned kinds, either natural or artificial. The sand and cement are mixed dry, and all water added at once, when the mixing must be rapid, yet complete. The mortar is firmly pressed into the moulds, without ramming, the moulds being laid on glass. When set, the briquettes are removed, covered with a damp cloth, and after twenty-four hours are immersed in water. The proportion of water for mixing neat Portland cement is 25 per cent., and for natural cement 20 per cent. With one of cement to one of sand 15 per cent. of water, and with three of sand to one of cement 12 per cent. of water may be used. The water for mixing and immersion should be 60 to 70 Fahr., and the testing-room of the same temperature. The test should be made immediately after removing from the water. The stress is applied at a uniform rate of 400 lb. per minute, but with weak mixtures one-half this rate may be used. Crushed quartz forms the best sand, and the best degree of fineness for cement is that between a No. 20 and No. 30 sieve. The setting of cement does not afford an indication of its final strength. Particulars of sieves used in cement tests are given in the Proceedings of the Institution of Civil Engineers, vol. lxxxv, sec. 3., and the full report may be found in the "Transactions of the American Society of Civil Engineers," vol. xiv, p. 475.

SPA FIELDS (OR NORTHAMPTON) CHAPEL.

This building, which will shortly be demolished in the course of alterations to the site, has had a curious history, and had at one time considerable importance in connection with the great religious revival of last century, a notable feature of which was the establishment of what is commonly known as the "Countess of Huntingdon's Connexion." Selina, second daughter and co-heiress of Washington (Shirley), second Earl Ferrers, married, in 1728, Theophilus (Hastings), ninth Earl of Huntingdon. Her ladyship was sister to the Lady Elizabeth Nightingale, whose effigy forms part of the well-known monument in West Minister. She was left a widow in 1746, with but three surviving children, and an ample fortune. But she thenceforward devoted her interests and her means to developing and maintaining Whitefield's Calvinistic teaching as opposed to the Arminianism of Wesley. She largely contributed to the building of chapels, the support of ministers, and the foundation of a training college at Trevecca in Wales. Her abilities can be estimated by a successful direction of so large an association, including the difficult task of controlling a body of uneducated, however zealous, lay preachers. Moreover, opposite as were her religious tenets and practices to those of her own social world, she preserved to the last her intimacy with many eminent and noted men of her day: several bishops, together with Bolingbroke and Chesterfield, could boast of enjoying her hospitality and friendship. This eminent woman died at a good old age, in her house adjoining the above-named chapel, in 1791,—the year also of Wesley's death,—having been reluctantly compelled at length to submit to a formal separation from the Established Church, so as to secure for her congregations and their ministers that legal protection which the Act of Toleration could afford. She was buried in the family vault at Ashby-de-la-Zouche. The college has since been removed to Cheshunt.

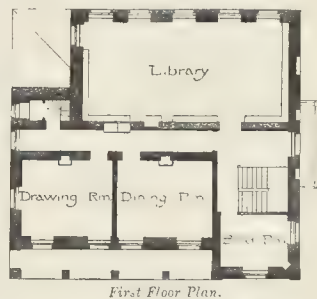
For a while Lady Huntingdon lived in Spa-fields, Clerkenwell. Her house, at present Nos. 24 and 26, Exmouth-street, stood in what was once Braynes-row, and is shown in Thornton's engraving after Hamilton, of 1783. This row formed the southern side of the modern Exmouth-street; its modern style, dating from about seventy years ago, being a tribute to the popularity of Admiral Sir Edward Pellew, Bart.* Braynes-row, by the way, must not be confounded with Baynes-row, or street, further westwards.† Next west to the countess's house was a circular building, which, together with the house in question, had been opened in 1775 as a place of entertainment or resort, by name of the Spa-fields Pantheon. The pantheon was purchased by her ladyship in 1779; and, as re-adapted for worship, soon became a leading chapel attached to the "Connexion." It is lighted by three rows of windows, and a round lantern over the cupola. The interior is fitted with two gallery-floors, an organ, altar-table, and so on. Two carved high-backed chairs by the altar (to the west) are shown as personal relics of the foundress. Outside, by the portico, stood an obelisk to her memory. The obelisk, of red granite, has just been removed to the new site at Lloyd-square. The organ is associated with the memory of Shrubsole, the chapel musician, who composed the air to Perromett's hymn, "All hail the power of Jesu's name." The quasi-Classic portico, facing to Exmouth-street, is modern, and is not square with the diameter through the doors within. Were it not for the wall windows, the addition of a portico gives to the structure a *faux air* of the Pantheon at Rome. The portico obscures the original semi-circular and embattled entrance which stands out in Hamilton's view. It is inscribed "Spa Fields Chapel, 1779." The area of nearly 43,000 square feet eastwards of the chapel is the old graveyard; and has acquired an unenviable notoriety for the crowded number of interments made therein. The burial-ground marks the site of the pond in the former Ducking Pond Fields. It is stated that heaps of remains were periodically burned

in order to find room for additional burials (thus anticipating the necessity of cremation); and that within fifty years as many as 80,000 bodies were laid in a space which should receive 1,400 at most. That nuisance culminated in a holocaust of the year 1845, when the lessees were indicted, and their nefarious proceedings arrested. Containing no tombstones, the graveyard has latterly served for a volunteers' drilling-ground. In August of last year the Marquis of Northampton, as freeholder, permitted the space to be opened by the Metropolitan Public Gardens Association, who, aided by grant from the Lord Mayor's fund, drained and levelled the land. Such a gift to the children of the neighbourhood proves the more valuable in that they are forbidden to make a playground of the recently-opened Wilmington and Northampton squares hard by and on the same estate.

A last service was celebrated in Spa-fields Chapel on Sunday, September 26th last, when Mr. E. J. Bird preached from the text, "Rise, let us be going" (St. Matthew xxvi. 46). The congregation have secured a fresh freshhold site by Lloyd-square, Clerkenwell, from the New River Company. On that site has been erected their new chapel, at a total cost of 15,000*l.*, almost entirely defrayed by the proceeds of property devised to them by the late Mr. Oldham, a prominent member of the community. The new chapel, of red brick, with stone dressings, is in the Early English mode, and is nearly octagonal in plan. There is room for 600 seats upon the ground floor, and for 110 in the gallery. The accommodation can be increased to 1,000, by the construction of more gallery seats. In the tower, 100 ft. high, is a muniment-room. Certain rooms for the vestry, the classes, and the committee are provided. A new organ has been presented anonymously. This chapel, on the northern side of Wharton-street, Lloyd-square, was opened for worship on September 29th last, and the former building in Exmouth-street will shortly be pulled down.

THE BRITISH SCHOOL AT ATHENS.

We give a view of the house erected for the British School of Archaeology at Athens, and also the plans of two floors as carried out; there has been some little alteration from the first scheme. The house, as we have before mentioned, was designed and planned by Mr. Penrose.



First Floor Plan.



Ground Floor Plan.

We have received an early copy of the rules and regulations for the school, which will shortly be obtainable by application to the hon. secretary, Mr. G. A. Macmillan. In these the

* Second son of Samuel Pellew, of Flushing-by-Falmouth, elevated June 1, 1814, Baron Exmouth, of Canonteign, co. Devon, and advanced Viscount Exmouth, September 21, 1816, for his gallant victory at Algiers on August 27 of that year.
† Vide the *Builder*, September 12, 1885, vol. xlix, No. 2,223, p. 348.



The British School at Athens.

objects of the school are clearly defined, and we may quote that portion of the rules which sets forth these definitions:—

"I. The first aim of the school shall be to promote the study of Greek archaeology in all its departments. Among these shall be (i) the study of Greek art and architecture in their remains of every period; (ii) the study of inscriptions; (iii) the exploration of ancient sites; (iv) the tracing of ancient roads and routes of traffic.

II. Besides being a school of archaeology, it shall be also, in the most comprehensive sense, a school of classical studies. Every period of the Greek language and literature, from the earliest age to the present day, shall be considered as coming within the province of the school.

III. The school shall also be a centre at which information can be obtained and books consulted by British travellers in Greece.

IV. For these purposes a library shall be formed and maintained of archaeological and other suitable books, including maps, plans, and photographs."

The following definitions are given as to the qualification for becoming students:—

"XVI. The students shall consist of the following:—

- (1) Holders of any travelling fellowships, studentships, or scholarships at any University of the United Kingdom or of the British Colonies.
- (2) Travelling students sent out by the Royal Academy, the Royal Institute of British Architects, or other similar bodies.
- (3) Other persons who shall satisfy the Managing Committee that they are duly qualified to be admitted to the privileges of the School.

XVII. Students attached to the School will be expected to pursue some definite course of study or research in a department of Hellenic studies, and to write in each session a report upon their work. Such reports shall be submitted to the Director, and may be published by the Managing Committee if and as they think proper.

XVIII. Intending students are required to apply to the Secretary. No person shall be enrolled as a student who does not intend to reside at least three months in Greek lands."

The Director is to be appointed by the Managing Committee for a period not exceeding three years (but is eligible for re-election); he is to direct the students in their studies, and to deliver "at least six free public lectures at Athens during the season."

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The second meeting of this Institute for the present Session was held on Monday last, Mr. E. T'Anson, F.G.S. (President), in the chair.

The Secretary (Mr. W. H. White) announced the decease of three members of the Institute, viz., Mr. George Devey, Fellow; Mr. Robert A. Fraser, Associate; and Mr. George Vulliamy, Past Vice-President.

The President said he should feel it to be his duty, with regard to Mr. Vulliamy, to convey to the widow the deep sense of the loss the Institute had sustained by his death.

Mr. Charles Fowler, in endorsing what the President had said, said he felt it was unnecessary for him to enter into the merits of an old friend who was so well known to many in the room.

Mr. Edmund Woodthorpe said that he had known Mr. Vulliamy from his earliest days.

As the oldest District Surveyor in the Metropolitan, and as having occupied the position of Chairman of the District Surveyors' Association, he (Mr. Woodthorpe) had been brought much into contact with Mr. Vulliamy, whose judgment and capacity, and his genial manner, were acceptable to the whole profession, besides his being a most kind and generous man in his relations with young professional men. Indeed, it would be difficult to find a man with the common sense, judgment, and gentlemanly discretion displayed by their deceased friend to succeed him in the office of Superintending Architect to the Metropolitan Board.

Professor Kerr said that the name of Mr. Devey ought not to be allowed to pass unnoticed, he being a very distinguished artist and a most creditable member of the profession.

Mr. George Aitchison, A.R.A., spoke as to the extreme delicacy of design and the general competence of the late Mr. Devey, whom he had known for over thirty years. At their first interview, Mr. Devey showed him a collection of sketches of old lamps from almost every Continental town, and, later, he had the pleasure of seeing some beautiful works of Mr. Devey's, mainly in Kent, near Lord De Lisle's seat. Everybody who knew Mr. Devey would regret his death, he being not only an architect of extreme diligence, but one whose works exhibited great elegance of detail.

Mr. R. Phéné Spiers suggested that when some memoir was written of Mr. Devey, it might be illustrated by a few of the models he had made, and with photographs of several of his buildings, without which it was impossible to understand the power of design and fertility of imagination which characterised all his works.

Prof. T. Roger Smith said he hoped that if a memoir of Mr. Vulliamy was read they might have an opportunity of seeing some of his admirable drawings made abroad, as well as for works at home. Before Mr. Vulliamy became Superintending Architect to the Metropolitan Board of Works he was engaged in practice with his uncle, Mr. Lewis Vulliamy, and made a great many of the drawings for the works carried out by that architect, including those for Dorchester House, Park-lane.

Mr. John Hobb, as one who had been intimately associated with Mr. Vulliamy for the last ten years, said he believed it would be difficult to find a more considerate and gentlemanly man. He began life a great many years ago, and those who only knew him as Architect to the Board of Works were probably not aware that he was an artist of great ability. He began life as an engineer, but that profession not being a congenial one, he was articled to Sir Charles Barry, afterwards making an extensive tour abroad, in Italy, Greece, and Minor, and Egypt for three years, drawing and making sketches

wherever he went, and measuring a great number of monuments, including those of Carnac and several of the larger temples of Egypt. On returning home he commenced practice, making a very good position for himself, and erecting several remarkable buildings. As Superintending Architect to the Metropolitan Board of Works he also did some things which showed in a marked degree his ability as an artist, notably a group of buildings in Queen Victoria-street, and the lamp standards on the Victoria Embankment. The public had great confidence in Mr. Vulliamy, and those who knew him, and had had business with him, must have been struck with his constant courtesy and his refinement of manner.

Mr. Percy G. Stone read a letter from the Rev. Chas. Voysey referring in eulogistic terms to the late Mr. Devey. He (the speaker) added that he was one of the few pupils Mr. Devey ever had, and hoped they would some day see upon the Institute walls an exhibition of some of his old master's marvellous sketches, as well as photographs of his works.

Mr. Philip Herspath, of Auckland, New Zealand, Fellow, and Mr. William Dunn, Associate, were introduced and welcomed by the President.

The Secretary announced that at the Examination held recently under the terms of the Metropolitan Building Act, the following gentlemen had received certificates of competency to act as District Surveyors in London, viz., Messrs. F. E. Farrow, Henry Blackburn, W. C. Evans, Brooker, S. Whatman, jun., and E. Mountford. At the same examination Mr. John C. L. Bettridge had received a certificate as Building Surveyor under a local authority, being the first candidate who had passed in this new examination conducted by the Institute.

The Secretary, in the absence of its author, M. Paul Sédille, then read a paper entitled "Étude sur la Renaissance de la Polychromie Monumentale en France." Mr. White explained by way of preface that M. Sédille had been instrumental in obtaining for the Institute certain working drawings by M. Garnier, belonging to the archives of the New National Opera and the French Government, and had also sent some working drawings of his own. The following is an abstract of the paper:—

The ancient and traditional custom of colouring exteriors in France had declined by the reign of Louis XIV. The eleventh-century paintings on the Church of St. Savin, near Poitiers, were the oldest extant in France. Polychromy had been employed very largely in later centuries, and the façade of Notre Dame de Paris still bore traces of paintings, as did also the greater portion of the ecclesiastical edifices of the thirteenth, fourteenth, and fifteenth centuries. The wooden frontages of residences were also painted, while pottery and glazed tiles were encased between the beams.

During the Renaissance, the influence of Italian taste transformed external polychromy; colouring was subdivided and localised, the paintings being often enriched with gilding, marble, and enamels. Terra-cotta and glazed materials were much used. The monuments of those cities famous for the works of Luca della Robbia and his school were the sources of inspiration. Moulded to its own taste by the French Renaissance, coloured architecture appeared less marked at the end of the sixteenth century, and diminished during the seventeenth, although found under new aspects in the half-tile half-stone façades of the Louis Treize period. From this epoch it disappeared almost entirely. With the era of the Grand Roi was inaugurated the solemn architecture imported by the Jesuits and Bernini. French artists, while imitating Italian buildings of the end of the sixteenth century, thought they followed the spirit of ancient Roman art. They restored antique edifices by robbing them of the splendours of their colouring, and reducing them to the bare beauty of form and proportion. This dealt a fatal blow at coloured architecture not only in France but in all those parts of Europe which had any architectural pretensions. During the eighteenth century colour was absent from every architectural conception; the total eclipse of this radiance was a veritable singularity in the historical records of architecture. All ages and peoples had given polychromy a prominent place in architecture. Architecture was the outcome of the great laws and aspects of nature, and was not colour the manifestation of nature? Could one imagine an object without its appropriate colouring? White and black were but light and shade intensified, and used as a setting to convey the full effect of the infinite varieties of colour. It might logically be hoped that colour would reassume over architecture those rights which belonged to it from time immemorial. In the style called "Louis Seize" a few light ornamental paintings vainly attempted to restore colour to the panels of doors and wainscoting. The Revolution, the Directorate, and the Empire for a long time overcame these fancies for colour. The style Impérial, in spite of its pompous stiffness, was, however, not wanting in brilliancy and masterly qualities of composition. Moreover, the art of the First Empire was represented by two talented men,—Percier and Fontaine,—and it might be assumed that, had Percier been less influenced by the taste of the age, he would not have been unmoved by the charms of colour. His design for the interior of a Salle-de-Musée, decorated with ornamental paintings of delicacy and harmony, is a proof of this. During the Bourbon restoration architecture remained stationary, but the Revolution of 1830 signalled the advent of a new era. With the restoration of the souvenirs and monuments of France of the olden time, attention had been called to the arts of the Middle Ages and the Renaissance. The works of Vitet, of Prosper Mérimée, of De Caumont, of Didron, and later on of Viollet-le-Duc, familiarised the public with Mediæval art. Wall paintings reappeared in old buildings freed from the whitewash of previous centuries, and colour, used in interiors, was soon to be produced on exteriors. A succession of important works on ancient art contributed to this return of polychromy. Hittorff was one of the first to search for colour on the monuments of antiquity. Segesta, Selinus, and the temples of its Acropolis, were objects of his studies, when in 1823 he visited Sicily. The results of his observations he had communicated to the Académie des Beaux-Arts in several papers, which created a great sensation. Encouraged by some, violently opposed by others, Hittorff saw his opinions passionately rejected or accepted; but the subsequent labours of the students at the École de Rome proved the accuracy of his theories. In 1851 he published "L'Architecture Polychrome chez les Grecs," containing a restoration of the temple of Empedocles at Selinus. Hittorff had restored, in like manner, the three temples which stood close to the Acropolis of Selinus. Théodore Ballu and Paccard were the first who left the Villa Médicis to study the ruins at Athens, and in 1845 and 1847 respectively restored the temple of Minerva Polias and the Parthenon, but the colouring was not represented in the bright colours of a newly-finished work. In 1848 Tetaz resumed the studies carried on by Th. Ballu at the Erechtheum, but M. Charles Garnier was

the first who displayed, in his restoration of the Temple of Jupiter Panhellenius in Ægina, Grecian polychromy in all its pristine brilliancy of tone. As a reminder, M. Sédille mentioned the works of several other French architects, and among them the restoration of Pæstum by Henri Labrousse. The excavations at Pompeii had periodically brought to light painted apartments. Constant-Dufeux had stated his belief that the Trajan column had at one time been entirely painted. Hittorff set the example of using colour in important works. His *Cirque* in the Champs-Élysées was a valuable testimony to the effects that polychromy could produce. Duban was one of the first to manipulate colour with an exquisite sense of harmony. At the École des Beaux-Arts he produced the "Loggi di Raffaele" in the galleries, and decorated the porticos in the Cour-du-Murier with paintings in a Pompeian style. Variegated marbles, glazed tiles, terra cotta, and naked iron had been used by him with truth and logic. Constant Dufeux also produced colour decorations, refined, harmonious, and effective. The diocesan architects sought to restore to the great religious edifices their ancient colouring, and in some cases with success. In the villa Louis Duc had built for himself at Croissy, on a bank of the Seine, the colouring was a distant repletion of Oriental art, and there, both internally and externally, paintings and glazed tiles combined to produce a decorative effect, as cultured as it was refined. After Italy, Greece, and the monuments of the Middle Ages, and the Renaissance, the East had supplied a conclusive argument in favour of coloured architecture, and for some time the East had been invading the West. Colour had extended itself without to without; no longer by superficial coats which would rapidly fade in damp climates, but under the form of coloured materials. The development of ceramics placed at the disposal of the architect, a varied supply of solid materials. The Exposition-Universelle of 1867 gave prominence to the efforts of English and French potters, while the *Azulejos* of the old Spanish monuments, the faience coatings of the mosques of Cairo and Persia, and the decorations of the Indian palaces, had exercised a sort of fascination easily accounted for. It was necessary to take these circumstances into consideration, in order to understand the marked reaction which then became manifest in favour of bright colouring obtained by the use of natural materials. M. Charles Garnier had introduced mosaics on a large scale in the *Nouvel-Opéra*, which had been a kind of revelation, and had borne abundant fruit. About 1872, after returning from Spain, M. Sédille himself largely employed terra cotta and glazed tiles, in combination with highly-coloured woods. From that time the use of terra cotta and glazed tiles had become general both in France and England,—indeed, in the latter country the efforts made to utilise the resources of the potter's art dated back to an earlier period. The Exposition-Universelle of 1878 gave a great impetus to the manufacture of ceramics; the façade of the Exposition, and the special pavilion of the Ville-de-Paris, equally attracted attention. As a proof of the renaissance of polychromy, M. Sédille mentioned many works executed in Paris, by David, Ballu, and M. Garnier, Vaudremer, and others. He, however, urged that it was no longer paintings which, as in the olden time, must constitute modern polychromy; but rather the coloured materials themselves which formed a part of the structure. This art had not, so far, been received with unanimous approval, and all the attempts hitherto made had not been equally satisfactory. But a misconception of colour ought no more to discourage one from polychromy than bad architecture ought to set one against good. Architects should serve a special apprenticeship to colour, study the laws of harmony, fathom its resources, and thoroughly understand the part it played, so as to avoid its abuse. Coloured materials, such as granite, marble, stone, metal, and wood, allied with terra-cotta, enamels, and all the fire-tested products, would render modern polychromy as lasting as the edifices of which it would be one day the inseparable adornment.

Mr. George Aitchison in opening the discussion remarked that M. Sédille was an extraordinary man. He was not only one of the apostles of colour in architecture, but so excellent a landscape painter that his pictures were admitted to the Paris Salon. He was a

man of such literary power that essays by him have appeared in the *Gazette des Beaux-Arts*; he was an architect, and a sort of apostle of the new architecture yet to come, not only in France, but in England and all over Europe. M. Sédille felt that a great portion of the construction of modern buildings must be in iron, he accepted those conditions, and in the *Magestins du Printemps* he had endeavoured to bring some of what formed the bulk of the interior structure to the outside. He had tried by only using piers and angles of masonry to show how constructions in iron and bronze could be made, in good proportion, harmonious in point of outline, and beautiful in colour. It must be interesting to all present to hear how the whiteness which at one time overspread everything like a leprosy was gradually being cured. M. Sédille when in this country was delighted to find how advanced English architects were in the use of external colour, and was enthusiastic on seeing in many of our buildings how much use had been made of mosaic on a gold ground, and of enamelled pottery and tiles. One cause, no doubt, of the general prevalence of white in buildings during the last century or so was that the Roman remains had been so bleached by time that the gorgeous colours they once presented were almost gone. Many of the temples, now a dirty white, were at one time blazing with colour, and when one went to Ravenna and saw interiors of tombs and temples covered with mosaic, it was evident that the Romans were by no means such great admirers of white as had hitherto been supposed. Their exteriors were mostly coloured by means of splendid marbles of high tint and polish, and also of bronze and gilding; therefore it ought not to be said of them that they delighted only in proportions shown in white. M. Garnier, in one of his publications, had given a sort of dream of what was in store for Paris, when everybody would have as great an admiration for colour as he himself had, and when the houses would be resplendent with mosaic, polished marble, enamelled terra-cotta, bronze, and gold. M. Garnier also made a charmingly apposite remark on the subject of marble. He said, "Marble, it is true, does not retain its pristine beauty and polish in this damp climate of France; but, however damaged it may become, it has always a superior and cultivated air. It is like a gentleman in a shabby coat; you never mistake him for anything but a gentleman, and he is a very different person indeed from a common fellow in his Sunday best." The members of the Institute were very much indebted to both M. Sédille and M. Garnier for the magnificent specimens of detail working drawings shown upon the screens. He might add that M. Sédille had built several country houses enriched with enamelled pottery. In England, a veritable land of potters, that charming material might well be more employed than it was. He wished to point out the capability of the material, even in country places, for enhancing by a little bit of colour the whole tone of the building. When he was a young man there was a general feeling that statues and buildings ought to be white, and that any kind of colour only spoiled them; but how many things in nature were white? On misty days the whole sky was white; when snow fell the whole landscape was white; but, as a rule, white was used by nature very sparingly, and as a precious thing to give greater emphasis to the colour about it. He did not see, therefore, why men should not go to nature for their colour, as they had gone to her for the delicate proportions, elegant outlines, and the light and shade of her most choice productions.

Mr. H. H. Statham proposed a vote of thanks to Mr. Paul Sédille for the very interesting and suggestive paper he had sent, and which had been received with the applause always bestowed on recommendations to use colour. Everybody applauded such recommendations, but very few people carried them out, perhaps for want of sufficient encouragement to do so. There were, he thought, one or two points in the paper which suggested question and consideration. Throughout the whole of it, M. Sédille had carefully kept himself to the recommendation of constructive polychromy for external work, and rightly so, for it should be borne in mind that any attempt to apply colour to the exterior of buildings by mere pigment, would not only probably end in a gaudiness of effect, but would

also interfere with the monumental and imperishable character always desirable to maintain in any building of importance. With regard to the restorations which had been made, by various theorists, of Greek temples and other buildings, as they were supposed to have been painted, and based simply on the remains that had been discovered, although they might be very plausible, and were, in many cases, no doubt, really something like what had been done, he could not say that they had always impressed him with increased respect for the artistic judgment of the Greeks. If they took even the very moderate examples given by Mr. Penrose at the close of his book, and some also, which, if he remembered rightly, were given by Hittorff,—whose book he was sorry to say he had not looked up for many years,—even if the Greeks did do such things, metopes in strong red and triglyphs in strong blue, it was hardly a style of colour that added dignity or refinement to a building. If works like the Parthenon were really carried out in such colours, it was an indication that even the Greeks were not without their shortcomings. With regard to the painting of the statues in the frieze of the Parthenon, he might remind them of a suggestion from Germany a few months ago, which was published in an English journal, to the effect that the frieze of the Parthenon was not painted in crude and dead colours, but was gilt first and painted on the gilding, so that there was a kind of opalescent effect. This suggestion was stated by the writer to be borne out by the traces of gilding all over some portions of the work. He (Mr. Statham) had looked into the matter, and thought he could see some indication of this on some of the remains of the frieze in the British Museum. At all events, that was a suggestion of the manner in which the frieze might have been painted, a method which would have given much more brilliancy than the mere use of pigments on a dead ground would have produced. With regard to the painting of statues, touched upon by Mr. Aitchison, it ought to be remembered that statues in general, and certainly the Greek statues, were not, strictly speaking, imitations, but idealisations, of nature. They were the representations of ideas shown through natural forms. The nearer the natural colours were arrived at,—and this could never be quite attained, because it was impossible to colour marble so as to produce an optical illusion,—the more would the statue be removed from the realm of idealism and brought down to mere realism. Therefore, he could see no strong objection to statues being pure white. They were not imitations of the natural, but of the ideal, and the efforts made by Gibson, with a very strong belief in the practice of the Greeks, as represented by the works he had left to the nation, were to his mind most unhappy, and constituted a warning rather than an example. He quite sympathised with what both M. Sédille and Mr. Aitchison had said as to the far greater use which might be made of constructive polychromy in durable materials and the employment of those tiles of which there was so large an assortment, and which the French architects in many cases got from this country. In conclusion, he said he could not help thinking that polychromy might be made to bear upon the decoration of the room in which they were assembled, which showed what Mr. Aitchison had called a "leprosy of white" over their heads. The dome and ceiling decoration would really lend themselves happily to colour, and it would be a good practical outcome of M. Sédille's paper if in due time, when funds were forthcoming, they selected the decorator in whom they had the most confidence, and asked him to do a little polychromy for the meeting-room of the Royal Institute of British Architects.

Mr. Henry Dawson seconded the vote of thanks, sympathising, as he did, strongly with the idea of increasing the beauty of our buildings externally, not by the application of any pigment as colouring, but by the use of materials in construction natural in their colour, and, therefore, fairly durable. He would suggest, and especially to the younger members, who were the more likely to build in the future, the desirability of using much more largely than hitherto the various tinted stones that existed even in this country. Some were beautifully coloured, and yet they had been very much neglected. In Northumberland he had lately found new quarries affording admirably coloured stones, which were being used by the North-

Eastern Railway in their stations with very good effect. He thought, therefore, it would be well if London architects, where they were able to do so, would make more use of these native stones, which could not fail to materially add to the cheerfulness of the appearance of buildings in the metropolis. Very praiseworthy efforts had been made of late by some architects in London, and he thought this was a step in the direction of carrying out the idea. M. Sédille had in introducing colour to the exterior of buildings.

Mr. William Woodward remarked that an excellent example of external polychromatic decoration was to be seen at Messrs. Novello & Co.'s, Newman-street.

Mr. Octavius Hansard said he would warn every one to be guarded in the use of stone from any quarter of these islands until it had been tried in London. It would be a most delightful thing to be able to employ stone from the Northern, Eastern, or Western counties, but woe betide the architect who lived beyond a decade from the completion of his works if he brought these stones into the metropolis.

Mr. John Hebb said he should be sorry to say anything that might offend national susceptibilities, but he could not help remarking that throughout M. Sédille's paper there was a vein of eulogy of his countrymen which was, to say the least, remarkable. It was even more remarkable that that eulogy did not stop there, but was even extended to a considerable number of the architects of this country, though, as a rule, French architects were not very liberal in their appreciation of English architecture. M. Sédille might have been a little more guarded in his praise of the failures of the polychromatic decoration of Medieval churches in Paris. It did not require any great acquaintance with the subject to pronounce all those attempts to which M. Sédille had alluded, particularly in the case of Notre Dame, St. Germain des Prés, and the Sainte Chapelle, as being conspicuous failures,—failures not, as M. Sédille would have them believe, because they were the results of an imperfect adaptation of a good principle, but because they were endeavouring to carry out something that was impossible. They were really attempts to reproduce an entire scheme of decoration from mere patches of colour, which must be a matter of impossibility.

Professor Kerr said that a specimen of a new material was brought to him the other day, which it might be interesting to refer to in connexion with the present discussion. This was a sample of natural stone glazed by Messrs. Cliff, of Leeds. The question of glazing stone had for a long time been before the minds of inquirers, with the view to enabling a building to keep itself clean by means of the rain. The merit of the contrivance was that although the glaze was effected by the ordinary means of producing a pottery glaze, it was put on to the stone, as he understood, at such a low temperature as not to injure the stone. If he was rightly informed, the glaze was accomplished by a portable oven which could be fixed on any building works in progress, and the stone as it was dressed could be glazed before being laid. If there was anything in the invention, and if the glaze could be modified a little so as not to be too glaring, the introduction of the various stones of the country, which Mr. Hansard was so afraid of bringing into London, might be accomplished with greater confidence of success, because in every case, not only was the surface protected against the weather, but the colour was brought up, and from the different tints of freestones a very excellent polychromatic effect might be produced.

Mr. J. D. Crace thought it was most interesting to have heard, summed up in a few words, the history of the advance of polychromatic treatment in France, and particularly during the last fifty or sixty years. Mr. White, before reading the paper, had pointed out a few of the drawings which he (Mr. Crace) had sent to illustrate M. Sédille's remarks, and he ought to explain that they now appeared on the Institute walls for the second time, after an interval of more than forty years. They were prepared for the illustration of three separate papers by his father, in 1843, 1846, and 1848, with the express object of calling the attention of the Institute to the progress of polychromy abroad. One was an interesting example of polychromy which had been executed at Munich about 1840, and which was illustrated by some of the drawings referred to. One speaker had reverted to the unfortunate decoration of Notre

Dame, but he had not followed M. Sédille in the sense of praising that work. Allusion had been made in the paper to the external decorations of the Trocadero buildings, and any one who examined them carefully could not fail to be struck with the great amount of thought and delicacy they exhibited. They were in mosaic, introduced with great moderation, but with much effect, and he was pleased to be able to praise them, because he was not so well satisfied with the internal as with the external decoration. One could not help also being struck with the great refinement, and the careful thinking-out of all the colour applied to Parisian buildings of any importance. As to the colouring of statues, he would be sorry to enter upon the thorny controversy as an advocate for or against the practice. No doubt, colour was used on the sculpture of the ancients, but whether with advantage or not he was not prepared to say.

Mr. R. Phené Spiers thought that the subject divided itself into two considerations, first as to the remains of colour on ancient buildings, and, secondly, what would be the advantage of adapting it to our present buildings. As regarded the remains of ancient colouring on buildings, it was not exactly fair to judge them from the drawings which had been published in various works. He quite agreed with Mr. Statham that the bright-coloured metopes and triglyphs shown in the drawings of Mr. Penrose's book were somewhat disagreeable; but it must be remembered that those drawings had a partial glaze which probably was not the case in the buildings themselves when coloured. Again, one looked at the drawings by the dim light of this country, while the buildings were lighted up by the brilliant sun of the East. The Egyptian buildings still retained their colour, and preserved the same brilliancy which, as far as one knew, they originally possessed, but without that crudeness which they appeared to have in the drawings. He had no doubt in his own mind that the Parthenon must have been brilliantly coloured, or it would have been impossible to see it. The Walhalla, a building erected at Ratibon, in imitation of the Parthenon, and in the same material, was not coloured, and even under a bright German sun it was almost impossible to look at it. So great was the glare of the light on the white marble that the intense brilliancy of the object prevented its form being seen. It was evident that it would be useless in Greece to erect a building of the proportions of the Parthenon if it was impossible to look at it; therefore there must have been some colour upon it. With regard to the application of colour nowadays, there was one central point to be borne in mind, viz., that a very brilliantly-coloured object in this country, and especially in London, was far from agreeable, and that nature always insisted upon toning it down until it became more in harmony with our skies. As an instance, he cited the Buxton Memorial Fountain, at the corner of Great George-street, Westminster, which was constructed in bright washable materials, but it always looked too glaring after its periodical cleansing. As soon as a brilliantly-coloured or glazed surface was put up in London it was out of keeping with the climate, and therefore it was wrong to use it.

Mr. Sydney Vacher referred to what South Kensington was doing for colour by sending students to Italy, and having models constructed of whole compositions. He believed it would be a great thing if the Institute could do something in the same direction.

The President said he thought the meeting might be congratulated on having heard M. Sédille's instructive and agreeable paper, and the practical and learned remarks it had elicited. In addition to the vote of thanks to M. Sédille, he would also convey the acknowledgments of the Institute to M. Garnier for lending them his excellent drawings.

The resolution was then carried by acclamation.

The President further intimated that the next meeting would take place on the 6th proximo, when a paper in English, by Signor Giacomo Boni, of Venice, Hon. Corr. Member, would be read, entitled "The Ca d'Oro and its Polychromatic Decorations."

The Will of Sir John Kelk.—The will of Sir John Kelk, who died on the 12th of September last, has been proved, the personality being sworn as of the value of 408,352l.

THE INSTITUTION OF CIVIL ENGINEERS.

THE PRESIDENT'S ADDRESS.

At the opening meeting of the session, held on Tuesday, the 9th inst., Mr. Edward Woods, President, delivered an address, in which he stated that his connexion with the profession dated from the time when he entered the service of the Liverpool and Manchester Railway Company, so that he had had an opportunity of observing the gradual and progressive development of the railway system,—of the steps by which that system of inland transport had attained its present degree of perfection. The Liverpool and Manchester Railway without doubt afforded the pattern and example upon which (with such modifications as the experience of the first few years of its working suggested) its immediate successors were designed and framed. That line was originally laid with so-called fish-bellied rails of 35 lb. per yard, resting in iron chairs, supported on stone blocks wherever solid ground permitted their use. Wooden sleepers were only used as a temporary measure, where the road was on embankment, or on soft moss, and simply as affording ready means of lifting and adjustment until the bed had become consolidated. So much importance was at that time attached to the provision of a firm and rigid foundation for the rails, that George Stephenson took advantage of the rocky floor of the Olive Mount cutting, near Liverpool, to form a bed on which the chairs should directly rest. Again, Jesse Hartley, the Engineer to the Liverpool Docks, when he commenced the Bolton and Manchester Railway, carried out to a large extent the system of building up from the ground level solid stone walls on which to rest the rails. Mr. Brunel, preferring timber supports for the Great Western lines of rail, began by driving piles to carry the longitudinal half-balks of timber, on which were placed bridge rails. All these methods were found, from one cause or another, to be defective; and, chiefly by reason of injury done to the rails through excessive rigidity, had soon to be abandoned. On the Liverpool line the increasing weights of engines and speed of travelling soon necessitated a more substantial roadway, and led to the ultimate relaying, in successive portions, of the entire road, first with rails of 50 lb., then of 62 lb., and afterwards of 72 lb., and finally of the still heavier type now in use, made lately of steel instead of iron. The fish-bellied form was superseded at an early period by a rail of uniform section throughout, an improvement resulting partly from the experience of a sample piece of the line so laid, and partly from the conclusions arrived at by Mr. Robert Stephenson in determining the form to be adopted for the London and Birmingham Railway, after an exhaustive inquiry, conducted by the late Professor Barlow, at the instance of the Board of Directors of that railway. Mr. Locke had elected to adopt a similar form of rail for the Grand Junction Railway, and to lay the entire line on wooden sleepers. Since then stone blocks had been almost universally abandoned, as it was seen that, although wood was of a perishable nature, its elasticity, and the facility which it afforded for repairs, materially diminished the cost of maintenance, and contributed greatly to relieve the rolling-stock from the shocks and jars it encountered in passing over a rigid road. The same considerations led to the general adoption of the compressed wooden key in preference to the iron key for securing the rail to the chair. These variations, together with the subsequent application of fishing the joints of the rails, and the substitution of steel for iron, were embodied in, and constituted, the accepted practice of the present day. Cast-iron sleepers had been used somewhat extensively on foreign lines, but it was not improbable that as long steel sleepers might take the place of these as well as of wooden ones; and already such were coming into use on several of the leading trunk lines in England as well as on the Continent, whilst large quantities were exported to India, where, in addition to their other qualities, they afforded exemption from the attacks and ravages of the white ant. Generally the substitution of steel for iron rails had been attended with most beneficial results to all railway companies, a change which was rendered possible by the inventions of Sir Henry Bessemer and of the late Sir William Siemens, and by the keen competition of manufacturers. Within a recent period con-

tracts had been made for steel rails of heavy double-headed section, delivered free on board, at less than 3*l.* 10*s.* per ton, whilst in 1870 the market price of iron rails of similar type ranged as high as 7*l.* 10*s.* per ton, steel rails then ruling at 10*l.* per ton.

The President then proceeded to observe that the most advanced type of locomotives of the present day retained the essential characteristics of those which held the field at the commencement of the era to which he had referred. The important features common to both included the water-surrounded furnace chamber,—the multitubular boiler,—the wheels mounted either on crank or on straight axes, whether single or coupled, driven by a pair of horizontal or inclined cylinders, the smoke-box, and the steam blast to intensify the draught. Great improvements, it was true, had been effected in most, if not in all, constructive details, whilst the progressive increase of traffic called for a corresponding augmentation of the power necessary to haul the trains. Hence the locomotives of the present day possessed, as a rule, at least four times more steaming power, coupled with six-fold weight, than those of the class represented by the "Planet," the approved type of the period from 1832 to 1836. Contrasting the two types, the approximate comparison as regarded weight was as 7½ tons to 45 tons; as to firegrate area, as 7 square feet to 20 square feet; and as to heating surface, as 300 square feet to 1,400 square feet. Inclines which at one time were regarded as too formidable to be worked advantageously by locomotives, were readily surmounted by the powerful engines of the present day. Hence gradients of 1 in 50 and 1 in 60 were common on many railways, whilst important lines, ascending and crossing mountain ranges in different parts of the world, had continuous ascents of many miles in length of 1 in 25, 1 in 30, 1 in 33, &c., worked by engines differing only from such as were common in England in the circumstance of greater dimensions and capacity, and adjusted so that the weight on the coupled wheels should be sufficient for the utilisation of the tractive force they were designed to put forth. The limit of inclination admitting of being surmounted by locomotives appeared to be practically reached at the figure of about 284 ft. to the mile (1 in 20); for beyond that limit the weight necessary to be given to the engine to procure adhesion absorbed, by reason of the gravity of its own mass, the greater part of the power it was competent to exert. Resort must then be had either to the stationary engine and rope, or to one or other of the systems which had within a recent period been reintroduced, and which were next alluded to.

The President in a subsequent portion of his address dwelt upon the progress of railway enterprise in the British colonies, as one of the most important factors contributing to the promotion of their wealth and comfort, and to the furtherance, not only of their own commercial industries, but also those of the empire as a whole. In this connexion he dealt successively with Canada, New South Wales and Victoria, Queensland and South Australia, Western Australia, New Zealand, Tasmania, the Cape of Good Hope, Natal, Ceylon, the West Indies, &c. It was to be regretted that, on the initiation of railways in the continent of Australia, the question of the adoption of a standard gauge, applicable to all the colonies, should not have been considered and determined by common consent. Whilst the three colonies of New South Wales, Victoria, and Queensland commenced their railway history nearly at the same time, each adopted a gauge differing from the others,—New South Wales the standard English gauge of 4 ft. 8½ in., Victoria one of 5 ft. 3 in., and Queensland a gauge of 3 ft. 6 in. South Australia had adopted two gauges, viz., 5 ft. 3 in. and 3 ft. 6 in., and Western Australia 3 ft. 6 in. Victoria had subsequently adopted, in the case of some of the branches, the gauge of 3 ft. 6 in. The want of uniformity between the gauges of the several colonies would in course of time, no doubt, be severely felt in the restriction of traffic and increased cost of working when contact was made between these systems. The extent of the colonial railways now in operation, and to which reference had been made, amounted to nearly 21,000 miles, carried out partially by private enterprise, but mainly as Government undertakings. From the latest returns it would appear that the population of these several colonies amounted to, in round figures, 14,000,000. It would,

therefore, be seen, though the railway-mileage was small in respect of area of territory, it was very large when considered in respect of population, the accommodation afforded being about 1 mile to every 650 persons, as against 1 mile to 1,925 persons in the United Kingdom.

The address concluded with a brief account of the irrigation works now in progress in the Nile delta, under the direction of Colonel Scott Moncrieff, R.E., the Inspector-General of Irrigation. It would be remembered that the great weir spanning the Damietta and Rosetta branches at the apex of the delta (commenced in 1847 and completed in 1862), intended to hold up the waters of the Lower Nile some 4½ metres, and to divert them for irrigation purposes into the great system of canals which watered the adjoining provinces, failed through alleged defective foundations, and was found to be valueless except for the regulation of the flow of water into the two branches of the river. The cost of its complete restoration or reconstruction was estimated to exceed a million sterling. The work accordingly had been postponed as being beyond the financial resources of the Government. Colonel Scott Moncrieff, however, believing that the foundations of the weir might be trusted, came to the conclusion that it could, at a comparatively small expense, be so far strengthened as that, with the aid of some subsidiary works, and notably the construction of a second dam, it might eventually be made capable of holding up 4½ metres of water, in two drops of 2½ metres each, thus securing a water-surface never lower than 14 metres above sea-level. Accordingly the closing of the Damietta branch, which theretofore had not even been supplied with gates, and the strengthening of the foundations and floors of both weirs, and the construction of a second bar of rough stone on the floor of the dam, so as to distribute the pressure of water by creating two drops instead of one, and removed when the river began to rise, had been so successful as to hold up 3 metres of water during the low Nile seasons of 1885 and 1886 at a cost of less than 50,000*l.*, whilst attention had been bestowed on the details of water distribution. A temporary dam had also been thrown across the Nile below Benha, and two others above Rosetta, so as to allow as little as possible of the precious water to escape into the sea. By these operations 90,000 acres of land had been brought under cultivation, and a tract supplied with water during the summer months which never received it before.

CONCRETE IN HARBOUR CONSTRUCTION.

At the ordinary meeting held on Tuesday evening last, the President in the chair, six papers were read on "Concrete as applied in the Construction of Harbours," at Greenock, Girvan, and Quebec; Colombo, Newhaven, Wicklow; Fraserburgh, Sandhaven, and Portsoy; and Lowestoft; by Messrs. Kinipple, Kyle, Carey, Strype, Willet, and Langley, M.M. Inst. C.E.

Mr. Kinipple, in his paper on "Concrete Work under Water," described the methods he adopted for depositing partially-set or plastic concrete under water at various harbour works, having found that plastic concrete, when sufficiently set to resist the action of a current of water, was capable of uniting into a solid mass under water, though deposited in separate lumps. At Greenock the concrete was deposited behind sheet-piling, in depths of from 8 ft. to 38 ft. At Girvan, a pier and quay-wall were constructed of plastic concrete, deposited behind a facing of small dovetailed concrete blocks grouted together at the joints; and a concrete groyne was formed under the shelter of a movable wrought-iron shield. The head of the Wick Pier was rebuilt with blocks of plastic concrete of 60 to 140 tons, formed *in situ* under the protection of sail-cloth. Quay-walls were constructed at Quebec Harbour of crib-work filled with plastic concrete, the cribs being floated into position and sunk on bearing piles. Some experiments showed that cement grout, poured down pipes, could unite shingle, 20 ft. under water, into a solid mass; and this method was successfully adopted for filling up the fissures and open joints in a graving dock at Greenock, which had given great trouble with leakages. The paper concluded by descriptions of novel expedients which the author proposed for the construction of breakwaters in concrete with little plant, and independently of the state of the weather.

Mr. Kyle, in his paper on the "Colombo

Harbour Works, Ceylon," described the various stages by which the western breakwater, 4,212 ft. in length, was constructed, from Custom House Point, for sheltering a water-area of 502 acres, at low-water. The works were commenced in 1874 and completed in 1885, at a total cost of 705,207l. The breakwater was formed by laying sloping courses of large concrete blocks, by means of a travelling Titan, on a rubble mound previously deposited from an 80-ton steam hopper-barge, and levelled by divers. The Titan could carry a load of forty tons on an overhang of 28 ft., and cost 5,562l. The first 1,326 ft. of pier, 50 ft. wide, consisted of two walls with an intermediate hearting of rubble; but the rest of the pier was built solid, 34 ft. in width, with four or five courses of blocks, weighing from 16½ to 31 tons each. The foundation of the pier increased in depth from 13 ft. below low-water, near the land, to 23 ft. 9 in. at the head. Each row of sloping blocks was connected with the adjacent ones by filling the joggle grooves, left between each row, with concrete in bags; and the pier was capped all along the top with concrete-in-mass. The pier-head was built of concrete-in-mass, the lower portion being deposited inside a circular wrought-iron tank; and it was surmounted by a concrete lighthouse 36 ft. 6 in. high. Twenty-five steamers of the largest class could moor in depths of from 26 ft. to 40 ft. in the harbour; and there was room, at low-water, for a large number of vessels drawing from 6 ft. to 26 ft. The works were designed by Sir J. Coode, V.-P. Inst. C.E., and carried out by the author.

Mr. Carey commenced his paper on "Harbour Improvements at Newhaven, Sussex," by a history of the successive improvements effected from 1767 down to the commencement of the new works, begun in 1878. These new works, of which he was the resident engineer, and Mr. Banister, M. Inst. C.E., the Engineer-in-Chief, consisted of a curved breakwater, 2,800 ft. long to form an outer harbour, and to protect the entrance to the river, constituting the old harbour; the rebuilding of the entrance piers, and widening the waterway between them; the erection of a new quay on the eastern side of the river; the construction of a sea-wall along the shore; and dredging in the river and the approach channel in the outer harbour. The western sea-wall was commenced first, and was formed of concrete deposited within framing, with a hard skin of cement-charged concrete on the face to withstand the attrition of the shifting shingle beach. The breakwater was begun in 1880, and consisted of a monolithic mass of concrete raised, from low-water, on a foundation of concrete sack-blocks, weighing 100 tons each, deposited transversely in layers by a special steam hopper-barge. A concrete mixing-machine was designed by the author and Mr. Latham, which measured, mixed, and delivered 100 tons of concrete in twenty minutes for filling the bags; and, besides securing a more uniform mixing, it effected a great economy in time and cost. A portable continuous-mixing machine was also designed, capable of delivering 70 cubic yards of concrete per hour into the timber framing, erected on the top of the bag-work, for the construction of the portion of the breakwater above low-water in lengths of 40 ft. By this means, 300 lineal feet of superstructure were erected in three months. A gallery, raised above the quay-level on the western side of the breakwater, provided protection to the quay and a sheltered access to the extremity of the breakwater; it was mainly built of concrete *in situ*. A lighthouse was built of plastic concrete *in situ*, on a pile-work foundation, at the extremity of the west pier. The total expenditure on the whole undertaking, including land, two short railways connecting the works with the London, Brighton, and South Coast Railway, dredging, and various other works, was 463,000l., out of which the works described cost 254,000l. When the works were suspended in 1885, 1,482 ft. of the breakwater had been completed, and 300 ft. of foundations laid in advance, and a dock of 24 acres, which formed part of the scheme, had not been commenced.

Mr. Styrpe, in his paper on "Wicklow Harbour Improvements," described in detail the methods he adopted in the construction of a breakwater, 760 ft. long, for sheltering the mouth of the river Leitrim, and the improvement in depth of the entrance channel to the port. The breakwater was built solid, of concrete deposited *in situ*, and, starting above low water, extended into a depth of 18 ft. at low

water spring tides, being founded partly on rock and partly on marl. Staging was erected in advance of the work, secured at the bottom with shoes of concrete round the piles, and carrying two lines of railway on the top, along which the Titan and crane for depositing the concrete ran. At first, panning was employed, reaching down to the bottom, for protecting the concrete carried up in layers inside it; but subsequently a large central mound of concrete was deposited under water, by means of skips, on which the panning was erected, which reduced the exposure of the panning and facilitated the progress of the work. Divisions were left at intervals in the work, increasing in number in the upper part, to prevent irregular cracking. Richer and finer concrete was placed in the face near low-water level; rubble was not used below low water, and it was kept away from the face above, as its projections caused eddies and consequent disturbance of the concrete. The total expenditure on the breakwater, steam-packet pier, and dredging, including cost of land, amounted to 40,000l. Ordinary plant sufficed for the work, which consisted of huge masses of concrete, resting uniformly on the most irregular bottom, and secure from the attacks of the sea on account of their size. The author considered that a larger central mound might be adopted with advantage, thus reducing still more the amount of panning required.

The new works carried out at Fraserburgh, Sandhaven, and Portsoy, as well as the previous condition of these harbours, were described by Mr. Willet in his paper on "The Fishing-Boat Harbours on the North-East Coast of Scotland." The works at Fraserburgh consisted of a breakwater, 860 ft. in length, for sheltering the entrance to the basins, and the widening of the old Balacava Pier. The breakwater, 30 ft. wide, extending into a depth of 19 ft. at low-water, was built below low-water with bags of concrete, of 28 to 50 tons, deposited from a hopper-barge. Above low-water, the concrete was tipped from wagons into a framing up to quay level; and the parapet was formed by filling the framing with concrete from tipping-boxes lifted by a derrick crane on an overhead traveller, which was also used in erecting the frames. The Balacava East Pier was widened 16½ ft. on the sea side, along its whole length of 1,400 ft. with solid concrete, which protected the old dry-rubble wall from the sea; and as a parapet was raised 9½ ft. on its outer side, and 19 ft. above high-water, like the parapet on the breakwater, an additional protection was afforded to the quay, and an increased shelter to the harbour. The widening of the pier was commenced at the end of 1875 to provide a roadway to the breakwater without interference with the quay space; and the breakwater was begun in 1878, after the completion of the widening, and was finished in 1882. The average yearly rate of deposit of concrete was 8,000 cubic yards; and under favourable conditions, 400 cubic yards could be deposited in a day. The concrete in the pier cost 17s. per cubic yard, and in the breakwater, 26s. 5d. in bags and 19s. 5d. in frames; and the total cost of the works was 69,000l. Some damage was done to the breakwater, after its completion, owing to defects in the method of construction; and the pier was somewhat abraded by the shifting shingle along its sea face. These damages were repaired at a cost of 1,184l. A new pier, 1,395 ft. long, was erected at Sandhaven to increase the accommodation in the harbour by enclosing a water-area of five acres. The pier was mostly built between walls of concrete, deposited from barrows within framing, with intermediate hearting, resting on rock; and where the bottom was clay, a concrete toe was added. An exposed portion of the outer arm was made of solid concrete. The average cost of the concrete was 18s. per cubic yard; and the total expenditure on the works, including deepening the harbour, was 17,500l. The piers of dry rubble masonry protecting the east harbour of Portsoy having been damaged by the sea, rendering the harbour useless, their repair was undertaken in 1882. The piers were reconstructed and extended in solid concrete, deposited within framing from an overhanging crane resting on staging, at an average rate of 60 cubic yards in a tide. The works were completed in eighteen months, at a cost of 9,000l. The author considered that the proportion of 1 part of cement to 9 parts of gravel and sand, adopted for concrete at Fraserburgh, was too weak, and that the proportion of 1 to 6, adopted by him at Sand-

haven and Portsoy, formed concrete of more suitable strength for such exposed works.

Mr. Langley, in his paper on the "Lowestoft Harbour Works," described the works carried out by him for forming a new basin of ten acres, along the foreshore to the north of the harbour, excavated to a depth of 14 ft. at low-water. The west quay was built, up to low-water, by sinking thirty-eight hollow rectangular monoliths of concrete, 18 ft. long and 10½ ft. wide, to a depth of from 7 ft. to 9 ft. below the bottom of the basin. The hollow blocks were built up within framing, on a wedge-shaped cast-iron shoe. The block was gradually sunk by excavating inside it; and its descent was guided by long hanging bolts at each corner. The blocks were connected together by passing iron rails through two holes left in the adjacent sides of each block, and filling up the intermediate space between the blocks with concrete; the well inside was also filled with concrete. A block, 21 ft. to 23 ft. high, was sunk in forty-two days; and the block foundation cost 30s. per cubic yard, or 45s. per lineal yard. A concrete quay-wall was built, from low-water, on the top of the blocks, 13½ ft. high, and 8½ ft. wide at the base. The eastern and northern sides of the basin were enclosed by embankments surmounted by a wall of concrete-in-mass. The excavations were effected by excavators, steam grabs, and a Bazin sand-pump dredger, which latter raised and delivered an average of 1,000 tons of sand and gravel per day. The works were completed within twelve months, at a cost of 60,000l.

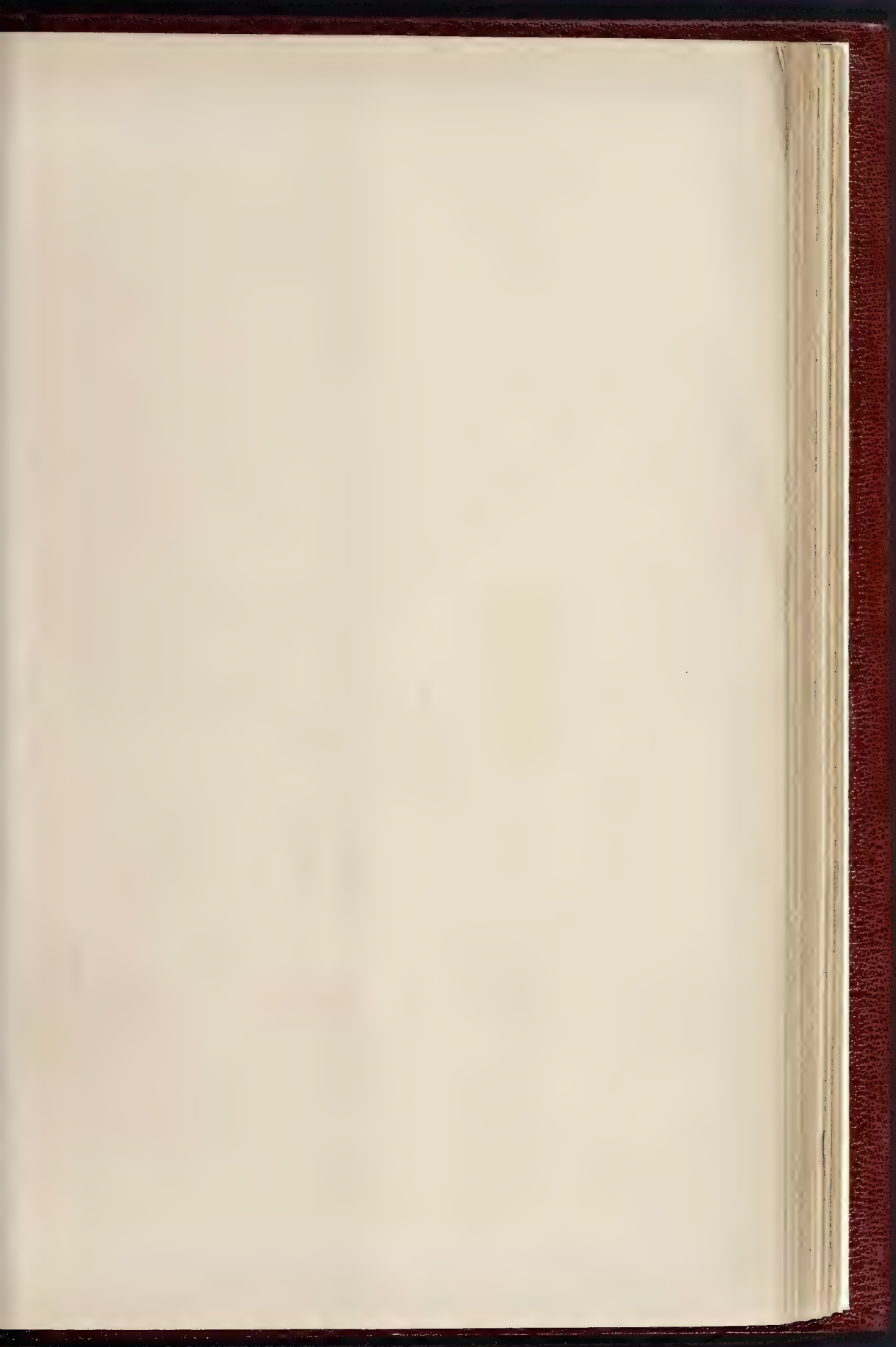
LECTURES AT SOUTH KENSINGTON.

MISS JANE E. HARRISON is again lecturing at the South Kensington Museum, this time on the "Myths of Attica," a further development of the subject of her lectures at the British Museum on the text of Pansanias's "Attika." Miss Harrison had given in these a graphic sketch of ancient Athens, dealing in detail with its streets, temples, and monuments, leaving the legends comparatively untouched; but in her Wednesday lecture she began a detailed account of that mythology of Attica which gave rise to so many cults, and which decided not only the building of temples, but often dictated their shape and distribution, as in the case of the Erechtheion. Miss Harrison passed over the very earliest legends, of which we have scant literary and no artistic record, and made the earth-born serpent-king, Kekrops, and his successor, the likewise earth-born Erichthonios, the central point of her lecture. Kekrops, with his serpent tail, is the emblem of the pride with which the Athenians regarded themselves as being home-born, indigenous, sprung from their own soil. In his reign took place the contest of Athena and Poseidon for the land of Attica. This contest Miss Harrison illustrated by a vase, familiar to those who have heard her lectures on the Parthenon, the late but beautiful *kalpis*, found at Kertsch, and now in the Hermitage of St. Petersburg. An interesting terra-cotta plaque, found near the bed of the Ilissos, and now in the Berlin Museum (there is a cast in the Cambridge Museum), illustrated the birth of Erichthonios. A clypeus from Corneto, also in Berlin, showed the same scene in a style of art more advanced; and two other vases illustrated the confiding of the Erichthonios by Athena to the daughters of Kekrops, with the strict charge that they should not open the chest he was shut in, and the betrayal of the charge by the Aglauros and Herse. Pandrosos alone of the three sisters remained faithful, and to her was dedicated a shrine in that Erechtheion which Erichthonios, when he became king, erected in honour of his foster-mother Athena. In this building were shrines, not only of Athena, but of Poseidon, who had contested with her for the lordship of the land, and the lesser shrine of Erichthonios himself. As in the Iliad lectures, given at this time last year, Miss Harrison not only treats of the development of the myths in art, pointing out on occasion how they deviated from the literary tradition, but she gives her audience a real insight into the spirit that actuated Greek workmanship, and the laws that governed the composition of a subject in vase paintings. It is interesting to hear that the lectures are being largely attended by students from the South Kensington Art Schools. The audience is large, and the arrangements for the lecture admirable in every way. The illustrations are, as before, shown by means of the oxy-hydrogen light.

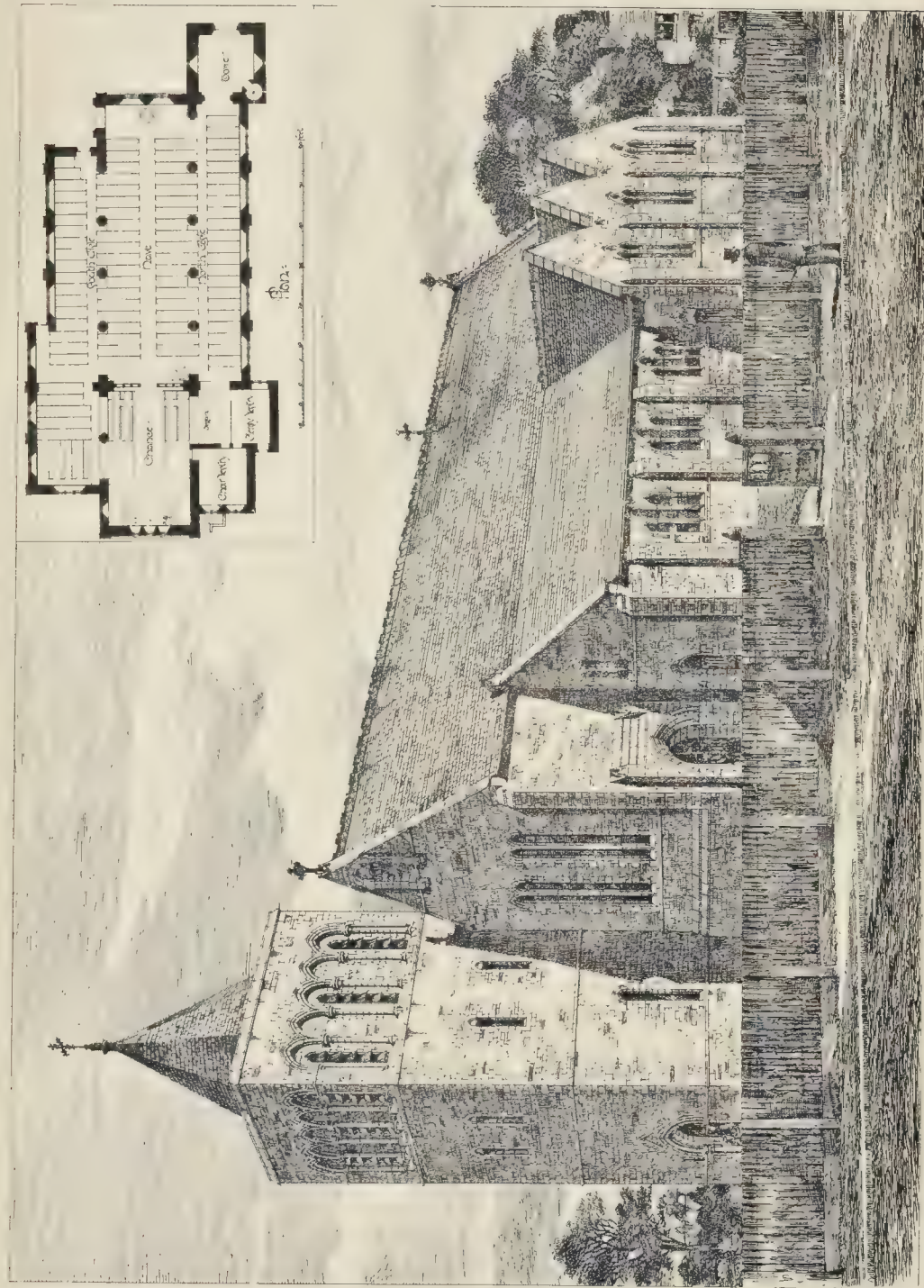




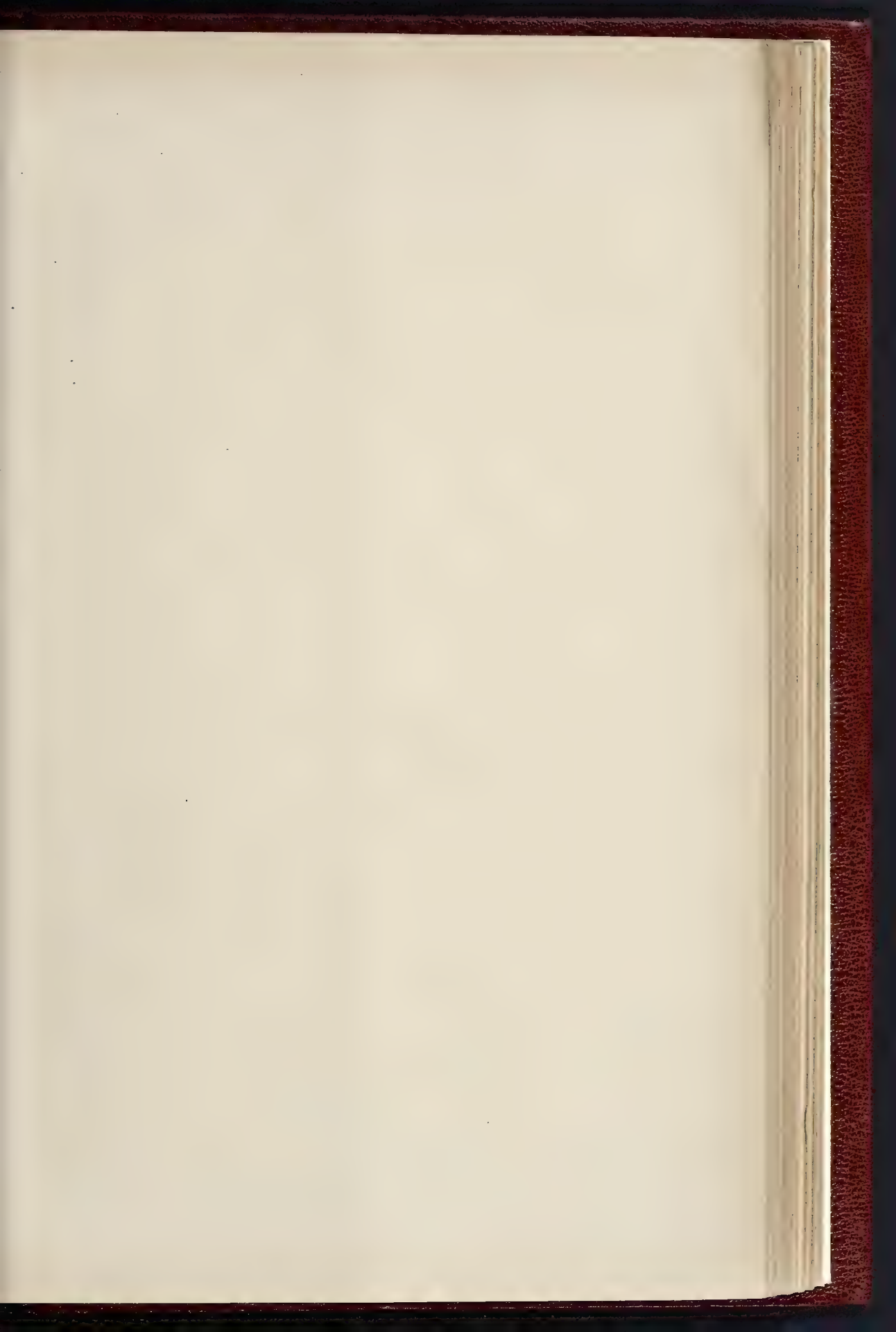
SELECTED DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH INTERIOR VIEW.—MR. TEMPLE L. MOORE, ARCHITECT



THE BUILDER, NOVEMBER 30, 1886.



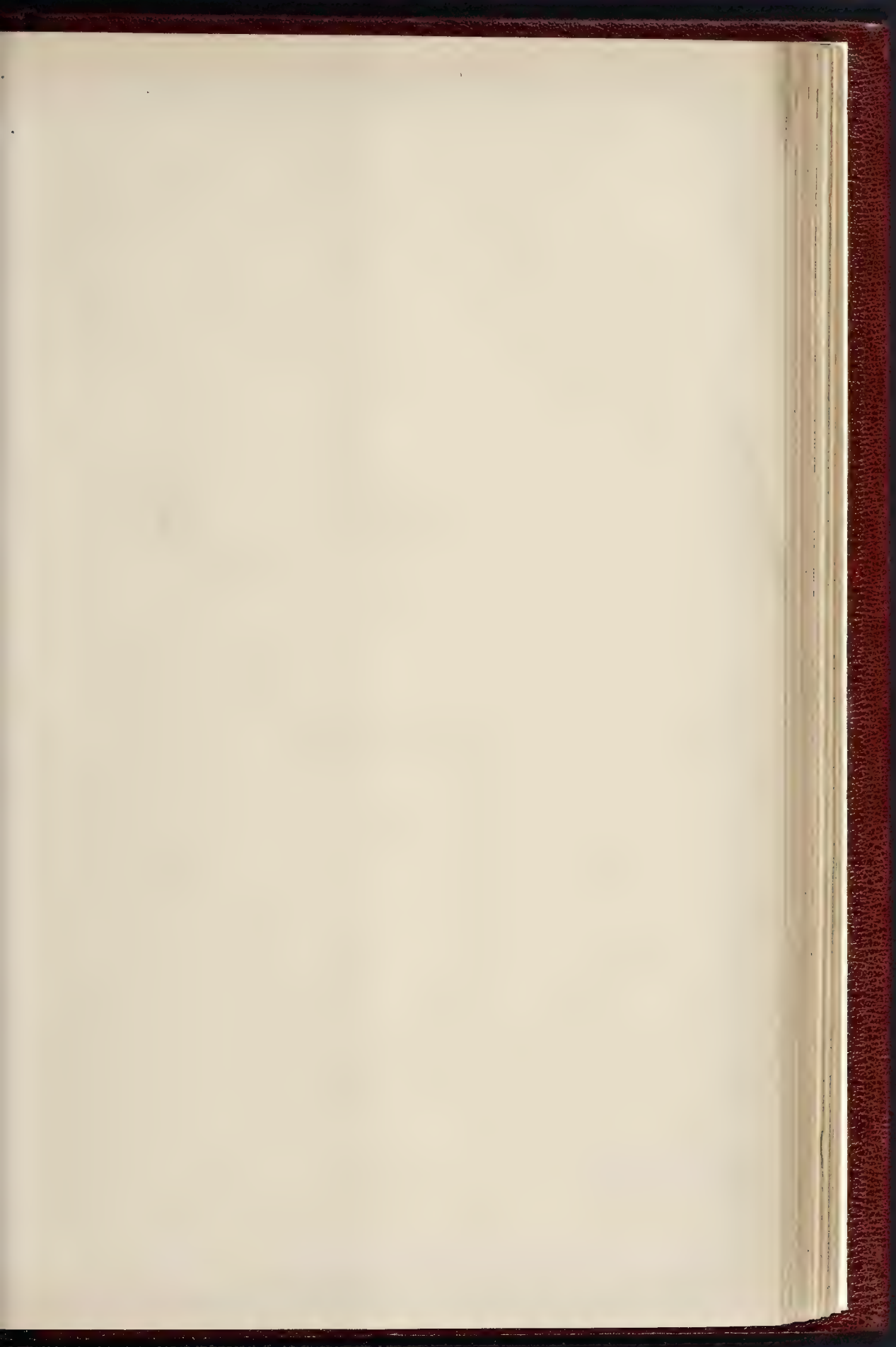
COMPETITIVE DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH.—MR. J. MARTIN BROOKS, A.R.B.A., ARCHITECT.

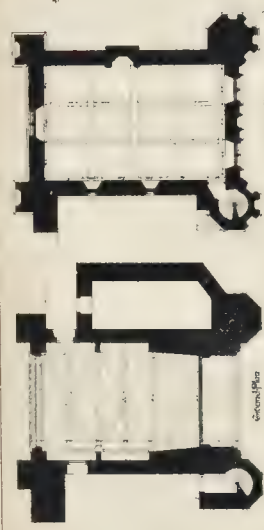


THE BUILDER, NOVEMBER 20, 1886.

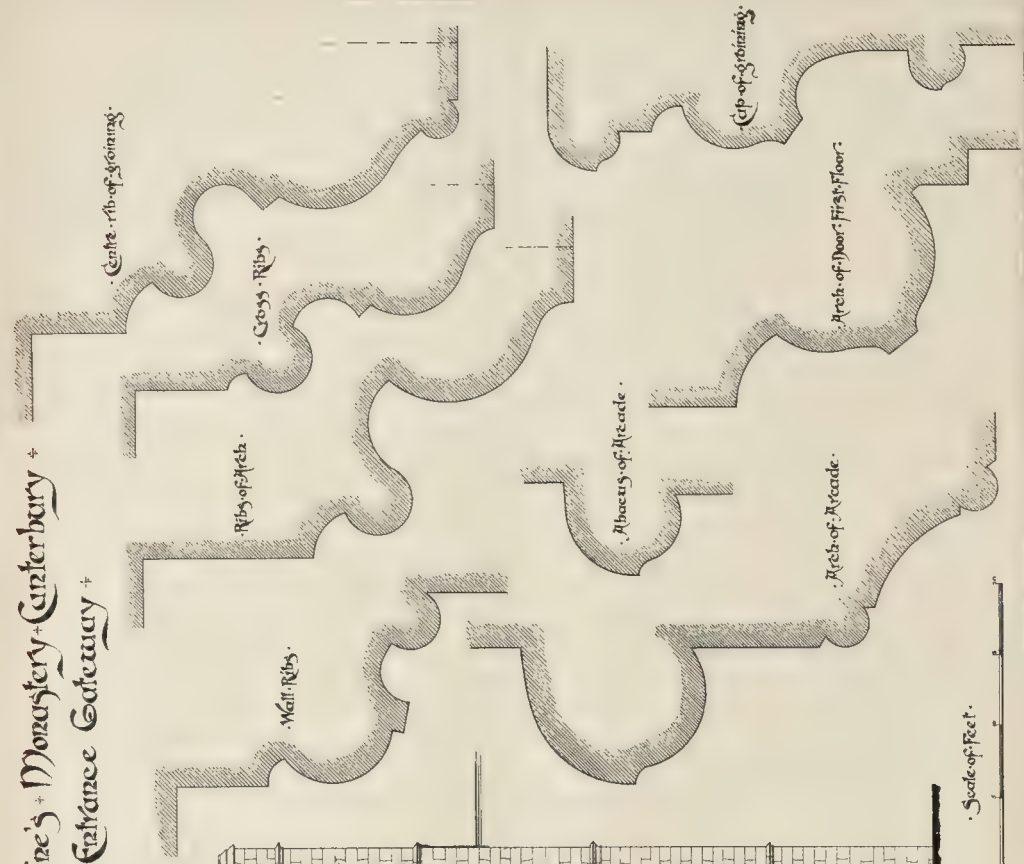
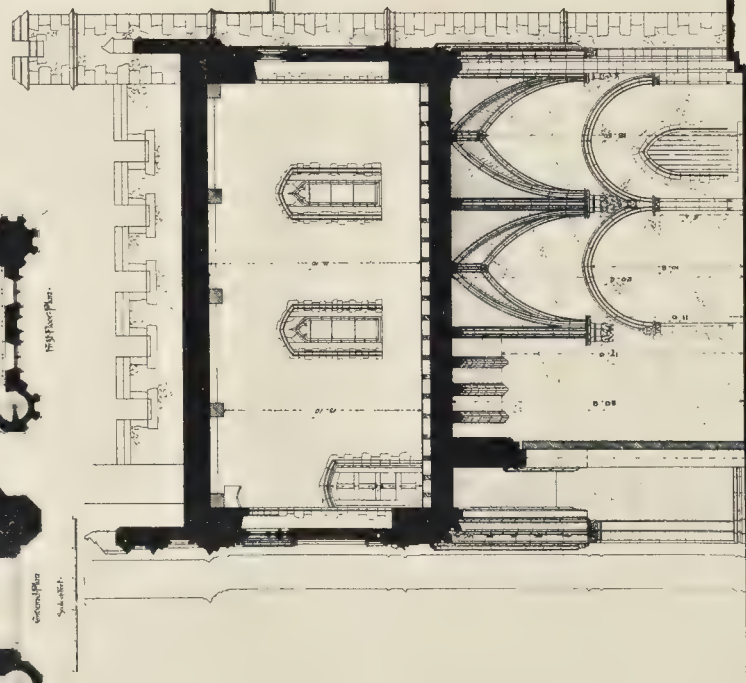


* Woodlands Park · Stoke D'Abernon · Surrey · View from Garden * Mr. Rowland Plumbe FRIBA Arch^t.

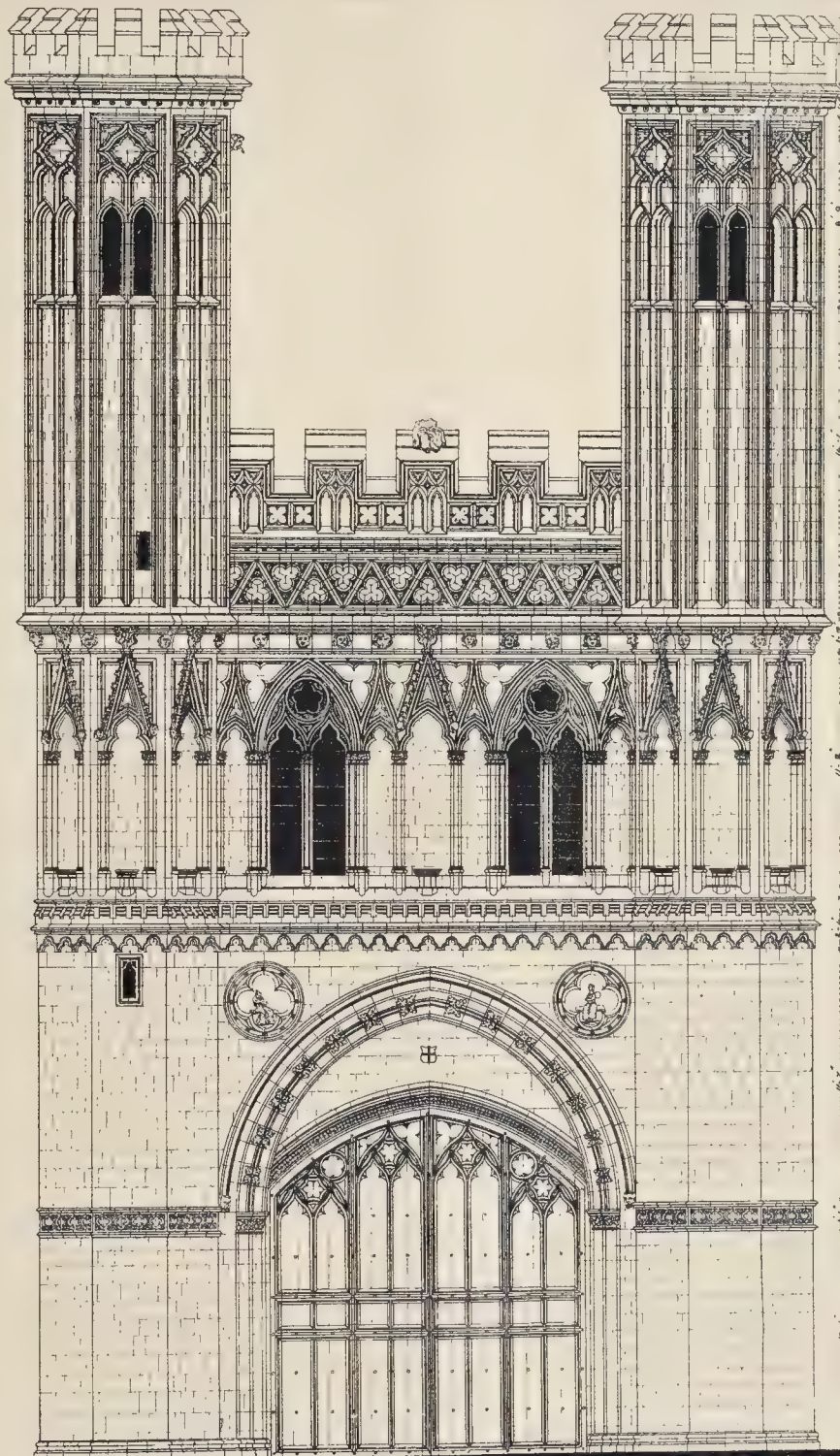




• St Augustine's Monastery - Canterbury •
• Entrance Gateway •



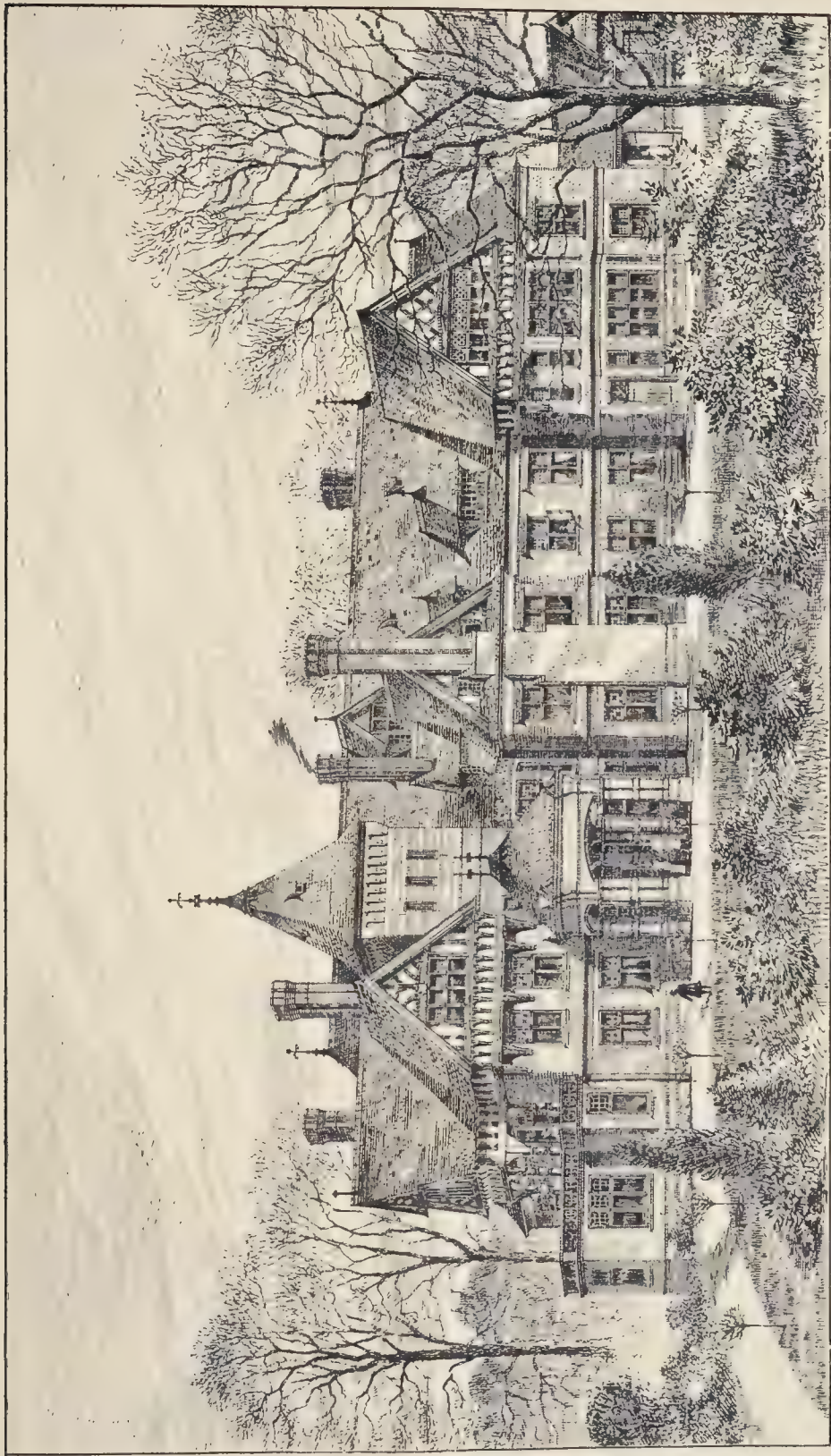
• Section through Gateway •
• Scale of Feet •



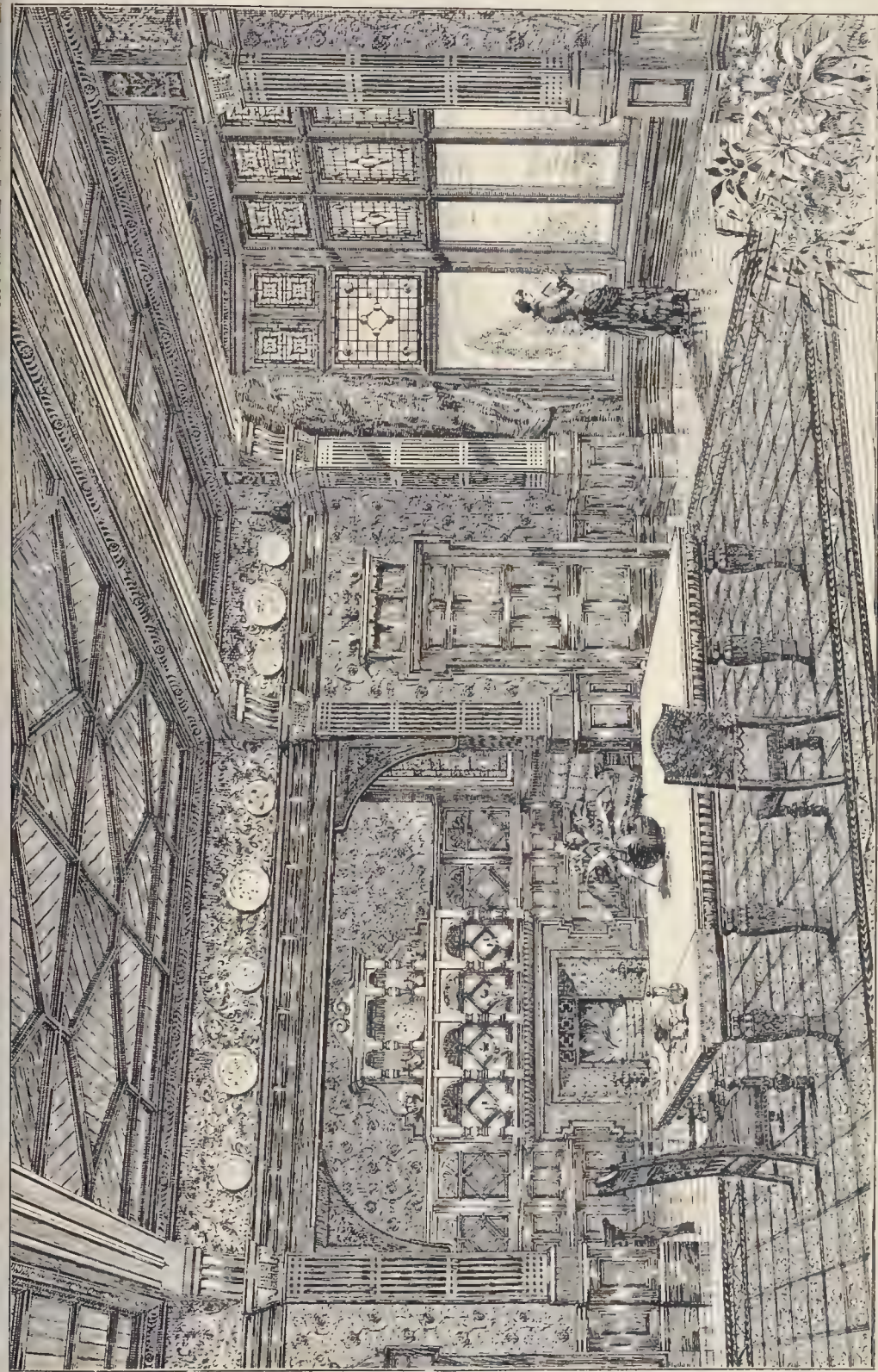
FRONT ELEVATION.

ST. AUGUSTINE'S MONASTERY, CANTERBURY: ENTRANCE GATEWAY.—DRAWN BY MR. H. J. WHITE.

warded the Architectural Union Company's Prize, 1886.



Woodslands Park · Stoke D'Abernon · Surrey · View facing road * Mrs. Rowland Plambe FRIER Archt.



Woollands Park · Stoke D'Abernon · Surrey : Dining Room. *M^{rs} Rowland Plumber FRIER Arch^t*

THE UNIVERSITY OF CHICAGO



SELECTED DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH: EXTERIOR VIEW.—MR. TEMPLE L. MOORE, ARCHITECT

Illustrations.

SELECTED DESIGN FOR ALL SAINTS' CHURCH, PETERBOROUGH.

ME illustrate this week the external and internal views of the design for the above church, which were selected lately in competition, under the device of a "Red Star."

It is proposed to face the church externally with red brick, with window dressings and quoins of Ancaster stone, with cills and pilasters of Ketton stone. Inside the brickwork is to be discoloured, and the pillars and arches are to be of Bath stone.

The roofs are to be boarded and panelled under the rafters, the floors are to be laid with wood-block paving. The church is to be seated with chairs. The first part of the church to be commenced shortly is to consist of the first four bays from the east end and the lower 10 ft. of the tower, which forms the vestry, the remaining bays of the nave and the completion of the tower being left to a future time. The architect is Mr. Temple L. Moore, of London.

COMPETITIVE DESIGN FOR ALL SAINTS', PETERBOROUGH.

The accompanying illustration of All Saints', Peterborough, was sent in for the same competition for which we give the selected design. This design was placed second. It was proposed to build it of Sutton-stone for the rubble work and Clipstone for the freestone, both of these being a local stone. The church is designed in a plain but substantial manner, as the funds were very limited. The estimated cost, including tower, &c., was 5,000*l*. The architect is Mr. J. Martin Brooks.

WOODLANDS PARK, STOKE D'ABERNON.

WE this week illustrate a design for a country house recently built for a gentleman who farms his own estate of several hundred acres, near Leatherhead, Surrey. The old house originally existing on the site was an ordinary stucco-fronted, slate-roofed building. It has not been removed, but where not surrounded by the new buildings, has been re-roofed and faced with red brickwork and tile hanging in such a manner as to bring it into harmony with the new structure. Suitable character has been given to the exterior by the large-span, steep, tiled roof which contains a floor of bedrooms, many of them where the half-timbered gables are introduced being of unusually large dimensions. The first-floor is principally covered on the outside with tiles hung on walls 14 in. thick. The verandahs shown in the garden view are approached respectively from the boudoir and one of the guest-chambers. The ground-floor walls are faced with red brick, the walls being 20 in. thick, and built hollow. In the interior the general arrangement of rooms on the ground-floor is shown in the small plan attached to the garden view. The house is approached from the road through a covered carriage porch. The large central hall is built in place of a number of offices and dark closets formerly in the centre of the old house; it is open through both floors and half way up the roof, and is covered with a semi-decagonal panelled ceiling, the three centre panels being filled with painted glass under an outer skylight which is arranged in the flat of the main roof.

The new part of the house and also the hall is mainly fitted up with oak in character with the view given of the interior of the dining-room, the walls of which, where not covered with the joiner's finishings, are hung with tapestry. The ceiling of this room is panelled in oak. The floors above contain about twenty-five bedrooms with dressing and bath rooms, &c., attached to many of them.

The large winter garden screens the domestic offices from the pleasure-grounds and park beyond.

The whole of the premises are lighted by incandescent electric lights; the installation having been carried out by Messrs. Living, Wharton, & Down. The engine-house is built some distance away along with the farm buildings, and contains a 20-h.p. Babcock & Wilcox boiler, driving an A.M.N. 100 Sigs' high-speed engine, which gives motive power to the shunt-wound dynamo-electric machine. This machine charges fifty-four large

secondary batteries which are capable of illuminating 150 lamps, this number being sufficient for ordinary purposes. On special occasions, however, the engine is kept running to reinforce the accumulators, when nearly 300 lamps are used in the main building together with the farm buildings, stables, and the bailiff's and coachman's houses. A special feature connected with the electric lighting has been obtained by introducing lamps behind the twenty-four glazed panels of the hall ceiling, so that the light comes through the painted glass.

Mr. Messom, of Twickenham, was the contractor employed; the painted and ornamental leaded glass has been executed by Messrs. Gibbs & Howard. Messrs. George Jackson & Son's fibrous plaster has been used largely in decorating the hall, the colour decoration of which was carried out by Messrs. W. Phillips & Son. Messrs. Veitch were employed to lay out and plant the new portion of the grounds and to furnish the winter garden.

The works were carried out under the superintendence of the architect, Mr. Rowland Plumbe.

GATEWAY, ST. AUGUSTINE'S MONASTERY, CANTERBURY.

The measured drawings of this gateway, which we publish in this number, were made by Mr. H. T. White in competition for the Architectural Association medal for measured drawings, which was awarded for these, as the best set submitted.

The gateway, a fine example of work of the Decorated period, is the principal remnant now existing of the Benedictine Monastery, the original foundation of which is said to have been due to St. Augustine in conjunction with King Ethelbert.

The drawings represent the gateway as it now stands; it underwent some little repair and restoration some years ago, but the greater portion of it is old work.

We very much regret to learn that Mr. White, the young architect who made these measured drawings, died on October the 18th, since the medal was awarded for them and the drawings sent to us for publication. He just lived to hear that his set of drawings had been awarded the medal. He was, we understand, an industrious and promising young architect. That he endeavored to do his work thoroughly the accompanying drawings show, and we have to regret the loss of one who would probably have been a credit to the profession.

COMPETITIONS.

Johnstone Combination Hospital.—On the 8th inst., the special committee of the Board sat for nearly four hours examining some seventy sets of competitive plans which had been lodged in answer to an advertisement. The committee, the *Glasgow Herald* understands, reduced the number to a list fifteen, from which it is intended to make a selection. There are fifty competitors, some of whom have sent in alternative plans.

Kingston Workmen's Club and Institute.—In the competition for the rebuilding of this club, which was destroyed by fire, the premiums for the designs were awarded to "Endeavour," by Mr. Windybank, Kingston, first; "Fire," by Mr. E. Carter, Surbiton, second; and Mr. Threadkell, Kingston, third; the maximum cost to be 1,900*l*. Mr. Blatchley, hon. architect to the Club Union, was the assessor.

Leves Public Hall and Offices.—We hear that the result of the recent competition for designs for a Public Hall and Offices for Leves, is that the first premium has been awarded to Mr. S. Deuman, of Brighton; and the second premium to Mr. Mark J. Lansdell, of London and Hastings.

The Late Mr. Vulliamy.—We see by the paper of business for this week's meeting of the Metropolitan Board of Works that Mr. Lawrence has given notice of his intention to move "That it be referred to the Works and General Purposes Committee to consider and report as to the desirability of obtaining power to pay to the widow of the late Architect (who served the Board upwards of twenty-five years) one-half of the commutation value, according to the Government tables, of the pension that had been voted to him."

SCOTTISH ECCLESIASTICAL ARCHITECTURE.*

BY MR. HIPPOLYTE BLANC.

THERE is much fugitive literature floating about dealing with Scottish architecture. Burton, Robertson, Rickman, Fergusson, and others, have each touched it in their literary travels, and each seems in succession to have accepted the promptings of the earliest of these writers; and all have nearly succeeded by the harmony of their conclusions in popularising a belief that Scotland was a nation better known in the arts of war than in those of peace, and that, incapable of even harbouring art, she developed nothing, but was the imitator of the art of a foreign people, intercourse with whom imbued her with their sentiment and forms of art. The scantiness of the collections of material for written history seem to have hindered any just estimate of Scotland's individuality being formed; and, by most writers, the little that has been explored seems to have been accepted as sufficient upon which to found a conclusion. A systematic examination of existing remains is not stated to have been made by any of the writers named; nor can we trace that such is likely to have been done, because the examples selected by each writer, and the particular features viewed as analogous to foreign prototypes are nearly the same. This is unfortunate, because the high place earned by those authors as elucidators of architectural history claims for their writings almost unconditional acceptance. Be it observed, however, that they are not all technically-trained writers; and when it is pointed out, as I hope to succeed in doing, that it is not to history one must first look for facts, but to the buildings that are left to us, not only in their grouping and outlines, but chiefly in their details; then we may recognise the importance of a technical training as an essential to a fair interpretation of art history.

Unquestionably the best exponents of Scotland's architecture are the works by Muir (1848),—a carefully-compiled, well-classified, and accurately-defined inventory of Scotland's art progress, as shown by her buildings. With commendable prudence, conclusions are rarely drawn, though, in the matter of the period of foreign influence on Scottish architecture, there is an inclination to the finding in which the succeeding writers have concurred.

As yet, little has been collected relative to the early and minor ecclesiastical buildings of Scotland, and, in consequence, topographical works on those are few. But we are glad to welcome one most important addition to the scanty number, and which, though not bearing upon the ecclesiastical section of Scotch architecture, will unfold much that pertains to it, and help to give coherency to any future effort made in writing Scotland's ecclesiastical art history. The work to which I refer is that upon the "Castellated and Domestic Architecture of Scotland," now issued by Messrs. McGibbon & Ross.

Entering the path of architectural history with the advent of Christian missionaries to our island, we find of the caves or crypts and cells which they formed in our midst, there is not much to note. The former were rude chambers cut out of the rocks, comprising sometimes two apartments, and used as places of religious retreat. The latter were structures which cannot be said to be more than mere forms of buildings without definite architectural character. All over Europe such places of worship seem to be similar. Curzon, in his "Monasteries in the Levant," describes the numerous caves and holes,—"some natural, but most artificial,—in the rocks of the Holy Vale of Meteora, in Albania. He adds, "in these pigeon-holes whole flocks of hermits roosted."

In Scotland, as elsewhere, wood and wattle may have, in early times, supplied the necessities of certain colonies of cell-builders, until, in the sixth century, the "Roman" fashion of building in stone was adopted. The first structure was the church at "Whithorne" in Wigtownshire. With Columba's advent a new impulse was given to building churches, and these were of stone, as in Ireland (from whence Columba came). That found by Sir James Simpson on Inchcolm is perhaps the most perfect example of the period left us. It is about

* From the address of Mr. Hippolyte Blanc, President of the Edinburgh Architectural Association, delivered at the opening meeting of Session 1886-7 on Thursday, November 11th.

16 ft. by 5 ft., very rudely constructed, and is stated to be contemporaneous with some of the earliest Irish oratories.

In nearly all cases, Irish churches built of stone were also designed to have stone roofs, no wood being used in their construction. They were generally rectangular,—longer than broad,—and up to the period of the Norman conquest were not of the "basilica" form; that is, without apses. There are, in short, no evidences of Ireland obtaining her types from Rome. It may safely be asserted, says Ferguson, that the Christian religion did not reach Ireland through any of the ordinary channels across the Continent, but that she derived her early Christianity and religious forms from the East, by some of the more southerly centres which at that time seem to have touched on Ireland. As in Greece, the churches were small, not intended for the assembly of large congregations, but simply for the accommodation of the officiating priest. Many churches, not large churches, seem to have been the intention. No circular churches of the early period have been found in Ireland. The early works in Scotland bear strong marks of Irish influence, and these are chiefly in the western district. Between the period when Columba and his apostles spread the torch of religious influence over Scotland and that of the advent of the saintly Queen Margaret, many Christian edifices would have been founded; but of these nothing now remains, excepting, perhaps, the two towers of Abernethy and Brechin, which show their Irish origin on their face. The dates assigned to them are A.D. 715 and 1010 respectively, and their analogy to Irish types is traced by Dr. Petrie, in his work on the "Round Towers of Ireland."

I have noted that round churches are not found in Ireland, neither are there any of transeptal or octagonal form, excepting cathedral or monastic buildings. The round forms, however, though few, are found in England. In Scotland, one only is known to exist, namely, St. Orphir, in Orkney. It is described by Sir Henry Dryden, who claims for it a direct influence from the Church of the Holy Sepulchre at Jerusalem. Sir Henry further states his opinion that the Crusaders, in the eleventh century, probably were the means of importing the form into Britain. Those in England are of somewhat earlier date, but all are in the same century. Sir Henry, in his conclusions, has the support of history, which bears that Earl Haco, who had a palace near this church, went to the Holy Land, and returned to die in 1103. Without, however, seeking to undervalue the belief in the independent importation of the Scottish example from the East, more recent publications have revealed to us many churches of round form in Scandinavia and neighbouring islands which express more of the primitive modes of construction, and are more elementary in form of plan than the supposed Eastern prototype. Moreover, those examples which are complete possess local peculiarities which seem to claim for them a local origin. The only thing common to all of them is that they all have circular naves, and have, projecting from the outer circumference, a small apse of semicircular or horseshoe form. The Church of the Holy Sepulchre is, doubtless, roofed with stone, whereas the examples in Northern Europe have covered roofs in timber and thatching, even after stone roofing had been introduced into Scotland.

The feature which seems to give local origin to those in Scandinavia is that many of them have a double floor, the upper one being without windows, but pierced at regular intervals near the eaves with small openings, to be used for defence in time of trouble. Access to the upper floor is in some cases by a trap-door and movable stair, and sometimes by a stair in the thickness of the wall.

It, therefore, seems more probable that the prototypes of our Scottish examples are to be found in Scandinavia. An equally probable origin is that suggested by Ferguson, that the people, when first converted to Christianity, clung to the circular form as the sacred one which they had been accustomed to reverence in the tombs of their ancestors, and that the round churches are lineal descendants of those circles of stone,—half tomb, half temple,—which are known as spread over this country from Stonehenge to Stennis, and which are equally common throughout the Scandinavian province.

Small transeptal churches of early date in

Scotland are few, the remains of only one existing in Shetland, and among those churches found in Orkney and Shetland none have aisles.

In England the Saxon character of architecture, not found in Scotland, gave place to the phase of architecture called Norman. This was grafted on Saxon forms through the influence of the advances of William the Conqueror; but even before his day Norman detail was not an exotic in England. The sympathy between the early Normans and the English is shown in the record telling us that King Canute subscribed to the first foundation of Chartres Cathedral in 1020. The intercourse, which was frequent, between nobles in England with France, could not fail, as it did, to leave its impress in the architectural forms of that country. The Saxons built, after the Roman fashion, in stone, and in their plans of churches took the "Basilica" form, with eastern and western apses. The Normans likewise had adopted that form.

Scotland was not slow to adopt the new forms and better architectural definition which Queen Margaret's advent had introduced. Thus we find, besides the unique oratory built by that queen in Edinburgh Castle, some time between 1067 and 1093, many fair examples of Early Norman work are spread over Scotland.

At Birnie, near Elgin, is a very early church of nave and chancel, of rectangular form, under one roof, but having a well-defined chancel arch and imposts of decidedly Norman detail. Both in manner of construction and in form of windows the evidences of early date are well defined. The window external reveals, where original, are gable-checked about 1½ all round, the ingoing on the interior having the usual wide level, with no visible sign of original glass check, though glazing is now inserted. The same feature may be seen at Norham old church, of decidedly Norman date. It may be that, in the absence of glass, the openings (which are small) were fitted with movable frames, on which a transparent skin or parchment was stretched, as was sometimes used in the small churches of Orkney and Shetland.

With the Norman Conquest a train of good for arts and learning advanced northwards. Large tracts of land in the Lothians, now ceded to Scotland, were colonised by new lords and their followers, and quickly a new and more fervent expression of religious feeling spread over Scotland as in England. Religious communities from France were not slow to journey with the tide, and we find a great church-building period begins. Its period of activity lasted upwards of 200 years, during which time architecture in Scotland followed closely the lines of the sister kingdom of England. Lands, under new partitions, were freely given over to the clergy, who were thus enabled to devote themselves to the erection of edifices which, if not so liberal in scale of magnificence, were at least in equal proportion to the more favoured conditions in England. When Margaret became the wife of Scotland's king, she set herself to stir new enthusiasm in her clergy. Her influence was powerful and effective. Still leaning to English forms she sought to assimilate to them the Scottish church. Her chaplain was from Durham, an English primate was her spiritual father, and her foundation at Dunfermline was peopled from Canterbury. The disposition to Anglicise the Scottish people was still further pursued by her sons after her death, and the influence of all is seen in the early church architecture in Scotland. It was not a reformation, but an overlapping of the English church forms and discipline. The chief sees were foundations by David I., and the cathedral constituents were copied from English models,—Dunfermline from Canterbury, Coldingham from Durham. In these early times, the ecclesiastical system in Scotland was monastic, not parochial; and, on the decay of religion among the clergy, their lands passed to laymen styling themselves abbots. The religious services were discharged by a prior and a few monks. This order of things was gradually displaced by the parochial system. It takes its rise from the gifts of lands to the Anglo-Norman colonists, and wherever the grant of land was made, there its new possessor formed a hamlet, and built a church for those on the estates. Many parishes so formed retain still the name of the original titled possessor. The clergy of these churches were either priests from England or native kinsmen of the founders. Even among the higher ecclesiastics this practice obtained more prominence. Robertson says, "Of fifteen

prelates who were elected to the primatial see of St. Andrews, during the twelfth and thirteenth centuries, and who signed themselves as of the Scottish Episcopate, not one appears to have been a Celtic Scot. Most were Saxons and Normans from England. That the expressions of architecture, on both sides of the Tweed, are so similar during the twelfth and thirteenth centuries, is thus easily explained. The best, largest, and most refined expressions of ecclesiastical art in Scotland are of these times. The art was fashioned on English models, largely by English hands, and under English influence. To trace here the progress of building in Scotland, with contemporary progress in England, would be too lengthened a task; suffice it to note that in chronological sequence, in plan and arrangement, in composition of parts, and treatment of details,—in all but as regards number, magnificence of scale and elaboration,—the Norman and First Pointed churches in both countries were alike. In Dunfermline (1075), we have an epitome of Durham, which supplied Queen Margaret's father confessor, previously a prior there, and in Salisbury we have the prototype of Dunblane. Durham Cathedral was founded about 1070, Malcolm Canmore and Father Targot being present at the ceremony. The ties between Durham and Scotland were thus drawn still closer, and one may infer that what detail the contemporary chapel of Queen Margaret in Edinburgh Castle exhibits will have some correspondence with that at Durham. Coldingham (1098), Canterbury, Carlisle, and Lindisfarne on Holy Island (a foundation of 1098), were at this time rearing their heads, and assuming grand proportions. Of these Lindisfarne has preserved most of its original outline of arrangement. Originally comprising a nave, with north and south aisles, transepts with apsidal recess in each, and chief apse eastward of the choir, it is a typical example of the Norman work. The details of strings, arch moulds, capitals, and bases are precisely what may be found at Durham, Dunfermline, and other contemporaneous work in both England and Scotland. The nave columns are varied in plan outline, and richly decorated in their height, almost alike in all of them. From such examples we see that, up to this period at all events, Scotland had not expressed any creation peculiar to herself, but was supplied with the art being fostered in England. As in the Norman, so in the First Pointed, period examples are alike in both ends of the island. Colonies of monks of different orders were constantly being sent forth from France and England; and such was the activity that, apart from parochial churches (which continued to be erected from the twelfth to the sixteenth centuries), of monastic establishments in abbeys, cathedrals, and priories about eighty were erected during a period of about one hundred and fifty years.

Dunfermline was recast in 1124 by David I., who brought Benedictine monks from Canterbury to occupy it. The nave of Durham had by this time been completed, and became the model for Dunfermline, with its channelled and dispersed pillars. Waltham Abbey, an early Norman work, is perhaps nearer the prototype for Dunfermline, for in length and breadth, in treatment of the decoration on nave piers, &c., there is great similitude.

The Tyronensians, a reformed branch of the Benedictines, was founded in France in 1109, and had only one house in Wales. They had six in Scotland, of which perhaps Kelso is most unique, both in plan and detail. Ponderous and compact, with scarcely any nave, it bears marks of a more direct importation from France. It was founded about twenty years after the formation of the Order.

The first trace we find of the pointed arch in Scotland is at Kelso, in the tower arches built in 1128-1152; and we should remember that in France the earliest example is 1144, and in England 1154, so that Scotland stands in an almost parallel position. At Jedburgh also, built about the same time, we find the pointed arch in the clearstory, though that part may be much later, and may be classed as of transitional character. The whole indicates French influence in detail. It was founded by Austin canons from Beauvais.

In Scotland the Norman phase of architecture continued late; St. Magnus Cathedral, Kirkwall, dates from 1137, and of it Sir Henry Dryden states that it shows the same peculiarities of style which are found in churches of an older date in Normandy. At the same

time, to support his opinion, Sir Henry finds a connexion between that part of France and those who founded the cathedral. The parochial system in Scotland was quite established in the twelfth century, and of parish churches we have Dalmeny, built about 1154, Leuchars 1190, and Duddington probably somewhat earlier. The earliest of these is about the period when that style was ceasing to be practised in England.

Scotland's works of the twelfth and thirteenth centuries are unquestionably her best efforts. In them we find exhibited an equal knowledge of the prevailing style, and power in treating it, that is shown in England. A peculiarity distinguishing the Scottish churches is their extreme narrowness compared with their breadth. St. Magnus Cathedral, Dunblane, Dundrennan, Glasgow, and Arbroath are all very long, and in this they more nearly resemble the proportions of French than English examples. As examples of purity of style, graceful proportion, and scholarly simplicity, we have Glasgow (1242), sometimes called the "Scottish Salisbury." In treatment, however, it is markedly different from its assumed prototype. No transepts, no flying buttresses, finials, or other excrescences so prominent at Salisbury are seen in Glasgow Cathedral. There, all simplicity, the interior effect of solid and simple design, being more emphatic in this respect than the exterior.

Elgin Cathedral, probably the finest in Scotland, was begun in 1224. It was the delight of strangers and foreigners who came to see it. It surpassed Glasgow in richness, but still preserved purity in the extreme beauty and fineness of its detail. The east gable is especially beautiful in composition and detail. The large round window over the double tier of lancet windows shows a closer affinity to French gable treatment than to English. The western double doorway is a remarkably fine and dignified example. In Early Pointed work double doors are frequently met with in both English and French churches, though few are on so grand a scale. Another, though much plainer instance, occurs in Glasgow Cathedral. A feature peculiar to Elgin is the double aisles to the nave.

Dunblane Cathedral, founded about 1233, is a further example of perfect grace and simplicity of design. Uncontrolled by the severity of Gothic forms, its every part is the expression of freedom and truth, and succeeds in producing beauty of composition and proportion that in Scotland has not been excelled.

In Holyrood we have a west-end treatment savouring somewhat of French feeling, especially in the towers. The doorway is perhaps the most beautiful in Scotland, if not in Britain, and at one time may have been double, the tympanum being much later.

For some years longer Scotland was enabled, under peaceful influences and royal encouragement, to pursue the development of her civilisation and arts; and from the scattered fragments remaining at Dunfermline Lady-chapel, Dryburgh choir, Inchcolm chapter-house, Crossraguel, Kilwinning, Plascardine, Kinloss, and elsewhere, there is sufficient to show Scotland's ability to treat her art skillfully in her own way. The death of Alexander III., in 1286, brought those restful and prosperous times to a sudden check. For upwards of a hundred years Scotland suffered under the fierce contentions of a disputed succession. There was no advancement in art, and the hitherto quiet march of learning and social refinement was obstructed.

The erection of churches was interrupted, and consequently we find nothing on a large or complete scale attempted. A people whose ancestors the Romans were powerless to conquer were most unlikely to yield to southern oppression, which now manifested itself. Scotland increased her security by a military alliance with France, and until the succession of James I., in 1406, the flow of art intercourse with England was all but stemmed. With the revival of quieter times, art blossomed forth anew, but not in the style of its former magnificence. The long interval had lost to it generations of good and able men. The new generations, in the effort to supply the demand made upon them by the revival of learning and piety, struggled on. The seeds of art had become mixed. England had passed through the Decorated phase, and was occupied (in 1377) with the later phase of Perpendicular, peculiarly England's own, while France, seeming to have lost sight of licence, gave the reins

to uncontrolled fancy, and was industriously pursuing the Flamboyant phase, which may be considered peculiarly her own. Scotland then, in a state of uneducated manhood, was left to begin upon her own art traditions. This her works show she did, and in doing so she began her new art history from the period of its cessation, and may have incorporated here and there some of the minor features concurrently expressed in England or France, and with which renewed intercourse may have made her artists acquainted. But wholesale imitation of the forms of plan or detail of any of these countries is not found in Scottish work. Her art had become as decidedly her own as her independence; and, true to the national characteristics, the strength and vigour exhibited in all the examples is particularly noticeable. We miss the delicacy of refinement and purity of the thirteenth-century efforts, but the new forms have the merit of originality, which longer study would trim to more pleasing expression.

It is to the collegiate churches chiefly we must look for the examples of Scottish art of the period. Of about forty of those, nearly all were founded in the fifteenth century. The selection of a few of them will serve to show their characteristics. Generally, the churches are not of great dimensions, but many have very carefully executed detail. The plan is usually cruciform, as at St. Giles's, Linlithgow, St. Monance, Seton, Corstorphine, Ladykirk, &c., and comprises a central tower, south-west porch, sacristy, and sometimes chantry chapels. In many instances the nave has not been completed. Where towers are not central they occupy a position on the west gable of the nave, such as at Linlithgow, Stirling, Ladykirk, &c. The towers are terminated with a polygonal spire of stone, rising from within a parapet enclosure,—the only instance of a broach spire being that at Seton. The cathedral form of two spires at the west end of the nave is found only at Aberdeen, where the prevailing simplicity is changed for rather a poor effort at decoration.

But it is in the tracery of the windows we find most to arrest attention. There we find a leaning to the so-called Flamboyant, but not the Flamboyant of France, nor its less profuse representations in England. The tracery is rather more purely Geometric than of the free flowing lines of that style, and in this respect is peculiarly Scottish. The windows are of two and more lights, and show careful thought and study, though the effect cannot always be viewed as satisfactory. Good examples are found at Paisley, Haddington, Melrose, Linlithgow, Seton, and elsewhere. At no time do we find in England so large a group of forms, such as we should expect had that country been the source of inspiration, and it is scarcely complimentary to the contemporaneous art of France to credit it with the heaviness and inelucence of detail which obtained in Scotland. Rickman, in a brief notice of Melrose Abbey, concludes the later additions there to be the work of a Frenchman, because of the record on a panel which bears that one John Murvo, born in "Parisse," "had in keeping all mason-work of St. Andrews, Glasgow, Melrose, and Paisley, &c." Had he brought with him the forms of detail peculiar to our Scotch works, we should probably find the same features in the other buildings noted as being under his care. He had the keeping of mason-work, which significantly indicates the limit of his appointment, and does not appear to imply an appointment as architect. Nearly all the features peculiar to Melrose of John Murvo's time may be found in other earlier collegiate and parochial churches in Scotland. Among the foundations of the fifteenth century, we find here and there an infusion of Perpendicular feeling, now fully developed in English work. Melrose expresses most, and Stirling east end bears a touch of it in the windows. The inference is that channels to English art were gradually being opened up, and conveyed the feeling to Scotland, where, however, it is found blended with local feeling, which gives the results a mixed expression.

The window mullions, in many examples,—such as Aberdeen, Seton, &c.,—have the centre one of three or more mullions, with a double order of mouldings carried up into the tracery, and abutting upon the outer reveals of the windows, giving a very clumsy, inelegant appearance to the window.

Circular or wheel windows are not uncommon, though they have not much appearance; and

where the upper part of a large window is designed with a circle, it is filled in with three and four cusped loops radiating from the circumference. A similar treatment of small circles is found in early work in Hampshire. The east window of St. Duthus' Church, Tain, is a good example of pure tracery of the Decorated period, the upper circle in which has a nearly parallel example in Dorchester and St. Alban's, England; others occur also in France.

The most unique church of this period in our midst is that at Roslin, which stands forth as the most redundantly decorated building, for its size, that we possess. Simple, but incomplete in plan, its peculiar richness has given rise to much speculation, and in the absence,—to a casual observer,—of any building of a like quality in Scotland, writers have found a way out of the difficulty of accounting for its peculiar art character by declaring it to be an exotic. From some source, most writers have quoted that it was built by artificers from foreign parts, and to Mr. Fergusson we are indebted for tracing a prototype in Spain. A closer examination of the building must, however, dissipate that idea. That the plan is not necessarily from foreign parts is shown by its nearly exact similarity to the east end of Glasgow Cathedral, built two centuries before, and in which occurs the same geometric ratio of proportion. In its profusion of carving (similar details to which may be found in edifices of the period) may be traced the outlines of mouldings common to nearly all the churches of the fifteenth century in Scotland, whether it be in the clustered shafts, with their capitals and bases, or in its window rebates, buttresses, and pinnacles. An increase of richness is given to the window ingoings and buttresses by the introduction of niche canopies and bases, but, so far as the buttress decoration is concerned, that also is a characteristic of the period. The four-leaved, isolated ornament, common in English work of the thirteenth century, is found also in Scotch examples. A solution to the speculation may be found in the circumstance that Lord St. Clair was hereditary Master-Mason of Scotland, and, naturally desirous to mark his estimate of the honour of his office, he would strive, in founding a church or chapel, to outvie the contemporaneous structures of other noble founders. The production displays an entire disregard of cost, and it may be, in its accomplishment, artificers from foreign parts were engaged, but if so they must have been under local direction and superintendence. The fenestration is of the same school as that of Haddington and other buildings, notwithstanding the insertion here and there of the eccentric form of St. Andrew's cross, and throughout the edifice nothing is revealed which would associate the design with any work beyond Scotland.

The only quality that seems common to Roslin Chapel and the example of Burgos Cathedral in Spain, cited by Mr. Fergusson as Roslin's prototype, if one may judge from the illustration in his own work, is that they are both excessively rich.

The detail of this period is exceedingly varied, nearly every building giving evidence of independent thought in some special feature, but the field is too wide to be taken up this evening. One feature common in Scotland is the persistent retention of the round-headed doorways through all the progressive changes of style. In these, therefore, there is no evidence for fixing dates. Their moulded work will, however, invariably afford a clue to the period.

Of the Scottish architecture of the fifteenth century,—the outstanding period,—much could be written, and in thus sketching a few of its points I merely desire to clear the way for a more thorough treatise upon it on another occasion. It represents the period when Scotland is seen to have relied more upon herself, and her efforts have therefore more force and individuality than is shown in any other of her building periods. Up to the thirteenth century we have seen that Scotland had supplied to her art from Ireland, Scandinavia, France, and England, in the handling of which to her own uses many evidences of independent thought are seen; but, as if still fresh in the liberties of her earned independence, she in the fifteenth century prefers to move on uncontrolled by foreign promptings.

This sketch would be incomplete without a notice of the crown termination given to a few of the towers in Scotland. They are, perhaps, the most beautiful and perfect of all her efforts

of later date. If not of Scottish origin it can be said they are peculiar to Scotland, and, so far as can be learned, are earlier than the only example existing in England, namely, that at Newcastle. To my mind the crown termination of St. Giles is superior in respect of vigorous grace of composition and perfect fitness of detail, to any of the others existing. That at Aberdeen descends to clumsiness, while that at Newcastle is too attenuated, and has not the restfulness of pose essential to the success of its effect.

A SANITARY RETROSPECT.

This was the subject of the interesting address delivered by Captain Douglas Galton, C.B., F.R.S., as Chairman of the Council of the Society of Arts, at the opening meeting of the 133rd session of that Society, held on Wednesday evening last. He said at the outset that as we were entering upon the jubilee year of the Queen's reign, it had occurred to him that it would be interesting to take stock, as it were, of the progress which had been made by the nation in some one of the branches of usefulness to which the proceedings of the Society had contributed, and it seemed to him that the most fitting subject to select would be that of the progress which had been made in sanitation during Her Majesty's reign. After giving a graphically-written sketch of the defective sanitary condition of the people of this country at the beginning of the Queen's reign, he proceeded to pass in review the principal steps in advance which had been made, including the institution of our system of registration of births, deaths, and marriages, and the progress of sanitary legislation and administration, thanks to the labours of Mr. Edwin Chadwick, Dr. Farr, Sir Robert Rawlinson, and others. Turning from the community generally to the metropolis, he said—

A new era in metropolitan sanitation was inaugurated in 1855. In that year the Metropolitan Board of Works was created. In this body was vested the main drainage of the metropolis, but the charge of the subsidiary parish sewers was left to the vestries, who were also charged with the care of the streets and roads, the Metropolitan Roads Commission being abolished, and all duties of lighting, control of removal of refuse, &c., were placed on the vestries. Thus the formation of this new Board was somewhat of a retrograde movement, because the concentration of functions, which had been commenced under the Metropolitan Roads Commission and Metropolitan Sewers Commission, instead of being strengthened in the new Board, was abandoned, and something approaching chaos was introduced. This Board has, however, by degrees had remitted to it the general London improvements, and certain other general municipal functions, as well as power to levy general rates. The City retained its individuality, excepting as to the main sewers, and effected improvements and opened out thoroughfares in the part in its jurisdiction. The improvements in the other parts of London are mainly due to the action of the Metropolitan Board of Works. Great alterations have taken place in our thoroughfares; indeed, Regent-street is the only important thoroughfare which has not undergone an almost complete transformation during the Queen's reign. Smithfield Market for live cattle has been abolished. Many of those large tracts of London which were occupied by dwellings of the most wretched description are now traversed by wide thoroughfares, and covered by artisans' dwellings erected by private enterprise. But there is no diminution of the rate at which the vast aggregation of population in London still continues to progress, and, unfortunately, many of the wretched crowded dwellings still remain, where those born in close rooms, brought up in narrow streets, and early made familiar with vice, are deteriorated in *physique*, and grow poorer from inability to work. A recent writer in the *Fortnightly Review* says of our prospects:—"The poorer quarters will become poorer, the sights of squalor, misery, and hunger more painful, the cry of the poor more bitter." This is an evil we have to meet and overcome. Although in respect of the housing of the working classes so much remains to be done, we have results to show that much sanitary improvement has been achieved. We can congratulate ourselves that, in the place of the mad banks which occupied the foreshore of the river in the heart of London, embankments

extending from Chelsea to Blackfriars, and from Vauxhall to Westminster, form the finest roadways in the world; and that the sewage is removed from the heart of London by means of vast works.* The reconstruction of the drains, the removal of the sewage from the midst of the population, the opening out of thoroughfares so as to admit ventilation into crowded districts, have all tended to improve the sanitary condition of London. Some interesting tables, prepared for me by the kindness of Mr. A. J. Mundy, of the Registrar-General's Office, show the remarkable sanitary results of these various efforts. The death-rate of London in the five years 1838-42 was 25.57 per 1,000. In the five years, 1880-84, it was 21.01 per 1,000; and the deaths from zymotic diseases, which in the decade 1841-50 had averaged annually 5.29 per 1,000, were reduced in the years 1880-84 to 3.4 per 1,000. If, however, we assume that there had been no change in sanitary conditions, and, therefore, that the death-rate had gone on increasing according to Dr. Farr's formula of increase due to density of population when the sanitary condition remained unchanged, the death-rate of 1880-84 would have averaged 26.62 per 1,000; that is, a saving of 5.61 per 1,000 has been effected by sanitary measures. If upon this basis we compare the saving in life which has resulted from sanitary improvements at different periods since 1838-42, we find that it amounted to an annual saving of 4,604 lives during 1860-70; of 13,929 lives annually during 1870-80; and of 21,847 lives annually between 1880-84. The main drainage works were commenced about 1860, and terminated in 1878, and the increase in the saving of life in these consecutive periods may to some extent be taken as a gauge of the effect of the gradual construction and completion of these works. No doubt this London death-rate is far too high, and is an evidence that insanitary conditions still prevail all round us; that the housing of the working classes is still far from satisfactory, and that we are too careless about infectious disease. The Metropolitan Board of Works has never had a clear field for municipal action; yet when we compare the present condition of London with what it was at the Queen's accession, the Metropolitan Board of Works, in spite of the disadvantages of its constitution, will have a grand record to show, in the Jubilee year of the Queen's reign, of metropolitan improvements and metropolitan sanitation.

As to the general results of the sanitary legislation on the well-being of the people, Captain Douglas Galton said:—

The main principle which guided public administration, both before and during the earlier years of the Queen's reign, may be said to have been that of non-interference, and of allowing free competition to prevail; although, no doubt, some efforts had been previously made to regulate the labour of females and children in Factory Acts. The practical application of the knowledge derived from the Registrar General's statistics led to further investigation in particular cases by such men as Dr. Simon, Dr. Buchanan, Sir Robert Rawlinson, and others, and gradually caused a reaction from what may be called the *laissez faire* system, to the spread of opinion in the direction of control over individual action in the interest of the community generally; and the result was the enactment of the successive laws for regulating the sanitary condition of the people, which I have enumerated. This large amount of legislation is practically little more than the interpretation required by the increase of population, and by the complicated exigencies of modern life, of the common law maxim, *Prohibetur ne quis faciat in suo quod nocere possit alieno; et sit utere tuo ut alienum non ledas*: that is to say, no man shall do anything by which his neighbour may be injuriously affected, and each person must so use his property and his rights as not to harm any one else. This common law doctrine had become practically obsolete, because there was no machinery in existence to enforce it; and the present generation inherited a legacy of misery amongst the poorer classes, owing to the absence of control over the increase in our towns, the

absence of regulations in the building of houses, absence of water supply and drainage, and other matters which I have mentioned. . . . The present social condition of the people affords an equally striking evidence of general improvement. Food and clothing are cheap, the construction of streets and new buildings in our towns are regulated, houses are improved, overcrowding and cellar dwellings are prohibited, the common lodging-houses are controlled. Petroleum affords a brilliant light to the poor in country districts which are beyond the reach of gas, and who were formerly dependent on rushlights. Water supply is rarely deficient; removal of refuse is enforced. But there remains much still to be done. Numbers of the people are still crowded in wretched dwellings, our rivers are polluted and subject to floods; our infectious diseases are not properly guarded against. The main feature of the legislation of the past half century is the recognition of the principle that when large numbers are congregated together in communities, the duty of preventing injury from this aggregation rests on the community and if this principle is duly acted on, if in all aggregations of population free circulation of air is encouraged by preventing the crowding together of buildings; if refuse is immediately disposed of, so as to cause no injury to any one; if pure water be provided; if we isolate infectious diseases; and, above all, if we are fortunate enough to retain the blessing of cheap food and clothing, we shall not transmit to our posterity a similar legacy of misery to that which we inherited.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The first ordinary meeting of the current session was held at Queen's College on Tuesday evening, November 16th. The Vice-President (Mr. John Cotton) was in the chair. Resolutions were read from the Leeds Architectural Society and the Manchester Society of Architects approving of the proposed new Charter of the Royal Institute of British Architects. The secretary read the annual report, balance-sheet, and class reports for the past session. The following gentlemen were nominated for membership:—S. J. Holliday, B. V. Hirsch, J. Jephcott, H. Buckland, L. Stone, G. Bassett, J. K. Shaw, H. R. Lloyd. A paper was read by Mr. Victor Scruton (hon. sec.) entitled "Poetry and Price-lists." A lengthy discussion followed, in which Messrs. W. Henman, A. V. Ingall, J. Newton, and J. Cotton took part. A hearty vote of thanks was accorded to the author for his interesting paper, and, after a response from Mr. V. Scruton, the meeting terminated.

Dundee Institute of Architecture.—Mr. James Sellars, I.A., Glasgow, read a paper on "Everyday Architecture" before a meeting of the Dundee Institute of Architecture, Science, and Art, last week. Mr. Sellars called attention to the need for improvement in sanitary matters, and pointed out that as one of the things which should form part of everyday architecture, or the everyday work of the architect. He was of opinion that for the general good of the community the authorities should have power to test drainage systems periodically, and to compel proprietors to repair or renew them as might be necessary. Speaking of the extent to which the profession was poached upon, Mr. Sellars mentioned that more than one-half of the plans which went before the Glasgow Dean of Guild Court were signed by persons who had no claim to be called architects, and who did not so designate themselves in the "City Directory."

Glasgow Architectural Association.—On the 9th inst., a lecture on "Architectural Study" was given by Mr. Wm. Leiper, F.R.I.B.A., Honorary President. Mr. M'Nab, President, occupied the chair. The sum of his advice was that of Michelangelo, to draw often and draw well; the disadvantage Scotch architects labour under in the lack of all academic instruction in architecture, either practical or as a fine art, can be best minimised by the careful study of the works of the past by pencil and measuring rule. Some beautiful sketches by Mr. Geo. Reid, R.S.A., Mr. Haig, and Mr. Wm. F. Salmon, architect, who also lent the collection, were shown as samples of what such studies should be. At the close, after such remarks by Mr. David Barclay, F.R.I.B.A., and Mr. T. Gildard, a hearty vote of thanks was accorded to Mr. Leiper.

* Captain Galton is surely rather too much of an optimist here. A great deal of the sewage is brought back again into "the heart of London," in the worst possible way, in the waters of the tidal river into which it has been poured. Let us alter that, and then it will be time to congratulate ourselves.—Ed.

Manchester Architectural Association.—The fortnightly meeting of this Association was held on Tuesday evening in the board-room of the Diocesan Chambers, Mr. F. W. Mee in the chair. A paper was read by Mr. W. Parslow, F.R.I.B.A., of the Liverpool Architectural Society, on the subject of the design and construction of lunatic asylums. A discussion followed, and a hearty vote of thanks was accorded to the lecturer. The question of the Royal Jubilee Exhibition, to be held in Manchester during the coming year, was brought before the meeting, and a resolution was unanimously approved of expressing the opinion of the meeting that the action of the executive committee in the matter of architectural illustration is not in any sense either respectful or satisfactory to the profession.

York Architectural Association.—On the 10th inst. the opening meeting of the fifth session of this association was held at the Church Institute, under the chairmanship of the President (Mr. W. Hepper). The hon. secretary presented the report, which stated that the Society now numbers fifty members. Mr. W. Hepper, the President, gave his annual address.

OBITUARY.

Major-General Boileau, R.E., F.R.S., died a few days ago. He was for some time Superintending Engineer in the Public Department of Works for the North-West Provinces at Simla, and of late years had taken an active part in local government affairs at Kensington.

Mr. G. T. Doo, R.A.—Mr. George Thomas Doo, R.A. (retired), F.R.S., the well-known engraver, died on the 13th inst., at Sutton, Surrey, in his eighty-seventh year. He was a member of many foreign academies, and in 1855 was elected an Associate of the Royal Academy, being advanced to the full rank of R.A. in the following year. In 1861 he was elected President of the Artists' Annuity Fund, and in 1863 he gave evidence before the Royal Academy Commission at Westminster. Mr. Doo joined the ranks of the retired Academicians some years ago.

Mr. E. Bassett Keeling.—The death is announced of Mr. E. Bassett Keeling, F.S.I., in his fiftieth year. He was articled to Mr. C. L. Dresser, of Leeds, and amongst his works may be mentioned the New Jerusalem Coffee House (rebuilt in 1879), Prince's Mansions, Victoria-street, Westminster (recently illustrated in the *Builder*), the Auction Mart Restaurant, Tokenhouse-yard and Tokenhouse-buildings. In the earlier part of his professional career he was architect of several suburban churches, and of the whilome "Strand Music Hall" (subsequently converted into the Gaiety Theatre), which was very much criticised at the time of its erection, and it certainly exhibited many eccentricities of design, some of which have been obliterated by subsequent changes. Nevertheless, it had the merit of originality and effectiveness, and was not only at the time something novel in its way, but had even some influence on the style of other buildings erected soon after it; and it is not every architect who could say that of any one of his works.

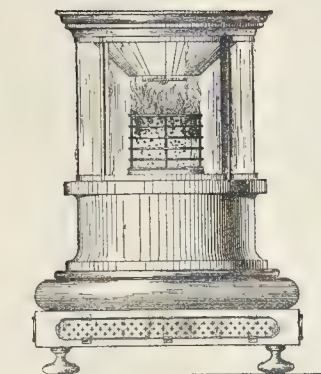
Mr. E. Ladell.—Mr. Edward Ladell, a painter whose *specialité* was "still life," died on the 9th inst. at his residence in Exeter.

Mr. T. A. Prior.—Mr. Thomas Abel Prior, the line engraver, died on the 8th inst.

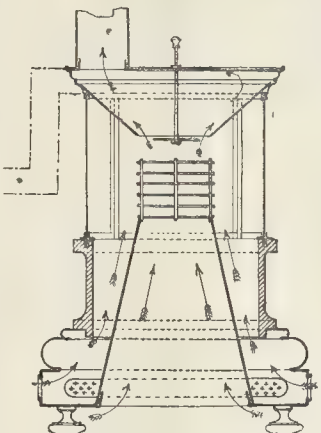
Funeral of the late Mr. G. Valliamy.—The remains of the late Mr. Valliamy were buried on Wednesday, the 17th inst., in the churchyard of the beautiful little church of Stone, near Dartford. There was a large attendance at the grave, and in addition to the relatives of the deceased, there were present a deputation from the Institution of Civil Engineers; a deputation from the District Surveyors' Association, consisting of Mr. H. Parsons, the hon. secretary, Mr. H. Hart, Mr. G. McDonell, Mr. T. H. Watson, and Mr. Robt. Walker; several officers of the Metropolitan Board of Works, including Mr. A. Gunn, the Accountant, and Mr. John Hebb, the Assistant Architect. The grave was dug on the south side of the chancel. The coffin, which was extremely plain, and had a brass plate simply recording the name of the deceased, and the day of his death, was heaped up with magnificent wreaths contributed by various friends.

A NEW STOVE.

This stove is designed and patented by M. Epaminondas Abate as a smoke-preventing and slow-burning stove, and appears to us worthy of attention both on the ground of scientific construction and agreeable appearance. As will be seen from the elevation and section, it is a circular stove with glass sides in



Elevation.



Section.

the upper portion, with a small central circular grate, which receives a double current of air, one in the centre delivering under the fire, the other outside furnishing a supply to the upper portion of the fire. The consumption when we saw it burning was slow and nearly smokeless; a considerable degree of heat is radiated from the glass and metal surfaces when the stove is entirely closed up, while the fire is still visible to view. The glass partition can be opened on hinges if desired, when the stove becomes practically an open fire, of course under those conditions its special arrangement for air supply is interfered with. The real value of the stove is in giving a moderate and equably-unstained warmth to an apartment or hall, with little smoke, and a very small consumption of coal, allowing for the cheerful effect of a visible fire.

Sanitary Institute of Great Britain.—At an examination, held November 11th and 12th, sixty-four candidates presented themselves, nine as Local Surveyors and fifty-five as Inspectors of Nuisances. Questions were set to be answered in writing on the 11th, and the candidates were examined *visu voce* on the 12th. The Institute's Certificate of Competency to discharge the duties of Local Surveyor was awarded to Messrs. John Reid Anderson, John F. Curwen, John William Metcalf, and Charles Chambers Smith; and the Institute's Certificate of Competency to discharge the duties of Inspector of Nuisances was awarded to forty-two of the fifty-five applicants.

CORK CATHEDRAL.

SIR.—Admirers of Cork Cathedral, the noblest work of Mr. Burgess and (some think) of the Gothic Revival, will be sorry to hear that a change is in contemplation there which will very seriously alter for the worse the aspect of the interior of the building, besides greatly impairing the effect of a fine musical instrument. The church, as those who have seen it are aware, is one of the few modern ones for the English service having the organ in a western gallery. For this the building was designed, the west end of the nave having a lofty portal (which forms with those of the aisles the finest west front of any modern church), and in the gable a rose window, on either side of which, in the gallery, the organ is arranged, forming an exceedingly satisfactory interior termination to the church. I have, however, just learned, on a visit to the Cathedral last week, that it has most unfortunately been determined to remove, at the first opportunity (when the money comes in) the organ to the choir, stacking the pedal pipes to lumber up the south transept, and getting in as best can be managed the rest of the instrument in a gallery to be constructed in the south choir aisle, where some brackets were left by Mr. Burgess to carry a small choir organ. This plan, if carried out, will ruin the effect of the west end, which is quite unlighted, save by the rose window aloft, and will become a dark empty space of no meaning, will encumber the south transept in a small church where there is no space to spare, close the view round the south ambulatory, one of the most charming architectural views there is, and last, not least, diminish by half the effect of a very fine instrument, for which, in a moderate-sized church, the west gallery is by far the best position. Were the Cathedral a large building, the excuse that the choir and organ could not work together would be a serious one; but here the length of the nave is not enough to cause any inconvenience, and the only reason alleged is that some of the congregation who may be near the west end object to hear the louder pipes above their heads. I write this letter, therefore, to call the attention, not of the Society for the Perpetuation of Architectural Bathos, for Cork Cathedral is not ancient, and, if it were, is far too noble a building for them to appreciate, but of all admirers of a building, designed, as a whole and down to the smallest detail, by the greatest architectural genius of the nineteenth century, and of any musicians who may have any acquaintance with the circumstances, in the hope that it may be yet time to ask the Dean and Chapter, or Vestry, or whoever is responsible, to reconsider their decision, and to leave Mr. Burgess's organ in the state in which he left it. Mr. Pullan especially may or may not be aware of this, but if he be ignorant his attention should certainly be called to it.

H. C. S.

There is not the slightest doubt that the change of position, and the breaking up of the organ into sections, would be ruinous to its effect as an instrument. It is a piece of utter folly to treat a large organ so. There is, however, the difficulty, continually recurring, that an organ is wanted near the choir, and they, for ritual reasons, must be at the east end. The best thing would be to put a small organ near the choir, and connect both organs to one keyboard (also near the choir) by electric or other action. This would cost less than moving the large organ, and be infinitely more satisfactory, both architecturally and musically.—
Ed.

THE DANGERS OF NEW BUILDINGS.

SIR.—In reference to the *résumé* of a lecture on this subject in your last [p. 730], allow me to say that the dangers pointed out by Dr. Hülmann have long been recognised by the Italian Government, who will not allow a new house to be inhabited until one year after completion, and not then until it has been inspected and certified by a surveyor.

It is surprising that in a country like England, whose climate is so moist, no law has been passed prohibiting the occupation of houses which are sometimes scarcely finished, thus exposing the occupants to contracting diseases that may continue during a whole life; and this especially applies to the poorer classes, who have no means of drying their houses before inhabiting them. People in a good position can afford to have them dried before entering, in the same manner as several of the new hotels in London have been during the last few years. If a law to that effect were in existence, it would go far to prevent the speculative builder running up cheap houses, and using green timber and bad mortar and plaster. JOHN ASHTON.

A QUERY.

DEAR SIR.—Can any of your correspondents assist me to a roughly approximate idea of the quantity of lime mortar used annually, say, in England?
M. S. E.

FIR.

SIR.—Will some of your readers kindly give their opinion and experience on the relative merits of best Swedish red fir and good middling Dantzic fir, when used for lintels, joists, roofing, and ordinary carpentry? Which is the best?
TIMBER.

CHURCH-BUILDING NEWS.

Alston.—The spire of St. Augustine's Church has now been completed, from the designs of Mr. G. D. Oliver; the cost was about 1,000l. The height from the ground to the vane is 145 ft., and of the spire above the tower 65 ft. It is understood that the old bell, which since the church was rebuilt has occupied a temporary position in the unfinished tower, has now been removed to the belfry, where its tones are heard to much greater advantage. It is in contemplation shortly to have a peal of bells.

Battersea.—On Saturday was consecrated by the Bishop of Rochester, the Church of St. Stephen, Kersley-street, Battersea. The site is on the south side of Battersea Park. This completes, all but one, which is now in progress, the number of churches erected by the aid of the Bishop's "Ten Churches' Fund," which has granted 4,000l. towards the 5,400l. required for the cost of the entire work, including all expenses. The church has been built to accommodate 700 persons, including space for sixty chairs. The foundation stone was laid on May 15, by the Right Hon G. Cubitt. The church is built in red and buff bricks, with window tracery, caps, shafts, and bases of arcades in stone. The arches are of bricks moulded specially for this building. The ground-plan comprises a canted apsidal chancel with aisles, nave with aisles, and a western vestibule. The aisles are low and without windows, being lighted by the large windows of the clearstory. There is a small tower on the north side of the chancel to take a ring of six small bells. The upper stage is formed to take a clock with four dials, built in moulded brick with a pointed brick for each of the hours. The spire is covered with tiles. There are extensive vestries in a crypt beneath the chancel. The east window is filled with stained glass from drawings by the architect of the church, Mr. W. White, F.S.A. It represents the condemnation and martyrdom of St. Stephen, with the Crucifixion and Ascension above.

Dolwyddelan, near Festiniog.—The new parish church of Dolwyddelan, consecrated on the 10th of November, seats 228 worshippers, and consists of a nave with chancel, having an organ-chamber on the north side. As it stands on sloping ground, advantage has been taken to arrange the clergy and choir vestries under the easternmost part of the chancel, and a staircase has been built in a semi-octagonal manner on the south side. There is a north porch with an open-timbered roof. The walls are built hollow of the beautiful slaty stone, procured on the actual site, with Runcom stone dressings. The nave roof is open-timbered, having trusses with curved braces, and, like the rest of the church, is covered with local slates. The chancel has a wagon-headed boarded ceiling divided into panels by moulded ribs. The west end is surmounted with a massive stone-gabled bell-turret, for one bell. The church is fitted with open benches of pitch-pine, the choir seats and other chancel fittings being of English oak, of a more ornamental character, as is also the upper part of the pulpit; the base of the latter is of Wrexham stone, and also the font. The building is paved with Godwin's tiles, of special design by the architect, the floor to the chancel over the vestries being carried on Portland cement concrete, and rolled iron joists to gain height. The altar-rail is of oak, carried on iron standards. The floors under the seating and to the organ-chamber and vestries are of solid wood blocks. The windows are glazed with cathedral glass of various tints, to designs arranged by the architect. The church is heated with warm air by Messrs. Rosser & Russell, of Charing Cross, and lighted by oil lamps supplied by the Defries Patent Safety Lamp Company. The character of the church is an adaptation of the thirteenth-century style. Mr. B. Edmund Ferrey, F.S.A., is the architect. The work has been carried out by several contracts, not by one builder. The old parish church on a lower site still remains, and will be preserved as a mortuary-chapel, and for occasional use.

Newcastle-on-Tyne.—The Building Committee for St. Jude's Church, Newcastle-on-Tyne, have agreed to purchase a plot of vacant ground, and also buy and pull down the three houses adjacent thereto, and situate at the corner of Clarence-crescent and Barker-street, Shieldfield, as the site for the church, and they have appointed Mr. Arthur B. Plummer to be the architect for the new church.

The Student's Column.

STONE QUARRIES.—XXI.
MAGNESIAN LIMESTONES.

THE rocks we are now about to treat of have probably been the cause of more controversy amongst those who deal with problems connected with building stones than any other material of a like nature in the trade. We have previously alluded to the structure and composition of them (see *Builder*, vol. i., pp. 491-764). They were largely used in the construction of the Houses of Parliament, and, whilst some have stood the test of time fairly well, others, as is well known, have completely decayed, so as to necessitate considerable restorations. From a knowledge of this fact, magnesian limestones have not been in such good repute as they were formerly; but we venture still to think that much of this is prejudice, and that, as usual, the fault lies with those who select the stones and with the masons who lay them. Nowadays the work allotted to the latter class of men is, perhaps, executed with greater care than when the Houses of Parliament were built, though whether as much can be said for the former class would appear to be rather doubtful. As we have again and again urged, the causes of the failure of some magnesian limestones are not altogether due to their chemical composition, but to the state of crystallisation of their minute parts. Professor Daniell thinks that, in addition to being crystalline, the better class of magnesian limestones should contain approximately equivalent proportions of the carbonates of lime and magnesia. The typical proportions would thus be 45.7 per cent. of carbonate of magnesia and 54.3 of carbonate of lime. It is hardly necessary for us to observe that the stones always, more or less, contain some foreign matter, and we have never heard of any stone having the above identical composition.

B. von Cotta proposed that all limestones containing upwards of 23 per cent. of carbonate of magnesia should be classed as dolomites or magnesian limestones.* Following out this rule, we shall find that some of the most important building stones in this country will have to be excluded, viz., those which contain a comparatively large proportion of carbonate of magnesia,—too little to fall into the dolomitic series, and too much to be classified with the limestones properly so called, or with the sandstones. They are composed of about half silica, an oxide that does not enter very largely into the composition of true magnesian limestones; whilst, generally speaking, the proportion of carbonate of lime is about 10 per cent. greater than that of the carbonate of magnesia. It is, in fact, one of those cases of transition so often found in nature, and with which the systematist finds it extremely difficult to deal. The rocks under discussion are neither sandstones, limestones, nor dolomites, and were they sufficiently numerous we should certainly form them into a separate group, but from the fact that they are not, we shall, for convenience, describe them under the magnesian limestones, and the student should, therefore, be on his guard in estimating the action of the atmosphere on these aberrant forms. Dolomites used in building may, then, be divided into two groups. These are (1) magnesian limestones proper, poor in silica; and (2) siliceous dolomites, rich in silica.

Some of the principal quarries in the former group are at Anston, Bolsover Moor, Cadeby, Huddystone, Mansfield—Woodhouse, Roche Abbey, Smawse, and Steelley.

Anston Quarries.—These are near South Anston, in Yorkshire. The stone is of a light brown colour, and if carefully selected stands the London atmosphere very well, as may be seen in the front of the Museum of Practical Geology, Jermyn-street. It was largely used for the structure generally of the Houses of Parliament. The following are the analyses of the stone from two different quarries, made by Messrs. Ransome & Cooper:—

North Anston.		— Stone ends.	
Carbonate of lime.....	54.89	...	55.37
Carbonate of magnesia.....	42.07	...	41.71
Protoxide of iron.....	0.49	...	0.73
Peroxide of iron.....	0.24	...	—
Peroxide of manganese.....	trace	...	1.68
Silica.....	0.56	...	0.92
Water.....	0.61	...	0.45

* "Rocks classified and arranged" (English ed.), p. 246.

Bolsover Moor Quarries.—These are near Chesterfield, in Derbyshire. The stone is of a light yellowish brown colour. The specific gravity of a dry mass is 2.316, the weight of a 2-in. cube in the ordinary state being 4,890.8 grains; weight when well dried, 4,881.4 grains, and when saturated with water, 5,042 grains.* After being tested with Glauber's salts for eight days, it was found that the Bolsover stone disintegrated to the extent of one grain and a half; though we may mention we do not see that there is any practical outcome of this knowledge, for reasons previously explained. The following are analyses of the stone, the first by Professor Daniell and the second by Messrs. Ransome & Cooper:—

	I.	II.
Carbonate of lime.....	51.1	52.07
Carbonate of magnesia.....	40.2	40.60
Protoxide of iron.....	—	0.89
Oxide of iron and alumina.....	1.8	—
Peroxide of iron.....	—	0.83
Peroxide of manganese.....	—	trace.
Silica.....	3.6	3.64
Water.....	3.3	0.48

The Bolsover Moor stone has been largely used locally. It was selected for the Houses of Parliament, but owing to insufficient supply was not made use of.

Cadeby Quarries. near Doncaster, in Yorkshire. The stone is of a cream colour, and rather friable, the central beds being said to be the best. One specimen from Cadeby, which was experimented upon, absorbed one-fourth of its bulk of water. It has been used at Messrs. Day & Martin's manufactory, High Holborn; Edgware; and other places in the vicinity of the workings.

Huddystone Quarries.—These are near Sherburne, the stone being of a light cream colour. Hard veins occur in some parts of the stone. The following is the chemical analysis, according to Professor Daniell:—

Carbonate of lime.....	54.19
Carbonate of magnesia.....	41.37
Oxide of iron and alumina.....	0.30
Silica.....	2.53
Water.....	1.61

It has been used in Selby Cathedral, York Minster, Westminster Hall, and the Cross opposite Charing-cross Station (S.E.R.).

Mansfield Woodhouse Quarries.—These are two miles from Mansfield, in Nottinghamshire, and the stone is of a light brownish tint, known in the market as "yellow Mansfield." It is very similar to the Bolsover Moor stone in appearance, and is nearly identical with it in geological position. It, however, has a greater proportion of black specks than is usual with stones of this class. The following analyses are taken (1) from Smith's "Lithology"; and (2) from the Mem. Museum of Practical Geology, the latter being made by Messrs. Ransome & Cooper:—

	I.	II.
Carbonate of lime.....	51.65	52.80
Carbonate of magnesia.....	42.60	44.31
Silica.....	3.70	0.47
Iron and alumina.....	—	—
Peroxide of iron.....	—	0.63
Peroxide of manganese.....	—	1.84
(carbonate).....	—	—
Water, &c.....	2.05	0.23

The stone is very good for ashlar, columns, mouldings, and carved work. It has been used for the lower part of the river front of the Houses of Parliament; the Martyrs' Memorial, Oxford, &c.

Roche Abbey Quarries.—These are near Rawtry, in Yorkshire, and the stone is of a light cream tint. It is said to weather a dark colour, and lines show along the bedding planes. It has been extensively used in many churches in Lincolnshire and Yorkshire, including those of Tuhill, Blyth, and Bawtry; Roche Abbey; the Deanery, York; Toxteth Hall, &c.

The stone from the *Smawse Quarries*, near Tadcaster, is of a light brown colour, and rather brittle. It has been used in Ripon Minster, and repairs to York and Beverley Minsters.

That from *Steelley Quarry*, near Worksop, is of two colours, white and yellow. It has been used in the Houses of Parliament; the Abbey Church, Scarborough; and in Nottinghamshire generally.

The following are chemical analyses of the Roche Abbey stone (1) by Prof. Daniell; and

* See "Guide to Mus. Prac. Geol.," 1877 (4th ed.), p. 40.

Steetley stone (2) by Messrs. Ransome & Cooper:—

	I.	II.
Carbonate of lime.....	57.50	53.95
Carbonate of magnesia.....	39.40	43.78
Salphate of lime.....	—	trace
Peroxide of iron.....	—	0.64
Oxide of iron and alumina.....	0.70	—
Silica.....	0.80	0.44
Water.....	1.60	0.12

It will be seen that the Steetley stone very closely approaches the typical composition of a magnesian limestone.

The principal quarries falling under our second group of siliceous dolomites are found in the vicinity of Mansfield, where the Permian beds consist of an upper and lower bed of stone, with intermediate marls and sandstones. The lower limestone, which is the more important, varies in thickness from 70 ft. to 100 ft.

Mansfield stone is known to all of us. There are several kinds in the quarries, but those chiefly used are white and red, both forming good building materials, well adapted for fine ashlar work, columns, carvings, &c. The following is mostly obtained from Rivington's "Build. Const.," part iii., p. 38.

Of the white Mansfield stone, there are several beds, the top bed of all being of a coarser grain than the others. The second and third beds supply a very good fine-grained stone, fit for the finest ashlar work; whilst the lowest bed is much harder, and is well adapted for stairs, paving, landing, &c. It has been used in the Town-hall, Mansfield; Clumber Lodge, &c. The red Mansfield is generally more uniform in quality and appearance, whilst it is also considered to be more durable than the white. It is from 4 ft. to 5 ft. thick, and is procurable in blocks weighing as much as 10 tons. Columns are usually turned on a lathe at the quarries. It has been used in flagging part of Trafalgar-square; ashlar, columns and niches, Burlington House, St. Pancras Hotel and Station; Bilton House, &c.

The following are the published analyses:—

	White.	White.	Red.
Carbonate of lime.....	26.50	41.30	26.50
Carbonate of magnesia.....	17.08	7.30	16.10
Silica.....	51.40	50.00	49.40
Iron and alumina.....	1.32	—	3.20
Water and loss.....	2.80	1.40	4.80

The analyses of the white stones were evidently made from two widely-different kinds, if one may judge from the amounts of carbonates of lime and magnesia.

A very large proportion of Ireland is covered with limestone of the carboniferous formation, which produces some of the most beautiful marbles in the market. It is also used locally for building purposes, but, in comparison with the softer and more easily worked limestones of this country, it is by no means so economical, whilst the dark colour is also against its extensive use. When built to harmonise with the Portland stone, of which several edifices in Dublin are constructed, it looks fairly well. Many of the most ancient round towers in Ireland are made of limestone.

Limestone is a comparatively rare rock in Scotland, and when found, it is generally too highly prized for making lime, or for the smelting of iron ores, to be used in ordinary buildings, whilst the abundance of good sandstone more than compensates for the deficiency in this respect. There are, however, a few limestone quarries in the vicinity of Edinburgh and Glasgow.

Four Times Mayor.—Mr. James Fowler, F.R.I.B.A., has been three times Mayor of Louth, Lincolnshire; and on the 9th was elected to this office for the fourth time, the opinion being expressed and applauded on the occasion, that "his fellow citizens are proud of the mark he has made in his profession, his name being known not only in the county of Lincoln, but also all over England, and are sure that, as jubilee Mayor, he will strive to excel himself and thus do honour to himself and the town."

Registration of Plumbers.—A meeting was held on Wednesday at the Guildhall, under the presidency of Mr. Alderman Knill (Master of the Plumbers' Company), supported by Mr. George Shaw (late Master), Mr. F. Machin (Prime Warden), and Mr. W. H. Bishop (Renter Warden), at which certificates of registration were issued to upwards of 200 plumbers.

Books.

Archæological Cantiana, being Transactions of the Kent Archæological Society. London: Mitchell & Hughes. 1886.

THE archæological wealth of the county of Kent seems to be as inexhaustible as the enthusiasm of its explorers. Canon Scott Robertson (who not only edits the Transactions of the Society, but contributes to the present volume some of its most valuable memoirs) is one of the foremost in the band, and in the course of the year has brought to light a good deal that is worthy of notice. The rescue-work from what Bacon calls the deluge of time has not been indiscriminate, nor, on the other hand, has it been all of one character. The palæontologist, the ecclésiologist, the genealogist,—we wish these names were shorter,—as well as the architect and the antiquary, may each find much to interest him in his own particular study, and to enlarge his knowledge. Of course one of the great advantages of these local societies is that they direct attention to details and discoveries which might otherwise escape observation. In them are often to be found, not only missing links in a pedigree, but also solutions of architectural puzzles and numerous anticipations made by the ancients of modern art and ingenuity. One feels inclined sometimes to ask with the wise man, "Is there any thing whereof it may be said, See, this is new?" The volume before us opens, in due regard to chronological order, with a paper upon some Romano-British interments discovered at Bayford, near Sittingbourne. Among the relics found in the graves were two extremely elegant examples of ancient art,—a glass goblet with a long slender neck and double handle (unique in that respect) and the handle of a bronze vase, cast in high relief and containing the representation of a man, surrounded by animals, and apparently in the act of using the sacrificial knife.

These interesting discoveries are fresh evidence of the well-known fact that the neighbourhood of Sittingbourne was thickly populated during the Roman occupation of Britain. Richborough, on the eastern side of the county, was an older settlement, and the memorials of the past which have been there discovered are many and various,—the leaden seals of Constantine, with the imperial effigies and titles, being among them. Mr. Roach Smith has drawn the Society's attention to the circumstance that not a single lapidary inscription has yet been found, and suggests that deeper excavations on the site of *Rutupie* would assuredly reveal some sepulchral records of the thousands who, for more than three centuries, made it their home.

Mr. J. F. Wadmore, A.R.I.B.A., scarcely claims a Roman origin for the mound on which the Norman Castle of Tonbridge was subsequently erected, but it may have been occupied for defensive purposes by Roman and other invaders in succession. There is no doubt that a substantial stone fortress existed as early as 1086, and that two years later it was besieged, captured, and to some extent dismantled.

About the year 1230 extensive additions were made to the simple Norman structure, and it is of these that remains are now to be seen. As Mr. Wadmore (who gives some excellent plans and sections of the old buildings) justly remarks,—“Had the work been earlier, we should have seen the round-headed windows, with which one is familiar, either at Rochester or Colchester; had it been later, it would have partaken of the Edwardian character, in which it is entirely wanting.”

The ecclesiastical buildings which are described in the Transactions are, as one might expect, especially numerous. The Society, in its annual excursion visited Sundridge Church, of which the most striking features are its Early English arcades and lofty roosts; Chevening, with its interesting series of Lennard monuments and Chantry's beautiful effigy of Lady Frederica Stanhope; Eynsford, with its apse and Galilee porch; St. Mary's, Sandwich, which was terribly injured by the fall of its central tower in 1687, but has preserved some curious Norman and later features; Great Mongeham, which was carefully restored some thirty-five years ago by Mr. Butterfield; and Eastry, with its narrow, lofty nave resembling an inverted ship, and a curious carving upon one of its pillars by which the Sunday letter for any year may be discovered.

Special memoirs are given of some of the more important churches, and amongst these must be reckoned St. Botolph, Lullingstone,—which Canon Scott Robertson has described and Mr. Herbert Baker illustrated with equal felicity. Lullingstone Church dates back to the Norman era, but it underwent so complete a transformation in the reign of Edward III., that it would seem, at first sight, to belong to the Decorated Period. The original plan was unchanged, but later on,—in Tudor times,—a north chapel was attached to the chancel and a rood-screen of singular beauty was inserted. The date of this handsome addition to the church's features can be accurately determined. It bears the pomegranate badge of Katherine of Aragon, sometimes alone and sometimes united with the rose of England, and here and there upon it occur carved peaches with the letter "E" cut on them which are evidently a rebus of the donor's name, Pêche or Peachey. Sir John Pêche, whose magnificent monument is one of the most conspicuous ornaments of the church, died in 1521–2, and his widow (who was a daughter of Lord Scrope) erected this screen partly as a memorial of her deceased husband. Canon Robertson suggests that both the monument and the screen may have been designed by Torregiano, Michelangelo's fellow-student, to whose skill we owe "the daintiest monument in Europe,"—the tomb of Henry VII. in Westminster Abbey. The magnificent tomb of Sir John Pêche, which occupies the whole space north of the Communion-table, is carved with the minutest elaboration, even to the veins upon the hands of the recumbent knight. The armorial shields are numerous and fanciful, and, together with the other details, will repay careful study. Lullingstone Church has been remarkably fortunate in having had in its successive patrons several intelligent and liberal lovers of art. Sir Percival Hart, who inherited, as representative of Sir John Pêche's sister, "re-edified" not only the windows, but also the whole of the north chapel, in 1614, and another of the same family and name carried on the work of renovation in the reign of Queen Anne. Then, Sir Thomas Dyke, who married the heiress of the Hart family, carried out some improvements in the middle of the last century, and Sir William Hart-Dyke, the present representative, has cut down the old square oaken pews and floored them with solid blocks instead of boards. Lullingstone is a rare,—we hope not a unique,—example of a country village church which has for five centuries enjoyed the loving care of those who have inherited the lordship of the lands around it. Among other interesting memoirs in this volume we must mention a paper by Mr. R. C. Hussy upon the curious little church of Barfreston; another upon the ancient architecture of Erith Church, from the pen of Mr. F. C. J. Spurrell; and a third upon the early history of Ashford, by Mr. Robert Furley, F.S.A. In this are some notices of domestic architecture and a good drawing of the boldly-carved gable-head of the old Buttery at Ashford. Quarry House, near Rochester, a Jacobean (or perhaps Elizabethan) red-brick mansion, formed the subject of a notice in our columns just forty years ago, and is, we are told, doomed to early destruction. Churchwardens' accounts and a very exhaustive account of church plate (illustrated) add variety to the contents of the Society's volume, which is excellently printed and admirably edited.

The Law of Bills, Cheques, Notes, and I.O.U.'s.

By T. W. SMITH, Barrister-at-Law. London: Effingham Wilson. 1887.

We observe that though the date of this book on the title-page is 1887, that of Mr. Smith's preface is 1884. We presume, therefore, that we have now before us simply one copy of another edition recently issued from the press. There is no doubt that every one should be acquainted with this book. People,—even business men,—are often very ignorant about the law of cheques and bills. How many business men, for instance, who keep cheques till they have got together a little bundle to pay into their bankers, are aware that by keeping them they run a risk, and that a cheque is payable immediately, and that any one who keeps it does so at his peril? Full information on this and similar points can be found in a handy form in this little book.

Food Grains of India. By A. C. Church, M.A., F.C.S., &c., with numerous woodcuts. Chapman & Hall. London: 1886.

A SCIENTIFIC treatise by a scientific man on a subject of much economical interest, though hardly coming strictly within our class of subject. The illustrations are very carefully executed on a large scale, and give a good idea of the growth and character of the vegetable products they represent.

The Agricultural and Tenant Right Valuer's Assistant. By T. BRIGGS. (London: Crosby Lockwood & Co. 1886.)

This work is primarily intended for the agricultural valuer, but there are portions of the book which will be useful to others. Such, for instance, are the tables for calculating the contents of unsquared timber and for the valuation of estates. The book is handy in size and well printed, and it cannot fail to be useful to many.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,433, Venetian Blinds. J. S. Orton.

This invention consists chiefly of an arrangement of weights or springs to equalise the balance of parts in raising and lowering, and to provide for the equal lifting of the slats of the blind when the same is raised, instead of the first slat being raised first, and then the others gathered close together as the actuating cords are pulled. The cords are put over a long roller or cylinder, with lateral or end play to accommodate the coiling and uncoiling of the lifting cords, and this cylinder takes the place of the pulley-block of the ordinary Venetian blind. Weighted links are affixed, so that when one length is caused to descend it gains in weight and power exactly what is lost by the other portion in ascending. By this counterpoise the blind is always balanced.

14,425, Syphon Drain Traps. J. Gordon.

The object is to provide cheaper and more effective syphon traps by improving the form and arrangement. The invention consists in disconnecting syphons having one or more branches, each branch opening varying in size or diameter as required, and suitably rounded at the socket points. The fall is preferably 1 in 10 in the drain, thus providing for the desired drop at the ingoing end. Thus a 2 ft. syphon affords a drop of over 2 in. at the inlet end.

14,695, Electrical Door Fastenings. C. L. Carson.

The object is to provide for the release of door fastenings or bolts by a weak current of electricity acting on a contact piece. When the current is interrupted, the bolt of the door is withdrawn, or falls out of position by its own weight, so that in theatres or such places, in the case of panic, exit may be made by merely pushing open the doors.

14,775, Shop Stall-boards. R. Legge.

The stall boards are made movable, so that they may be run backward or forward with the goods displayed upon them, either by pushing or by mechanical arrangements, such as a crank actuating a worm-wheel and rack.

14,809, Fastening Doors, &c. A. P. Alexander.

This is designed for strong rooms or coffers, and refers to obstruction bars instead of hinges, which bars are locked and secured by cipher or letter locks.

15,138, Fastening Coal-hole Plates. E. G. Banner.

A lining piece is made with a groove running around the inner upper edge thereof, and with the said grooved edge is connected a channel for leading off water. The cover plate is coned upon the inside. The fastening is effected by two balanced arms set to such a position that when the plate is fixed they will catch just below the lining piece and securely fasten the plate. When the arms are pulled from below, the counter-balance is raised, the unfastening is effected and the plate may be lifted out.

15,248, Joints of Stoneware Pipes. O. Elphick.

With the object of making a joint which shall be tight even when the pipes are deflected out of a straight course: the lining is formed with inclined surfaces to facilitate the entrance of the tip of the next pipe to its place within the socket and the joint to the lining to the socket is made cylindrical, and with the tip on the extremity of the pipe of spherical curvature. Joints so made are not rigid, and yet remain tight when the pipes are not closely butted together.

15,269, Fittings of Doors and Gates. G. H. Gooch.

This invention is designed chiefly to prevent the wear and tear of the parts connected with the handles or knobs, and consists of a series of arrangements for fixing the rose and spindle by special means, with tools also designed for the special purpose.

NEW APPLICATIONS FOR PATENTS.

Nov. 5.—14,245, W. Stuttle, Hot-water Boiler heating Buildings, &c.—14,284, E. Verity and Others, Lever Latch for Doors, &c.

Nov. 6.—14,305, H. Wilkes, Window or Sash Fasteners, &c.—14,310, J. Morley, Water-closets, Lavatories, &c.—14,322, F. Sueson, Water-closets.

Nov. 8.—14,375, D. Burns, Chimney Cows and Ventilators.—14,384, S. Robson, Ventilation of Dwelling-rooms.—14,386, T. Rees, Metal Tiles.—14,396, W. Blakeney, Earth-closet and Urinal.—14,409, S. Tausig, Electric Fire and Burglar Alarm.

Nov. 9.—14,426, H. Tucker, Corrugated Iron Roofing.—14,434, G. Howard, Decorating Wood.—14,470, H. & A. Foster, Sawing Machinery.—14,491, R. Henry, Sash-line Fasteners.

Nov. 10.—14,527, T. Cox, Fixing Bricks, Tiles, Cornices, &c., without mortar and cement.—14,538, W. Sargent, Circular Glass Ventilators.—14,545, J. Bridger, Glass Tile, Panel, &c.

Nov. 11.—14,550, H. Perry, Sizing or Varnishing Paper-hangings.—14,584, E. Kent, Heating and Ventilating houses.—14,627, H. Dodd, Flushing Apparatus.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,167, J. Tucker, Mortise Bolt.—12,824, J. Pollock, Window Fastenings.—13,130, P. Westmott, Cranes and Hoists.—13,148, T. Armstrong, House Drainage.—13,284, F. Lyte, Manufacture of Pigments.—13,313, R. Reeves, Ventilation of Drains, &c.—13,365, R. Garland, Domestic Fire Grates.—13,365, H. Thompson, Kitchen Ranges.—13,463, G. Wickham, Siphon Cisterns for Flushing Water-closets.—11,502, G. and S. Jennings, Water-closets.

12,633, R. Pees, Mortise Lock.—13,278, C. Straub, Building Material for Architectural Purposes.—13,436, J. Harrington, Spirit Levels.—13,452, J. Hunt, Fitting, Ornamenting, and Decorating Shops, &c.—13,554, S. Johnson, Automatic Water-closet Apparatus.—13,616, R. Scholefield, Brickmaking Machinery.—13,688, N. Locke, Opening and Closing Fanlights, &c.—13,693, J. Gorney, Cleaning the Pans and Seats of Closets.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

13,622, F. French, Fastener for Window Sashes.—15,877, J. Dejaiffe, Dressing, Polishing, and Squaring Stone, &c.—228, G. Hardingham, Lattice Bridges.—307, A. White, Lavatories.—407, G. Jennings and Others, Flushing Cisterns.—538, R. Somers, Fire-places.—3,309, G. Potter, Attaching Door Knobs and Handles to Spindles.—5,418, W. Dodson and R. Skoach, Manufacturing Bricks, Ridge Tiles, &c.—10,454, C. Thorntree, Fastening Window Sashes, either Shut or Partly Open.—11,078, A. Barber, Laying Asphalt Concrete Pavements.—15,097, C. McCarthy, Window Fastener.—487, E. McClellan, Traps and Air Valves for Waste Pipes and Drains.—4,856, W. Burdock, Lamps or Burners for Painters, Plumbers, &c.—5,286, E. Staples, Attaching Door Knobs to Spindles.—13,021, H. Dale, Fireproof Shutters for Stairways.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

NOVEMBER 8.

By WOOD & STILES.

Uxbridge-road—37, Adelaide-road, 77 years, ground-rent, 71, 7s. £105
Stratford—47 and 49, Lett-road, 71 years, ground-rent, 81, 10s. 3s. 95
Horney—9 and 11, Brook-road, freehold. 210

NOVEMBER 10.

By HARDS & JENKINSON.

Antigua—The Claremont Sugar Estate of 600 acres, and a leasehold interest in the Tremontaine Estate 1,600

By GIBLIN & CALD.

Plumstead—157, Barrage-road, 33 years, ground-rent 21. 230
By CHINNOCK, GALSWORTHY, & CO.

Kensal New Town—Ground-rent of 211, reversion in 7 1/4 years. 405
Ground rents of 671, 8s. reversion in 8 1/4 years. 1,350
Ground-rents of 1101, reversion in 8 1/4 years. 2,408
Ground-rents of 601, reversion in 6 1/4 years. 1,170

Baywater—Ground-rents of 4201, 7s. reversion in 6 1/2 years. 15,000
Ground-rents of 1801, reversion in 6 1/2 years. 4,825
6, Pembroke-place, reversion in 6 1/2 years to rack rent of 1401 a year. 185
7 and 9, Norfolk-terrace, reversion in 6 1/2 years to rack rent of 1701 a year. 151
Norfolk-yard, reversion in 6 1/2 years to rack rent of 1601 a year. 120

NOVEMBER 11.

By G. STOCKINGS.

Ealing-green—18, 19, and 20, Diarrell-road, 98 years, ground-rent 231, 10s. 900

By VENTON, BULL, & COOPER.

Great Marylebone-street—No. 53, term 13 years, ground-rent 351. 401

By C. C. & T. MOORE.

Ilford—1 to 4, Tyne-terrace, 77 years, ground-rent 141. 800
Ground-rent of 141, reversion in 77 years. 310
St. George's-East—13, Cannon-street-road, freehold. 875
15, Cannon-street-road, freehold. 270

Poplar—19 and 21, Newumberland-street, 78 years, ground-rent 21, 10s. 370

By R. SIMMONS.

Brookley—128 to 134 even, Brookley-road, 73 years, ground-rent 141. 1,050
Walworth—12 to 16 even, Help-street, 21 years, ground-rent 161, 10s. 745

51 to 67 odd, Elizabeth-street, 13 years, ground-rent, 161. 2270

2, Elizabeth-street, and 47 to 53 odd, Westmoreland-road, 33 years, ground-rent 311. 630

38 to 52 even, Liverpool-street, 23 years, ground-rent 271, 10s. 1,670

Old Kent-road—53, 56 to 106 even, Mina-road, 34 years, ground-rent 421. 2,441

11 to 9 and 17 to 21 odd, Smyrk's-road, 81 years, ground-rent 271, 10s. 1,760

27 to 37 odd, Smyrk's-road, 33 years, ground-rent 211. 1,350

39 to 45 and 65 to 71 odd, Smyrk's-road, 34 years, ground-rent 281. 1,650

79 to 105 odd, Smyrk's-road, 34 years, ground-rent 491. 2,940

26 to 54 even, and 60 and 62, Smyrk's-road, 33 years, ground-rent 601, 10s. 3,160

64 to 88, and 91 to 102 even, Smyrk's-road, 34 years, ground-rent 621, 6s. 3,395

Ground-rent of 301, 10s., term 34 years. 650

By DAVIS & DALLIS.

Mitcham-common—A plot of freehold land, 2r. 16p. 610

By DAVIS & PERFECT.

Finsbury Park—6, Portland-road, 8 1/2 years, ground-rent 121, 10s. 680

19, Woodstock-road, 81 years, ground-rent 81, 10s. 305

MEETINGS.

MONDAY, NOVEMBER 22.

Royal Academy.—Mr. Charles A. H. Church on "The Chemistry of Fresco and Tempera Painting." 8 p.m.
Society of Engineers.—Mr. J. W. Willis-Bud on "The Extremity of Time and its Redemption." 8 p.m.
Inventors' Institute.—Mr. Charles Ingalls, C.E., on "The Ailsa Craig Fog Signalling Station (27, Chancery-lane, 8 p.m.)."

TUESDAY, NOVEMBER 23.

Institution of Civil Engineers.—Discussion on papers on "Concrete as applied in the Construction of Harbours." 8 p.m.
Liverpool Architectural Society.—Mr. J. H. MacGovern on "Antiquities of Kirk Braddon Cemetery and Peel Castle." 7 p.m.

WEDNESDAY, NOVEMBER 24.

Society of Arts.—8 p.m.
Royal Academy.—Professor A. H. Church on "The Chemistry of Water-Colour Painting." 8 p.m.

THURSDAY, NOVEMBER 25.

St. Paul's Ecclesiastical Society.—Mr. J. Grimshere on "Some of the Cathedral and Abbeys of England Architecturally and Historically Considered." 7 30 p.m.
Society of Telegraph Engineers and Electricians.—(1) Adjourned discussion on Mr. Gilbert Kapp's paper on "The Determination of the Characteristics of Dynamos." (2) Mr. James Winburne on "Some Experiments on Secondary Cells." 8 p.m.

FRIDAY, NOVEMBER 26.

Royal Academy.—Professor A. H. Church on "The Chemistry of Oil Painting and of Spirit Fresco." 8 p.m.

Miscellaneous.

The Superintending Architectship.

M.B.W.—At the meeting of the Metropolitan Board of Works, held on the 12th inst., the Chairman (Sir James M. McGarr Hogg) stated that it was with much regret he had to inform the Board of the decease of Mr. William, the tidings of which had been communicated to him by a telegram that morning. It was moved by Mr. Edwards, seconded by Mr. Freeman, and resolved unanimously, "That the Clerk do communicate to the widow of the late Mr. William an expression of the Board's sincere condolence with her in her bereavement." Subsequently, at an adjourned meeting, it was moved by Mr. Edwards, seconded by Mr. Shepherd, and resolved—"That, pursuant to the powers conferred by the Metropolitan Building Act, 1855, and of every other power enabling the Board in that behalf, Mr. John Hebb, Assistant Architect to the Board, be and he is hereby appointed the Superintending Architect of Metropolitan Buildings, and Superintending Architect to the Metropolitan Board of Works, for four weeks from the 13th day of November, 1886, and that the seal of the Board be affixed to the above resolution." The Solicitor subsequently laid before the Board a copy of the resolution, and the seal was affixed thereto.

Water-Softening.—On another page will be found the prospectus of the Consumers' Economic Water-Softening and Purifying Company, which is being formed (as a branch or sub-company in connexion with the Atkins Filter and Engineering Company) to promote the more extensive use of Atkins's excellent process of water-softening, which has often been described and referred to with commendation in our columns. The project is one well deserving of the attention of sanitarians and water-consumers generally.

Official Salaries.—At the meeting of the Lambeth Vestry, last week, the salary of the Surveyor (Mr. McIntosh) was increased from 600l. to 750l. per annum.—The City Commissioners of Sewers, at their last meeting, increased the salary of Mr. D. J. Ross, Chief Assistant to the Engineer, from 400l. to 500l. per annum.

Sale of Building Sites near Aldershot.

On Monday evening Mr. H. J. Brake, of New Bridge-street, offered for sale, at the Bridge House Hotel, Ash Vale, Surrey, a number of freehold plots of building land, situated in Ash Vale, near Farnborough and Aldershot. The land in question was recently purchased from the War Department of the Government by the present vendor, and has since been laid out for building purposes. It is close to the Ash Junction on the South-Eastern Railway, and to the Ash Vale Station on the South-Western line, and was described as very suitable for the erection of villas. The auctioneer observed that the property offered comprised some of the finest sites in the county, most of the plots being in an elevated position, commanding extensive views of the surrounding neighbourhood, including the camp and town of Aldershot. The locality presented specially attractive features for the erection of residential property, and to the speculating builder, the great demand for houses offered a tempting opportunity. There was a very numerous attendance, the sale-room being much crowded, whilst large numbers were unable to obtain admission. The number of plots announced in the particulars was 152, most of them having frontages of 20 ft. and a depth of 100 ft., whilst there were also several larger plots, having frontages varying from 40 ft. to 100 ft., and one exceptionally large plot, upwards of two acres in extent, which it was stated contained a bed of the best gravel, which would pay a large profit on the working, and an unlimited quantity of sharp sand of a bright colour suitable for every description of building. On the sale commencing there was a very active demand, and seventy-two of the lots submitted having all been sold at prices ranging from 11. to 11. 10s. per foot frontage, the auctioneer said that in consequence of the lateness of the evening the remaining plots would be offered on Monday next.

A New Public Hall at Harwich.—The rapid increase of Dovercourt (which is, in fact, a suburb of Harwich) as a seaside resort, has just led to the erection of a spacious public hall for the accommodation of the inhabitants of the two places. The building, which has been erected by the Harwich and Dovercourt Public Hall Company, is situated on the main high road, midway between the ancient seaport of Harwich and its younger watering-place, within about half a mile of the centre of each locality, and immediately opposite the redoubt, which occupies high ground overlooking the sea. The building has a frontage of upwards of 45 ft., and is 90 ft. in depth, thus covering a ground area of more than 4,000 superficial feet. It is faced with cut and moulded red bricks, relieved by stone dressings and windows. In the centre of the frontage there is a large arched window, flanked on each side with ornamental pediments. The north and south side frontages have each ranges of arched windows, and the whole of the windows are filled in with stained and coloured glass. At the west end there is a stage, with committee and retiring rooms on each side. The foundation-stone of the building was laid in May last by Mr. J. Round, M.P., and the structure has just been completed. Messrs. Whitmore & Reeves, of London and Chelmsford, are the architects; and Mr. A. Diss, of Colchester, is the contractor.

Liverpool Engineering Society.—The usual fortnightly meeting of this Society was held at the Royal Institution, Colquhoun-street, on Wednesday evening; Mr. Coard S. Pain, Assoc. Inst. C.E., President, in the chair. A paper by Mr. A. C. Hutzig, M. Inst. C.E., on "A Formula and Diagram for Ascertaining the Resisting Power of Piles," was read by the author.

The Severn Tunnel is to be opened on the 1st of December.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.	£. s. d.
Greenheart, B.C. ton	6 10 0	7 0 0	0
Teak, E.I. load	0 9 0	14 0 0	0
Sesuvio, U.S. foot cube	0 2 0	0 2 7	0
Ash, Canada load	3 0 0	4 10 0	0
Birch do	2 5 0	3 10 0	0
Elm do	3 10 0	4 10 0	0
Fir, Dantisc, &c. do	1 10 0	4 0 0	0
Oak do	2 10 0	4 10 0	0
Canada do	0 0 0	6 0 0	0
Pine, Canada red do	2 0 0	3 10 0	0
" yellow do	2 5 0	4 0 0	0
Lath, Dantisc fathom	3 0 0	5 0 0	0
St. Petersburg log	2 15 0	4 0 0	0
Wainscot, Riga do	3 5 0	3 7 6	0
" Odessa, crown do	3 5 0	3 7 6	0

TIMBER (continued).

	£. s. d.	£. s. d.	£. s. d.
Deals, Finland, 2nd and 1st. std. 100	7 0 0	8 0 0	0
" 3rd and 4th do	6 0 0	8 10 0	0
Riga do	5 10 0	7 0 0	0
St. Petersburg, 1st yellow do	8 10 0	14 0 0	0
" 2nd do	7 0 0	8 0 0	0
" white do	7 0 0	10 0 0	0
Swedish do	6 0 0	15 0 0	0
White Sea do	7 0 0	17 10 0	0
Canada, Pine, 1st do	17 0 0	29 0 0	0
" 2nd do	11 0 0	17 0 0	0
" 3rd &c. do	8 0 0	9 0 0	0
" Spruce, 1st do	8 0 0	11 0 0	0
" 3rd and 2nd do	5 0 0	7 10 0	0
New Brunswick, &c. do	5 0 0	7 0 0	0
Battens, all kinds do	4 0 0	12 0 0	0
Flooring Boards, sq. 1 in. do	0 9 0	0 13 0	0
" 2nd do	0 7 6	0 8 6	0
Other qualities do	0 5 0	0 7 0	0
Cedar, Cuba foot	0 0 3	0 0 3 3/4	0
Honduras, &c. do	0 0 2 1/2	0 0 3 3/4	0
Australian do	0 0 2	0 0 3 3/4	0
Mahogany, Cuba do	0 0 4	0 0 7	0
St. Domingo, cargo average do	0 0 4	0 0 7	0
Mexican do	0 0 3 1/2	0 0 4 1/2	0
Tobacco do	0 0 4	0 0 8 1/2	0
Honduras do	0 0 4	0 0 8 1/2	0
Maple, Bird's-eye do	0 0 6	0 0 8	0
Rose, Rio ton	7 0 0	10 0 0	0
Bahia do	6 0 0	10 0 0	0
Box, Turkey do	5 0 0	12 0 0	0
Saint, St. Domingo foot	0 0 6	0 0 10	0
Porto Rico do	0 0 7	0 1 0	0
Walnut, Italian do	0 0 4	0 0 6	0

METALS.

	£. s. d.	£. s. d.	£. s. d.
Iron—Pig, in Scotland ton	0 0 0	0 0 0	0
Bar, Welsh, in London do	4 7 6	4 15 0	0
" in Wales do	4 2 6	4 7 6	0
" Staffordshire, London do	5 10 0	6 0 0	0
Sheets, single, in London do	6 15 0	8 10 0	0
Hoops do	6 0 0	7 0 0	0
Nail-roads do	5 15 0	6 10 0	0

METALS (continued).

	£. s. d.	£. s. d.	£. s. d.
COFFER—			
British, cake and ingot ton	44 0 0	45 0 0	0
Best selected do	45 0 0	46 0 0	0
Sheets, strong do	61 10 0	62 0 0	0
" India do	49 10 0	0 0 0	0
Australian do	0 0 0	0 0 0	0
Chili, bars do	40 12 6	41 0 0	0
YELLOW METAL lb.	0 0 4	0 0 4 1/2	0
LEAD—			
Pig, Spanish ton	12 13 9	12 15 0	0
English, common brands do	13 2 6	0 0 0	0
Sheet, English do	13 16 3	14 0 0	0
SPELT—			
Silesian, special ton	14 7 6	14 10 0	0
Ordinary brands do	14 5 0	14 7 6	0
TIN—			
Banca ton	0 0 0	0 0 0	0
Billiton do	0 0 0	0 0 0	0
Straits do	100 10 0	0 0 0	0
Australian do	101 5 0	0 0 0	0
English ingots do	104 0 0	0 0 0	0
ZINC—			
English sheet ton	0 0 0	0 0 0	0

OILS.

	£. s. d.	£. s. d.	£. s. d.
Linseed ton	20 5 0	20 10 0	0
Cocunut, Ceylon do	39 10 0	37 0 0	0
Ceylon do	27 0 0	0 0 0	0
Copra do	0 0 0	0 0 0	0
Palm, Lagos do	25 0 0	25 10 0	0
Palm-nut Kernel do	0 0 0	0 0 0	0
Rapeseed, English pale do	22 5 0	0 0 0	0
" brown do	20 15 0	0 0 0	0
Cottonseed, refined do	19 0 0	20 10 0	0
Fallow and Oleins do	25 0 0	45 0 0	0
Lubricating, U.S. do	8 0 0	10 0 0	0
" refined do	8 0 0	13 0 0	0
TURPENTINE—			
American, in casks cwt.	1 8 0	0 0 0	0
TAR—			
Stockholm barrel	0 15 0	0 15 6	0
Archangel do	0 10 6	0 11 0	0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Boys' Upper School, Carleton.	The Governor.	Not stated.	Dec. 3rd.	i.
Sewage System.	Cleithorpes U.S.A.	3 L., 20s., and 10s.	Not stated.	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up Roads.	Wandsworth Bd. of Wks.	Official.	Nov. 23rd.	ii.
Paving Works.	St. Luke's Vestry.	do.	Nov. 24th.	ii.
Re-Making Roads, &c., Sidcup.	do.	R. Tomlinson.	Nov. 26th.	ii.
Removal of Snow, Ice, Sludge, &c.	St. Martin-in-the-Fields.	Official.	do.	ii.
Extension of Girls' and Infants' School.	Barnes School Board.	do.	Dec. 1st.	ii.
Enlargement of Sorting-Office, Poplar.	Com. of H.M. Works.	do.	Dec. 3rd.	ii.
Erection of Eight Cottages, &c.	Admiralty.	do.	Dec. 10th.	ii.
Brick and Pipe-Sewers, Carriageways, &c.	Met. Board of Works.	do.	do.	ii.
Erection of New Board Schools, &c.	Schl. Board for London.	do.	Not stated.	ii.
Erection of a Villa Residence.	G. Lansdown & Harris.	do.	do.	ii.

TENDERS.

BEDFORD.—For the erection of eight villa residences, in Conduit-road, Bedford, for Mr. D. C. Preston. Mr. F. T. Mercer, architect, Bedford. Quantities supplied.—

First List.	£. s. d.	£. s. d.	£. s. d.
Garrud, London	26,558	0 0	0
Ansell, London	6,550	0 0	0
Watson & Walker, Bedford	6,436	0 0	0
Potter, Bedford	6,380	0 0	0
Spencer, Bedford	6,310	0 0	0
Harrison, Bedford	6,110	0 0	0
Foster, Bedford	6,105	0 0	0
White, Bedford	6,057	0 0	0
Balsam, London	5,828	0 0	0
Laughton, Bedford	5,645	0 0	0

Second List (Quantities reduced).

	£. s. d.	£. s. d.	£. s. d.
Ansell	23,956	0 0	0
Watson & Walker	5,732	0 0	0
Garrud	6,685	0 0	0
Potter	6,808	0 0	0
Balsam	5,534	0 0	0
Harrison	5,438	0 0	0
Foster	5,381	0 0	0
White	5,362	0 0	0
Laughton (accepted)	5,000	0 0	0

BRIGHTON.—For sanitary and decorative work at 10, Goldsmid-road, Mr. Chas. Edward Griston, surveyor, Brighton.—
George Lynn & Sons, Brighton (accepted) £110 0 0

BURY ST. EDMUNDS.—For additional works in connection with the sewage scheme.—
McKay* £2,275 0 0
* Accepted at 2,175s.
[No competition.]

CRANBROOK (Kent).—For the erection of three cottages, Angler Park, Cranbrook, Kent, for Mr. E. L. Tomlin. Mr. Mervyn E. Macartney, architect. Quantities by Messrs. Evans & Deacon, Adelaide-street, Strand.
Maides & Harper £1,367 0 0
Funnell & Son 1,342 0 0
Marshall & Son 1,297 0 0
Foster & Dicksee 1,280 0 0

CHISLEHURST.—For the erection of a house to be known as Northwood, Chislehurst, Kent, for Mr. Alfred J. Newton. Mr. James W. Burgess, architect, 3, Collyer-road, Camberwell. Quantities supplied by the architect:—

	£. s. d.	£. s. d.	£. s. d.
Mowlem & Co.	24,111	0 0	0
A. Sykes	4,090	0 0	0
G. & S. Fisher	3,579	0 0	0
Higgs & Hill	3,840	0 0	0
M. Gentry	3,818	0 0	0
Brass & Son	3,798	0 0	0
B. E. Nightingale	3,700	0 0	0
M. Manley	3,569	0 0	0
M. Marsland	3,425	0 0	0
R. A. Lowe	3,329	0 0	0
Spencer & Co.	3,250	0 0	0
J. Smith & Sons, Norwood Junction	3,197	0 0	0
H. Beasley	3,175	0 0	0

* Accepted.

CLACTON-ON-SEA.—For making, metalling, steam rolling, kerbing, channelling, and paving nine roads, for the Tending Hundred Rural Sanitary Authority.—
W. T. Hook (accepted) £2,107 10 0
[Twelve tenders submitted.]

EDENBRIDGE (Kent).—For laying out land, pumping station, and sewerage works. Mr. John Green Hall, C.E., engineer:—

	£. s. d.	£. s. d.	£. s. d.
W. Neave & Son, Paddington	43,967	0 0	0
L. Bottoms, Battersea	4,930	0 0	0
E. Smith, Edenbridge	3,925	0 0	0
H. F. Brow, Suffolk-lane, London	3,868	0 0	0
Parsons & Son, Margate	3,700	0 0	0
G. E. Wallis	3,434	0 0	0
J. J. Wise, Deal	3,413	0 0	0
H. Knight, Norden, Mitcham	3,325	0 0	0
B. Cooke & Co.	3,245	0 0	0
Woodham & Fry, Greenwich	3,183	0 0	0
J. H. L. Dams, Walmer	3,150	0 0	0
R. Cowdrey, Newent, Gloucestershire	3,146	0 0	0
H. R. Treherne & Co., Battersea	3,075	0 0	0
J. Dickson, St. Alban's	3,064	0 0	0
W. H. Dearn, Chichester	3,025	0 0	0
G. Pannett & Sons, Tonbridge	3,015	0 0	0
E. P. W. Lee, Wimbeldon	2,994	0 0	0
J. Young, Buckham-hill, Essex	2,990	0 0	0
J. Edmondson, Lower Edmonton	2,983	0 0	0
James & Wood, Birmingham	2,878	0 0	0
J. J. B. Marshall, Brighton	2,873	0 0	0
J. Hayward, Eastbourne	2,863	12 3	0
W. Cunliffe, Dorking	2,860	15 0	0
Foster & Dicksee, Rugby	2,650	0 0	0
H. Hill, High Wycombe (accepted)	2,476	14 0	0

HAMPTON WICK.—For alterations and additions at St. John's Church, Hampton Wick, Middlesex. Mr. R. T. Elson, architect, Hampton Wick. Quantities by the architect. —

G. Constable, Hampton Wick.....	2690 0 0
W. Hickinbotham, Teddington.....	630 0 0
T. Whannan, Hampton Wick.....	638 17 0
J. F. Collinson, Teddington.....	698 0 0
J. Spink, Hampton Wick.....	660 0 0
C. Bonell, Teddington.....	540 0 0
C. Olridge & Sons, Norbiton.....	534 18 0
J. Puller, Teddington.....	612 0 0
T. Wheeler, Kingston.....	464 18 6

HULL.—For the ironwork of Drypool Bridge, over the river Hull, for the Hull Corporation:—
Karl's Shipbuilding Company, Hull...£12,293 0 0
Handyside & Co., Derby.....12,118 0 0
Head, Wrighton, & Co., Stockton-on-Tees.....11,815 10 8
Whittaker Bros., Leeds.....11,598 0 0
J. Butler & Co., Stauningley, near Leeds (accepted).....11,560 0 0

LONDON.—For alterations and additions to 181, Upper Thames-street, for the Albion Iron Company, Mr. F. J. Chambers, architect:—

Estimate A. Estimate B.	
Gerrard.....	2339.....2212
Leader & Son.....	435.....197
Allen & Son.....	435.....180
Parker (accepted).....	329.....167

LOUGHBOROUGH (Leicestershire).—For Loughborough Waterworks extension to Blackbrook. Mr. Geo. Hodson, M. Inst. C.E., consulting engineer. Mr. Herbert Walker, C.E., engineer.

Contract No. 1.	
J. Farrer & Co., Ramsley.....	28,178 4 8
Clay Cross Co., Chesterfield.....	5,793 4 8
T. Small & Sons, Handsworth.....	5,431 0 0
J. S. Roberts, West Bromwich.....	5,420 17 11
Butterley Co., Alfreton.....	5,408 9 1
Cochrane & Co., Dudley.....	5,324 1 8
Staveley Iron Co., Alfreton.....	5,324 2 9
Stanton Iron Co., Nottingham.....	5,114 7 8
J. Oakes & Co., Alfreton Ironworks.....	4,893 0 0

Contract No. 2.	
H. Hill, High Wycombe.....	25,855 0 0
J. Knight, Loughborough.....	5,774 14 2
F. Dawson, Bury.....	5,187 0 6
Walmesley & Co., Preston.....	5,149 0 0
Holme & King, Wigan.....	4,954 0 0
Small & Son, Handsworth.....	4,480 16 0
W. Drewitt, Stoke-on-Trent.....	4,409 0 0
A. Faulk, Loughborough.....	4,360 0 0
Foster & Barry, Nottingham and London.....	4,250 0 0
J. Mackey, Stoke-on-Trent.....	4,216 11 0
Innes & Wood, Birmingham.....	4,214 0 0
Hughes & Son, Lower Gornal, Dudley.....	4,158 7 9
Pickhall & Son, Merthyr Tydvil.....	3,979 0 0
Enoch Tempest, Leicester.....	3,940 0 0
H. Vickers, Nottingham.....	3,718 0 0

PUTNEY.—For making road and sewer on the Ashbourne House Estate, Putney, for Mr. H. G. Smallman, Mr. Fred. Stocker, surveyor, Lewisham:—

Bath & Blackmore, Clapham.....	2860 0 0
Harris, Camberwell.....	847 0 0
Jones Bros., Wandsworth.....	813 18 0
R. Avis & Co., Putney.....	798 0 0
J. Nobbs, Clapham.....	785 0 0
J. Pizzey, Hornsey.....	715 0 0
Woodham, Greenwich.....	695 0 0
J. Ford & Co., Westminster.....	677 0 0
W. J. Milton, Clapham.....	655 0 0
Wm. Nichols, Woodgreen.....	648 0 0
Neal, Wandsworth.....	648 0 0
Marshall, Brighton.....	600 0 0
H. R. Trehearne & Co., Battersea.....	533 0 0
Rowland Bros., Fenny-Stratford.....	519 0 0

* Accepted.

RAMSGATE.—For the erection of three dwelling-houses and shops on Abbott's-hill, for Mr. G. Norris, Mr. E. L. Elgar, architect, Ramsgate:—

Paramor & Sons, Margate.....	21,700 0 0
J. H. Forwalk, Ramsgate.....	1,868 0 0
Regis & Copper, Margate.....	1,850 0 0
H. Bowman, Ramsgate.....	1,840 0 0
C. Collins, Ramsgate.....	1,250 0 0
T. Elgar, Ramsgate.....	1,250 0 0
W. W. Martin, Ramsgate.....	1,198 0 0
G. M. Dawson, Broadstairs.....	943 0 0

* Accepted.

TEMPLEBREDIN (co. Limerick).—For building spire, wrought-iron gables, railings, piers, and boundary-wall. Mr. W. G. Doherty, M.A., architect, Dublin:—
Jas. Newstead, Fermoy (accepted).....£200 0 0
[Fire tendered.]

TOXTETH PARK.—For the construction of a brick sewer in St. Michael's-road, for the Toxteth Park Local Board. Quantities by the engineer, Mr. John Price, Assoc.-M. Inst. C.E.:—

Holme & Green, Liverpool.....	4232 0 0
J. Garnett, Toxteth Park.....	203 12 1
R. Lomar, Toxteth Park.....	212 8 0
L. Marr, Toxteth Park.....	192 10 2
Catterall & Co., Liverpool.....	189 16 4
J. Evans, Parkgate (accepted).....	161 0 0

[Engineer's estimate, 170l.]

TOXTETH PARK.—For pulling down and re-erecting wall in Aigburth-road, for the Toxteth Park Local Board:—

McCabe & Co., Kirkdale.....	£121 18 3
Holme & Green, Liverpool.....	86 0 0
Catterall & Co., Liverpool.....	77 4 4
G. Porter, Toxteth Park.....	73 19 0
L. Marr, Toxteth Park.....	73 13 4
R. Lomar, Toxteth Park.....	73 13 4
J. Evans, Parkgate.....	58 15 0
Ireland & Hurley, Liverpool (accepted).....	48 15 8

[Engineer's estimate, 60l.]

WORCESTER PARK (Surrey). For the erection of house, Lava View, Worcester Park, Surrey, for Mr. E. C. Stapledon, Messrs. Whitfield & Thomas, architects, Cockspur-street. Quantities by Messrs. Evans & Deacon, Adelaide-street:—

Hardy.....	£2,910 0 0
Foster & Dickes.....	1,769 0 0
Turtle & Appleton.....	1,795 0 0
Maides & Harper.....	1,793 0 0
Buttrick & Sons.....	1,789 0 0
Oldridge & Sons.....	1,768 0 0
Adkins Bros.....	1,748 0 0

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Size lines (about fifty words) or under..... 6s. 6d.
Each additional line (about ten words)..... 0s. 6d.
Terms for Series of Trade Advertisements, also for special Advertisements on front page, Competitive Contracts, Sales by Auction, &c. may be obtained on application to the Publisher.

SITUATIONS WANTED.

FOUR Lines about THIRTY words or under..... 2s. 6d.
Each additional line about ten words..... 0s. 6d.
PREPAYMENT IS ABSOLUTELY NECESSARY.

* Stamp must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post-office, Covent Garden, W.C. to DOUGLAS FOURDRINER, Publisher.

Addressed to No. 46, Catherine-street, W.C.
Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that of the latter ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS.—Orders to DISCONTINUE or to alter must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder," may have Reprints addressed to the Office, 46, Catherine-street, Covent Garden, W.C. Free of charge. Letters will be forwarded if addressed in envelopes are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 15s. per annum *Paravale*. To all parts of Europe, America, Australia, and New Zealand, 25s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

G. R. as we have repeatedly informed our readers, we do not publish tenders, except unless the amounts are given.—S. D. J. H. H. your letter is an advertisement.—Z. R. (we will comply with the two as you suggest).—J. E. & Sons (we cannot do anything of the kind).—V. S.—R. W. (thanks).—V. (not a matter of any public interest).—B. H. (not a week).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline publishing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

Letters or communications beyond mere news items which have been duplicated for other journals, are NOT DESIRED.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Colonial and Foreign Postage.—A 3rd EDITION of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone.
CORSHAM DOWN, } SUMMER DRIED
FARLEIGH DOWN, }

BOX GROUND, COMBE DOWN,
WESTWOOD GROUND.
RANDELL, SAUNDERS, & CO., Ltd.
CORSHAM, WILTS.

Bath Stone.
BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
Box, Wilts. [ADV.]

Doubling Frestone.
The stone from these quarries is known as the "West Bed," and is of a very crystalline nature, and undoubtedly one of the most durable stones in England. Is of the same crystalline nature as the Chelvyth Stone, but finer in texture, and more suitable for fine moulded work.

HAM HILL STONE.
Greater facilities have been provided for working these quarries, and the stone can be supplied in large quantities at short notice.

Prices, and every information given, on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, near Ilminster, Somerset.

London Agent—Mr. E. WILLIAMS, 16, Craven-street, Strand, W.C. [ADV.]

Doubling Free Stone. For prices, &c., see dress S. & J. STAPLE.

HAM HILL STONE. Quarry Owners, Stone and Lime Merchants.

BLUE LIAS LIME. Stoke-under-Hamilton. [ADV.]

(Ground or Lump), Ilminster.

Asphalte.—The Seyssel and Metallic Lava, Asphalte Company (Mr. H. Glenn), Office, 3, Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds, and mill rooms, granaries, tun-rooms, and terraces.

Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADV.]

NOTICE.—THE BANNER SANITATION CO. beg to give Notice that having sold over 10,000 BANNER'S PATENT VENTILATORS, also a proportionate number of other Sanitary Appliances, and wishing to keep pace with the times, they have decided to reduce the prices of their goods from 25 per cent. to 40 per cent., thus offering to the public the best appliances at the lowest prices.

BANNER VENTILATORS.

The Strongest Exhaust Ventilators for all Buildings, Public Halls, Churches, Billiard-Rooms, &c.

HIGHEST PRIZES at all the most important EXHIBITIONS

Gold Medal. Health Exhibition, 1884.

For further Particulars and Revised Prices, apply to
BANNER SANITATION COMPANY
Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

VOL. LI. No. 2326.

SATURDAY, NOVEMBER 27, 1886.

ILLUSTRATIONS.

Parish Church of St. Michael, Macclesfield.—Mr. J. Stevens, Architect	770-771, 775
Competitive Design for the Government Life Insurance Offices, Wellington, New Zealand.—Mr. J. Hurst Seager, Architect	774
Houses in Pont-street, Cadogan-square.—Mr. Edwin T. Hall, Architect	778
Premises in the Edgware-road.—Messrs. C. Eales & Son, Architects	779
The Castle of Löwenstein, Wertheim	782
The Women's Fawcett Memorial, Embankment Gardens.—Mr. Basil Champneys, Architect	783

CONTENTS.

The Consulting Architect	780	St. Jans Gasthuis, Hoorn, N. Holland	783	Prime Cost and Painting in Tint	790
The Present State of Stonehenge	780	The Stadhuys at the Hague	785	Water-Colour Drawings	790
Notes	781	Church Planning	785	All Saints' Church, Peterborough	790
French and English Harbour Work	781	New Thermal Mills, Paisley	787	Concrete Floors	790
Old Houses of the Seventeenth Century around London	784	Builders' Benevolent Institution	787	Curse Hill Stone	790
The Cross in Heraldry	785	The Office of Superintending Architect	787	The Student's Column: Stone Quarries.—XXII.	790
Macclesfield Church	786	The Architectural Association	788	Recent Patents	791
Castle of Löwenstein, Wertheim	787	Light and Air: Along a Gwinnell	789	Recent Sales of Property	791
Competitive Design for Insurance Offices, Wellington, New Zealand	788	Apertures for Sun Copying or Heliography	789	Meetings	792
Pont-Street, Cadogan-square	788	Cases under the Metropolitan Building Act: Spaces in the Rear of Dwellings: Wooden Balustrades over Bays and Porticos	789	Sale of Building Land at Leytonstone	792
Women's Fawcett Memorial	788	Science and Art Department Examinations	790	Fees of District Surveyors	792
The "King's Arms," 254, Edgware-road	789	Sanitary Institute Examinations	790	Miscellaneous	792
				Prices Current of Building Materials	792

The Consulting Architect.



It may appear hypercritical to take exception to the title of Professor Kerr's new work,* and the difficulty of finding a suggestive and a short title for such a book may be admitted. Still it is necessary to explain

that Professor Kerr treats in this book of the duties and liabilities of an architect in relation to what may broadly be termed legal questions connected with buildings. He is not concerned with an architect's business when he is occupied in designing buildings. In other words, he treats of the duty of an architect when he is called in to advise or to assist persons who are busied with disputes upon such matters, among others, as structural damage, easements generally, and the easement of light more particularly. It follows from this that such cognate subjects as arbitrations, evidence, advocacy, and so on have to be touched on. Nor ought we to omit mention of the useful chapter, or section, as the author prefers to call it, on "Building Act Questions (London)."

There are obviously two essential elements in regard to such a work as this, which are absolutely necessary if its object is to be attained. The first is, that the legal principles upon which much of it is necessarily based should have been accurately grasped; and next, that not only should the writer have a large experience, but that he should clearly appreciate the reasonable view to be taken of the questions which must come before what we will, with the author, call "the consulting architect." There can, we think, be no doubt at all that Professor Kerr is sound in his law, and shrewd in his appreciation of the position of matters. The advice given is throughout full of prudence and practical wisdom, and could all architects act up to the precepts to be found in this work their clients would have good cause to congratulate themselves. But we fear, until this world is somewhat more of a Utopia than it is at present, that the soundest advice will be often useless, having regard to the want of temper, the grasping spirit, and the vindictiveness which are so often shown even in the most trivial of disputes. We have said that Professor Kerr is a sound lawyer, yet there is one point of some importance upon which he makes an assertion for which we

should have been glad to have seen his authority. "The mere obstruction," he says on p. 64, "of the light for one year is not enough to extinguish the easement, unless notice of that intention has been first delivered." The Prescription Act speaks of the owner of the dominant tenement having notice of the interruption of the easement. Lord Justice Fry, it is true, once intimated an opinion that a written notice was required, but that point has not, we think, ever been actually decided, and the general view is that all the notice required is such as will make it clear to the owner of the dominant tenement that there is an obstruction put up by a particular person.

It may be well to give an example, before proceeding further, of Professor Kerr's sensible and prudent advice. We find an instance in regard to this subject of the obstruction of light, one which, more than any other, perhaps, requires temper and judgment in the consulting architect. "As a general rule," he says, p. 79, "the substitution of a new window, of improved size, form, and quality, would cure any grievance whatever." Perhaps this is putting the matter too broadly, but certainly it applies to many cases. Professor Kerr then proceeds,—"But, of course, there is nothing in the law of England that will compel a plaintiff to accept a readjustment even of an easement over another man's property. . . . But, nevertheless, the suggestion has been made occasionally, and perhaps as the courts become more familiar with the principle and practice of compensation they may be disposed to allow or even to invite such proposals. It is needless to add that, in any process of settlement in which architects take the place of lawyers, the principle of re-adjustment is especially capable of being acted upon." This advice is thoroughly sound, and many disputes as to light might be nipped in the bud if the architects for the respective parties would adopt the prudent and proper course here suggested. In many cases, no doubt, they do give this advice, but in others there is no doubt that the respective architects or surveyors are keener for a fray than for a settlement, and in such technical matters as these lawyers very often will leave the question of the settlement to the architects, who are the persons best fitted to arrive at fair terms. We should like also to call attention to the thoroughly prudent advice contained on p. 63 as to the "erroneous attitudes of complainants" in regard to the same question. We do not adopt Professor Kerr's advice and strictures wholesale, but we advise its perusal by all who are thinking of litigation for infringement of light, and by all architects who are called in to give advice in such circumstances.

We are very glad that Professor Kerr recognises that one of the functions of the consulting architect is to be consulted in regard to sanitary matters. In all disputes or difficulties of such a nature a competent architect ought to be a much safer adviser than a so-called sanitary engineer or a doctor. This is one piece of advice which the author gives:—"The consulting architect has to bear in mind that he has not to do the doctor's work or the lawyer's. Probably in every case the chief question which he will put to himself, and report upon if he be allowed, is how the structural defect, whether it has or has not been the cause of the mischief, can be, probably very easily, remedied; as a practical man he may very generally say that the dispute ought wholly to turn upon this, all else being mere wrangling." The Professor then goes on to point out how an architect will in such cases generally advise a fair compromise, unless, as is very seldom the case, there has been some kind of legal fraud. This is proper advice, and we may add that a competent and high-class architect is much more likely to settle the matter for the benefit of all parties than any other person. He is not a man with a hobby, as sanitary doctors or sanitary engineers often are; he is acquainted with all the details of buildings and with the desires and the wishes of clients, which is not the case with the previous classes, and he has an authority which, if the matter comes to the execution of actual work, neither the engineer nor the doctor can possess.

The chapter on "Leasehold Questions" deals, of course, with a good many matters of great importance in the relations of landlords and tenants, and matters which are often the occasion of considerable heart-burnings. The author brings the light of common sense to bear on some of these questions. "The lessor ought not to expect, or to be allowed to expect, that his house is to be surrendered to him in such a condition of fresh repair as to make an incoming tenant fully comfortable at the expense of the outgoing; this kind of completeness must be accomplished at the cost either of the incomer or of the landlord, as may be agreed between themselves. On the other hand, a lessee who has covenanted, in the customary language, to keep the house in proper repair, must not be allowed to suppose that he is to leave it all out of condition." The author puts it that the house may come from the lessee's hands "substantial but shabby"; the signs of current wear should appear, along with the proofs of current repair. This is the fair and equitable way to put it; but the London landlord does not see these things at all clearly; and, as a solicitor once pithily told a tenant who con-

* The Consulting Architect: Practical Notes on Administrative Difficulties and Disputes. By Robert Kerr, F.R.I.B.A., &c. London: J. Murray, 1886.

sulted him as to his grievances against his landlord, "the law is always on the side of the landlords."

The philosophy of repainting is touched upon; and the difference between the old-fashioned plan of binding the tenant "to keep the paint in repair" like everything else, and the modern and now almost universal system (in London) of binding the tenant to paint the outside once in three years, and the inside once in seven years, is thus discriminated:—

"The difference of principle" (between these two systems) "is easily explained. Oil paint is primarily a preservative coating of carbonate of lead (white lead), with linseed oil as its vehicle of application whereby to protect from the oxidising influence of the atmosphere such materials,—iron is a most notable example,—as especially require it. Then, by adding various pigments, and using various modes of finish, this coating is made to produce agreeable effects of colour and surface decoration, including, perhaps, the somewhat expensive imitation of costly materials" [this latter crime, however, is greatly on the decrease]. "Accordingly, the old covenant to keep in order the mere paint was a matter of substantial repair, while the more modern covenants to repaint periodically refer to the decorative effect also, according to its degree."

That is so, and a most unreasonable thing it is that the landlord should claim power to interfere from time to time with the matter of internal decorative painting, which during the tenancy affects no one but the tenant and his private friends. External painting, which concerns the public appearance of the property, stands on a different footing; it is the landlord's interest to keep his property in a presentable style before the public eye, as well as the tenant's interest that his house should look respectable; and in more enlightened and less duke-ridden cities it is the landlord who binds himself to a certain amount of exterior painting, instead of binding the tenant to do it for him. But the fact is that the average form of lease on the majority of large London properties is so utterly unreasonable and on-sided in its claims on the tenant, that the result is that some of its conditions are habitually ignored on the one side and evaded on the other; indeed, Professor Kerr points out that, in practice, if the tenant only takes care to paint the inside in the seventh year and the outside in the third year before the termination of his lease, he may avoid the claim for dilapidations and have the benefit of the new work during his occupation. We are glad to observe also that the author reprobates the absurd practice of demanding premiums on the transfer of a lease, often as a mere concession to habit, and for no commercial reason of any kind which could be put to the purchaser in figures.

In the section on "Questions of Building" there is a great deal of most judicious advice as to matters arising between the architect and contractor in the course of carrying out a contract. In regard to the quantities question, Professor Kerr apparently leans towards what may be called the modern theory, that the architect should be responsible for the quantities, though he does not positively adopt it. Touching on the frequent provincial practice of the architect supplying his own quantities, he refers to the idea, apparently with approval, that the architect is the fittest person to do this, inasmuch as he alone knows what is in his own mind. The answer to this, which seems to be overlooked, is that the specification ought to be so methodically and clearly drawn up, and the drawings so clear, as to show, beyond any doubt, what is in the architect's mind. Laxity and vagueness of specification is at the bottom of a great many of the disputes which arise over the execution of contracts. It is the duty of the architect to specify and draw so clearly that there can be no doubt "what is in his mind"; but, having done this, we fail to see that it is part of his profession to ascertain what is the quantity, in run or in area, of each portion of the work which he specifies. That is a matter which does not concern the object which he has in view, the production of a satisfactory building. That a certain number of doors should be made after a certain design described and shown, is a matter for him to decide; precisely what

quantity of work of each kind they contain is really a question only of interest to the contractor who has to say for what sum he can execute them. We see no essential objection to the architect taking out and furnishing his own quantities (provided always that he is paid by his client and not by the contractor for so doing); all we say is, that he may be better employed on higher matters than in mere enumeration of quantities; that if he is in earnest in the study of the higher elements of his profession he ought to be better employed. This consideration, of course, trenches on the everlastingly vexed question, whether architecture is essentially a business or an art, concerning which we hold that there should really be no two opinions. If it is not an art (remembering always that there is a fine art of planning as well as of designing elevations and details) the architectural profession has very little *locus standi* worth speaking of.

The section on "Architects' Disputes and Etiquette" propounds views which in the main most of us will be disposed to assent to. In regard to "uniformity of practice," however, Professor Kerr holds up the uniformity of commission standard more decisively than we should be disposed to do, nor does he even hint at the possibility that there may be any other method of payment (except for a special class of work) than that of a percentage commission. This is a subject on which, however, we opine that the last word has not been said. There is a certain convenience to architect and client in the 5 per cent. commission practice, but it is nevertheless (like some other convenient things) absolutely illogical; and there would be many advantages in substituting payment by fees according to circumstances and the standing and talent of the architect, and the degree in which his services are sought after; not the least of which would be that in that case an architect of genius and fame could afford to repay himself by higher fees on a smaller number of works, which he could really give his own full attention to. He would probably make less money actually, but he would make it in a way more satisfactory both to himself and to the public.

There is, however, very little in the book to which we should be disposed to take exception; it is a most useful and suggestive one, judicious and balanced in tone, and has the merit of being written in an admirably clear and readable style. We may conclude by expressing our entire concurrence in the opinion, given in the chapter on "Architects' Disputes and Etiquette," that "the social standing of a profession is to be exactly measured by the extent to which mutual courtesy, good feeling, and above all good faith, are prevalent among its members." We hope such excellent precepts may always be put into practice.

THE PRESENT STATE OF STONEHENGE.

THE present condition of one of the most remarkable and well-known pre-historic relics of this country has recently formed the subject of a very careful report, to which we have already referred, by a deputation of four provincial members of the Wilts Archaeological and Natural History Society to that body. They relate that in the course of the autumn and winter of 1885 urgent appeals had been made from time to time desiring the Society to exercise whatever authority it possessed in defence of this national relic, which was reported to be undergoing daily injury at the hands of an unchecked public. Thereupon the Society determined to depute some of its officers to examine the site and report upon the subject. This deputation, consisting of the Rev. A. C. Smith, and Messrs. H. E. Medlicott, W. Cunnington, and H. Cunnington, visited Stonehenge on the 20th of July last and carefully examined every stone, noting down its exact condition with special reference to injuries of recent date, and eventually submitting the results to the Society in a report of which we are enabled to give a summary. In 1884 Mr. Cunnington had

printed in the magazine of the Society (vol. xxi.) his notes on the fragments, to which was added an illustration consisting of a ground plan of the stones in their present condition, numbered according to the following system. Mr. Cunnington takes his stand at the entrance to the great or outer circle, and looking towards the interior commences with No. 1, the upright stone or jamb on the left hand; he carries his numeration right round the whole circumference of the great circle, until he comes round to stone No. 25, which forms the right-hand jamb of the entrance, with the lintel, No. 25 L, resting on Nos. 1 and 25. He then proceeds to the second or inner circle, and in like manner enumerates all the stones from 26 round the circle to No. 45. Mr. Cunnington then proceeds to the left-hand spur of the exterior horse-shoe, or semi-ellipse, the stones of which he numbers from 46 to 55, and then to the inner horse-shoe, which he consecutively numbers in a similar manner from 56 to 68. Within this horse-shoe lies the stone or slab A, not far from the centre of the two concentric circles, and at or near to one of the focuses of the horse-shoes or semi-ellipses.

Let us now see what the deputation has to say as to the condition of these stones. No. 1 they find has been slightly injured by recent chipping and the cutting of letters upon it; No. 2, the next upright, has been untouched of late years. Upon these two rests the lintel, No. 1 L, of which they say nothing, and we may therefore presume that it has not been interfered with. No. 3 stands alone, without lintels. There are two very small chips upon it, of recent date. The next standing stones, 4 and 5, support a lintel, No. 4 L on the plan. Of the lintel they say nothing, but No. 4 has been chipped recently, and No. 5 is chipped in two or three places. Of the next group, Nos. 6 and 7, with lintel 6 L, No. 6 was found to be much chipped, and No. 7 to be very much chipped. The next stone, No. 8, lies out of the true circumference of the circle, and they found its original surface was not only injured, but completely destroyed, though with not much additional damage of late years. No. 9 stone is in two portions, *a* and *b*. It is injured in two places. Continuing their progress round the circle, stones Nos. 10 and 11 were found by the committee of inspection to have been slightly scratched. The next two stones, Nos. 12 and 13, lie prostrate, the one having its surface very much damaged, the other considerably damaged. No. 14, which is inside of its original position on the great circle, is uninjured of late, and No. 15 very little injured. Here occurs a considerable hiatus in the rank of standing stones which compose the outer circle until we come to No. 16, which is not in its original position. It was found to be worn by being constantly walked upon, but otherwise not recently damaged. Its lintel, No. 16 L, lies by its side, but has not been much injured recently. Then comes the trilithon of two standing stones, Nos. 17 and 18, supporting the lintel 17 L. Of these No. 17 was found to have been very badly chipped, and this recently, one piece measuring 10 in. by 8 in. had been taken off, but No. 18 is not seriously damaged. The report says nothing of any injury done to the lintel. The next standing stone, No. 19, is declared to be very badly chipped, with large pieces gone from it in many places. No. 20 lies prostrate; it is damaged only by footmarks. No. 21 is also injured by being walked upon, and the lintel No. 21 L, now thrown down from its position, but still lying between Nos. 21 and 22, its original supports, is badly worn by footmarks. No. 22, however, is in good condition. No. 23 still stands in its original *locus*; some initials have been recently cut into it and the stone is chipped on the outside. There is a crack on the north side of this stone, which has increased very much recently, and it was recommended that it should be stopped at once with cement or otherwise attended to. The standing stone, No. 24, was found to be in good condition, and the lintel 24 L, which rests on this and No. 25, has not been pointed out in the schedule as having sustained any

injuries. No. 25, the standing stone on the right hand of the person entering, and *vis-à-vis* to No. 1, with the lintel No. 25 L overhead, is badly damaged; the lintel itself having escaped the untender mercies of the iconoclast.

This completes the outer circle. The stones of the inner circle are neither so large nor so numerous as those we have already described. The first, No. 26, has sustained no damage. The stone is very hard,—too hard, in fact, to be easily cut. No. 27 is not injured, but it was evident that rabbits were at work beneath it. No. X, which leans upon this, had been much walked upon, to its manifest detriment. Nos. 29 and 32 were not damaged, but No. 30 had been pecked at a little with some sharp instrument, but was not much injured. No. 31 is in two parts, *a*, *b*, the former being not much injured, though slightly chipped; the latter has sustained two chips. No. 33 bears chips, but they are not of very recent origin; the damages of No. 34 are also not recent, but a large piece was broken off this stone about fifteen years ago, and the report states that rabbits are at work below it. Nos. 35 to 41 have been worn by the feet of those who have walked over them, and thus damaged more or less, but no chips or cracks are found upon them. No. 42, which appears to be in its original position, is slightly chipped, but otherwise unharmed; and No. 43 also is in its original position, and in good condition, but a little chipped. No. 44 has been chipped, but slightly foot-worn; and No. 45, the last stone of this inner circle contiguous to No. 26, the first stone, is in fair state of preservation.

We now pass from the two concentric circles to the horse-shoes, or imperfect ellipses, which they enclose. The first or outer horse-shoe contains ten stones, Nos. 46 to 55, as well as two lintels in position, and three lintels overthrown. Nos. 46 and 47 are in pretty good order, being only very slightly damaged; the lintel which they carry, No. 46 L, being out of the category of damages notified by the deputation. To this megalithic group, or *gylon* of three stones, succeeds another, 48, 48 L, and 49. No. 48 was found to be very little injured. It attracted the notice of those who inspected it on account of the curious diagonal vein of infiltrated siliceous running across it. There are no injuries reported to No. 48 L, but 49 is chipped, and some letters have been recently cut upon it. No. 50 lies prostrate and in two parts, *a* and *b*. The former of these is very much worn by the feet of those who have walked upon it, which have entirely destroyed its surface; the latter is in much the same condition, and rabbits have burrowed below it as well. The lintel, 50 L, has its mortise much worn by feet, but is otherwise in fair condition. The leaning stone, No. 51, is in good order, but bears one chip of recent date. The report states that this stone does not appear to have gone any further over in the incline, which it showed many years ago. The overthrown trilith, Nos. 52, 52 L, and 53, bears in all three cases the injurious marks of many feet. No. 52 has been very much damaged by boys, who made a slide down it, and rabbits have burrowed beneath. The lintel has its edge worn away, but in other respects has not been recently damaged. The shattered group, Nos. 54, 54 L, and 55, consists of no fewer than seven pieces; the first two being each in three pieces, and lettered by Mr. Cunningham *a*, *b*, *c*. No. 54a is damaged by foot-marks, and there are rabbit burrows below; Nos. 54b and *c*, are in fair order; Nos. 54 L, *a* and *b* have surface injuries; but the injuries to 54 L *c* are not very material. On the other hand, No. 55 is very badly chipped. This completes the outer horse-shoe.

The stones of the inner horse-shoe are thirteen in number,—56 to 68,—three of them being covered up, and therefore protected from injury, viz., 57, 62, and 67. No. 56 is very slightly chipped. No. 58 chipped, cut, and badly scratched; 59 in good order; 60, 61, and 63 damaged by feet; 64 is upright and in good order, apparently in its original position; 65 and 66 have been recently chipped and carved with initials; 68, the last stone of this inner horse-shoe, is worn by feet. The stone "A," which lies partly under 50b and 50 L, is also

very much worn by the feet. This completes the report on the stones forming the area of Stonehenge; but there are three outlying stones which the Committee had also under their notice. Of these, the first is (*a*) lying to the east-south-east. About nine years ago a fire was lighted against this stone, which caused a large piece to split off. The second stone (*b*) is known as the "Slaughtering Stone." An attempt has been made at an uncertain period to remove a corner of it by sinking six holes in a line, after the manner of breaking sarsens which is now practised. The "Friar's Heel," or "Devil's Heel" (*c*), is much chipped, and very much inclined. In addition to all these injuries, it should be added that scribbling with chalk has been practised all over the stones, and though such marks may not be injurious they are disfiguring, and should not be permitted. We are glad to notice, however, that steps have been taken to arrest the burrowing of rabbits, and no further injury need henceforth be apprehended from that source. The deputation are of opinion that the time has at length come when this grand monument should be properly protected from the irreparable injuries to it which are constantly going on at the hands of the thoughtless and the mischievous. This protection may be carried out by two methods, first, by a sunk fence or "ha-ha" at a considerable distance beyond the trench which encircles the precincts, to keep out all carriages and animals, at the same time not destroying the wild character of Stonehenge by any visible barrier; secondly, the appointment of a responsible caretaker, with power to enforce regulations with which he would be provided, to prevent picnicking within the area; and, above all, to stop any injury to the stones, such as chipping, marking, scratching, or walking over them. A very small entrance-fee would probably provide amply for the salary of such a person, and no honest visitor would grudge it.

As for the restoration of Stonehenge, the deputation very rightly recommends but little, confining its advice to three matters of a precautionary nature, which they think should be carried out as early as possible. These are,—(1) Nos. 6 and 7, with the lintel belonging to them, should be pushed back into their original plumb, and secured, when the unsightly wooden props and buttresses could be removed; (2) Nos. 25 and 1, the entrance jambs, with their accompanying lintel, need to be pushed back into proper and original position in like manner, and so secured before they lean farther towards the outside, and thus the threatened fall, which, if this is not done, must take place at no very distant date, be averted; (3) the "Friar's Heel," which is very much inclined, must be carefully examined, and if it is pronounced unsafe, be securely fixed. At the same time, the deputation has not recommended the replacement of the tall leaning stone in an upright position, although the readjustment of this remarkable feature has been advocated. Its fall would be a calamity, and it should be secured from imminent danger. To these immediate steps the report adds one suggestion in conclusion. They most strenuously advocate the re-erection of the great trilithon which fell in 1797; the exact position of it is undoubted, and its replacement has been frequently urged by distinguished antiquaries, notably by the Royal Archaeological Institute when it met in Congress at Salisbury in 1849 under the presidency of Mr. Sidney Herbert. Should the proper appliances for re-adjusting the stones 6 and 7, and 25 and 1, mentioned above, be procured (whether by permission from the Royal Dockyards at Portsmouth or elsewhere), it would seem an opportunity not to be let slip now, if ever, to re-erect the great trilithon, which, if re-placed in position, would add so much to the grandeur and imposing appearance of Stonehenge. The prostrate condition of this group is lamented by many. In conclusion, we hope that the report will bear good fruit, and result in the security of Stonehenge from material decadence, which appears only too plainly to be overhanging it.

NOTES.



THE application of the Metropolitan Board of Works to the Chancellor of the Exchequer for the continuance of the Coal and Wine Dues after July, 1889, is a case in which it is unusually difficult to strike a balance between the conflicting arguments. On the one hand it is urged that the impost is almost imperceptible in its pressure; that it has been the means of endowing London with public works and improvements on which nearly ten millions sterling have been laid out; and that if the dues are allowed to lapse, further improvements, urgently called for, can only be provided by additions to the rates. On the other hand, it is objected that the 450,000L a year thus raised is dealt with without any control on the part of those who pay the dues; that the expenditure of the Metropolitan Board of Works, amounting to upwards of twenty-five millions sterling on works, and some ten millions sterling in loans, advances so rapidly as to be a source of danger; and that it is desirable that such continued expenditure should rather be checked than facilitated. It is rejoined that out of the thirty-five millions raised by the Metropolitan Board, nearly ten millions of loan have been paid off. But it is difficult to see how this affects the question. The sum, whether in the form of liability in trust or of past expenditure, is an addition to the rateable value of, and thus to the cost of living in, the metropolis. The rateable value of London was six millions sterling in 1841, ten and a half millions in 1853, and twenty-eight millions in 1883. It is now thirty millions, showing an increment of a million a year, or 3.57 per cent., which is very much more rapid than the increase of population.

A MUNIFICENT expenditure in public works may endow a country with noble buildings, and render a great capital one of the wonders of the world. But the question of cost is one with which it is perilous to trifle. Royal Commissions have done little more than attest that the question of cost of living in London is, if not insoluble, as yet unsolved. The steady outlay of half a million a year on improvements is rapidly transforming the architectural aspect of London. But with equal certitude it is raising rent, rateable value, and cost of living. The set of modern opinion has been in favour of doing away with the self-supporting character of public works, as in the case of the abolition of turnpikes. That business is thus facilitated, and that considerable advantages are thus gained, is undeniable. But that these advantages are acquired at a cost which it is not easy to reckon, and which, at all events, has not been reckoned, is no less true. In 1871 the rateable value per inhabitant of the metropolis was 6.09L. In 1881 it was 7.22L. This rise of 18 per cent. in ten years represents, more or less, the rise of not only rates, but rent, taxes, and almost every element of the cost of life. We should be the last to undervalue the advantages of sanitary provisions, or of the facilitation of traffic by the improvements of streets. Only let the cost of each be clearly ascertained; and let us not fancy that we shall not have to pay for an outlay of 450,000L a year because the rate collector does not happen to call for it as a distinct charge. It would probably be safer in all respects if he did.

A S railway construction in England becomes more quiescent, for the reason that there is scarcely any room left for extension, our colonies take up the running vigorously, and open up fresh fields for engineering talent. Canada is particularly energetic in this respect, and has, in proportion to her population, built already more railways than any nation in the world. No sooner was the Canadian Pacific line open,—a line as gigantic in its conception as it will be valuable to English and Canadian commerce,—than it is followed by a new undertaking, that of the Hudson's Bay Railway, which, though not nearly so long or on so grand a scale, will be of immense importance as a supplier of meat and bread stuffs to this

country. The distance from Liverpool to Port Nelson, on the western coast of the bay, is about the same as the other sea routes, but from thence to the Red River Valley and Winnipeg it is shorter by several hundred miles than the routes by New York, Halifax, or Montreal. A western extension will branch off to Regina, so that in point of fact the enormous food resources of a vast Canadian area will be landed in England in a little over a fortnight. It is true that during the severest portions of the year the route will be unavailable, but for at least from four to six months the Hudson's Bay keeps open, and the cooler temperature will be a decided advantage for a great food traffic.

IN this number, under the heading of "Cases Under the Metropolitan Building Act," a case is reported which may have its good effects on health. Sanitarians denounced "back-to-back" dwellings, while speculators erected them and filled them with large families, until the Act of 1882 seemed likely to prevent the erection of such insanitary dwellings in all new neighbourhoods in the future. Section 14 of that Act makes it imperative that every new building, on a site not previously occupied by a building, shall have in its rear a certain amount of open space directly attached and exclusively belonging thereto, unless the Metropolitan Board of Works otherwise permit. The spaces seemed still very small; but sanguine people declared that on new sites "back-to-back" dwellings were now for ever impossible; and that every new building used for living in would have air-space both in front and rear. Ingenuity was, however, directed as usual to finding a way through the Act of Parliament, and dwellings in mews were deemed fair subjects for subtleties. Such buildings are often wide in frontage, so as to get the requisite space for stable, coach-house, and harness-room, all in a line; much depth (say 17 ft. or 18 ft.) being consequently not required. Thus all the important rooms can be lighted from the street; and it has been argued that the 14th section of the Act of 1882 does not supersede the 29th section of the Act of 1855. Mr. D'Eyncourt decided, among other things, that it does; and his decision will be useful as a precedent,—being a good reading of a good law.

AT the meeting of the Bath Town Council on Tuesday the question of the remains of the Roman bath, and the extent to which they might, would, or should be encroached upon or hidden by the new buildings, was debated with less of acrimony and more of common sense than on some previous occasions. Mr. Walker moved a resolution, in general terms, that the intersecting brick walls built within and through the remains, should "be so treated that the basement could be kept perfectly free for examination and recognition of the various chambers, baths," &c.: more easily said than done, considering the point to which the new works have been carried. Eventually this was withdrawn in favour of an amendment moved by Alderman Wilkinson:—"That it be an instruction to the Baths and Pump Rooms Committee to take the best and most effective measures for the preservation and exhibition of the Roman remains consistent with the carrying out of the plans accepted by the Council." As far as we can gather, it appears that there is a disposition to effect this by raising some few feet the previously intended level of the new basement floor, so that an open basement may be preserved under for free passage about the Roman remains; which is exactly what we recommended should be done.

THE *Berliner Philologische Wochenschrift* (Nov. 20) briefly reports the progress of the excavations at Pompeii, where a street of tombs has just been laid bare. Professor Von Duhn, of Heidelberg, visited the place in company with the director of the excavations, Signor Sogliano. Two hundred feet in length of the street is now explored, seven tombs having been found, four on one side, three on the other. They stand slightly above the level of the street. They are of simple, cubical form, built

of bricks covered over with stucco and sometimes faced with stone. The inscribed slabs are of marble. Several skulls have been found, in which Charon's obolus fee still adheres to the jaws. The coins thus accidentally preserved are, of course, of the greatest importance in determining the date of the tombs. It seems that the majority of them are prior to the reign of Augustus. A few marble portrait statues, of fair style, have been found outside the tomb; some of them still retain clear traces of painting. Perhaps the chief interest centres round the inscriptions painted in red on the grave and the chance scratched inscriptions of the passers by, who some two thousand years ago cut their names and their jokes on the monuments as they walked from Pompeii to Nocera. The monuments seem also to have served the purpose of advertisement columns. On one a smith of Nocera offers a reward to any one who will bring back his mare that has strayed away. The excavators have still about a quarter of a mile of tombs before them.

THE same number of the *Wochenschrift* gives an account of an interview between Herr Max Ohnefalsch-Richter, well known for his excavations in Cyprus, and with the new Governor-General of the island. The result is most hopeful. Sir Henry Bulwer is heart and soul in favour of excavations, and, moreover, desires that these should be conducted on the most strictly scientific principles. "Only with this object,—to enrich science," he says, "have we a right to disturb the dead in their graves. Archaeology has not for its object to lift the purses of greedy speculators. Excavations must not be undertaken on commercial grounds." These words have not been spoken without need. Further, Sir Henry Bulwer expressed himself as strongly in favour of the several efforts of European nations. As an Englishman he was bound personally to rejoice if the British Museum went ahead in the search, but he would welcome and encourage, so far as he could, any scientific effort, whether it came from London, Berlin, Paris, or Vienna. Major Chamberlain, the private secretary, spoke strongly in favour of the establishment of local museums, instancing those of Olympia, Pompeii, Nimes, where every object in the museum spoke of the past culture of the actual spot where it stood. Herr Ohnefalsch-Richter concludes with an account of a less satisfactory interview with a previous Governor-General, in 1882, the details of which we forbear to quote. We can only hope that as the previous Governor did not speak German, and the conversation was in part by signs and gestures, that there was some measure of misunderstanding.

THE third volume of Hermann's "*Lehrbuch der Griechischen Antiquitäten*," which is devoted to the remains of Greek theatres and stage lore in general, contains a valuable appendix, consisting of some letters from Dr. Dorpfeld chiefly on the pre-Lycurgic condition of the Dionysos Theatre at Athens. We desire rather to call attention to the letters, which are of great interest, than to summarise their contents; but it may surprise the general reader to learn that in the theatre, as it stood in the fourth century B.C., the orchestra was divided from the spectators' seats by an open canal of water, over which fourteen little bridges passed. It sounds a cool and pleasant arrangement. Dr. Dorpfeld holds strongly that of the previous structure nothing now remains except portions of the circular orchestra or dancing-place built of polygonal stones. This was the kernel of the theatre, and its only early permanent feature. Spectators' seats and scenic arrangements were of wood in early days, and regarded as strictly accessory. So much does he think this was the case that he holds that the theatre could be spoken of simply as the "orchestra," and hence, when the "orchestra" simply is spoken of, as in the now famous passage of Andocides, we need not conclude that the simple "dancing-place" to the west of the Areopagos is necessarily intended. It may be the very Dionysos Theatre itself. The suggestion is of great importance for the settlement of some points of Athenian topography.

THE Institute of Architects have forwarded a memorial to the Metropolitan Board, calling attention to the proposed sale of Staple Inn, and urging upon the Board the desirability of preserving the Hall and other historic buildings in the Inn, in the course of carrying out any scheme which may hereafter be decided upon in dealing with the site. The memorial is not likely to meet with any success, as the Board has no funds available for the preservation of ancient buildings, and it is doubtful whether the site could be looked upon as an open space, under which category alone the Board would have power to acquire it.

THE principal portion of the restorations at the Church of St. Bartholomew, Smithfield, being now complete, arrangements have been made for the re-opening services on the 30th inst. The interior now admits of being inspected by those who are desirous of seeing the work done. The collection of old worked stone which has been found during the progress of the works, including the greater part of the tracery of the great east window of the fourteenth century, has been arranged in a temporary museum in the Lady-chapel. The published accounts show cash receipts amounting in all to 9,688l. 15s. 1d., and the expenses are:—Purchase of the fringe factory, 6,565l. 14s. 10d.; restoration of apse by Rev. F. P. Phillips, 1,700l.; of east end, 119l.; new roof to church, 381l.; excavating Lady Chapel, 54l. 15s. 8d.; cost of circulating appeal for subscriptions, 412l. 18s.; and other miscellaneous items, leaving a balance of 165l. There is a fund of 92l. 1s. in hand for special objects, and a deficiency of 75l. on the organ repairs. The estimated costs of other items are promised or guaranteed, but the sum of about 2,000l. is still required to complete the whole of the work in hand, but a fresh appeal is now being issued for 10,000l. to continue the necessary alterations.

IN view of the great number of fires that have occurred within the last two or three years, and the unfortunate loss of life which has in so many cases accompanied them, we are glad to hear of a practically fireproof cement, patented by a Mr. Thomlinson, of Hove, and made at the Knot Hill Plaster Works, near Carlisle. Its base is sulphate of lime, which, being a non-conductor, has an immense power of resisting heat, even when it is so intense as to fuse gold, silver, or copper. What is of almost more importance, the cement does not shrink or expand from the action of fire, and should be, therefore, a first-rate preservative for ironwork, and a guarantee against structural derangement later on. The new material is a quick dryer, and very strong, a brick 1 in. square being capable of bearing a strain of 550 lb. before breaking. Capt. Shaw thinks highly of it; and if all that is claimed for it is true, it ought to go a long way towards solving the question of how to make houses unflammable.

THE report for 1886 of the operations of the Boiler Explosions Act is of considerable interest, and shows that the intentions of the Act (which dates from 1882) are being steadily fulfilled. It is true that the number of cases of examination and inquiry were greater than in previous years; but this cuts two ways, as showing that steam users were more alive to the value of inspection, while, on the other hand, the number of deaths fell considerably below the average of the three former years. The following brief table shows this clearly:—

Middle of	Cases.	Deaths.
1883	45	35
1884	41	18
1885	43	46
1886	57	33

More than half the accidents happened from deterioration or corrosion of the boilers, or from defective safety-valves, the number arising from neglect by attendants being only six out of the fifty-seven cases. Mr. Thomas Gray, who is responsible for the report, remarks that the word "accident" scarcely applies to the situation, for the majority of the boilers examined proved to be at such a critical con-

dition of tenuity, that the real accident was that they remained so long without exploding. Many steam users work their boilers long after they are unsafe for any pressure, while the question of fittings is too often regarded as not worth attention, they being, as a rule, "dangerously inefficient." The wonder, indeed, is that the loss of life is so moderate, considering what a wide and erratic range the fragments of an exploded boiler frequently have.

MESSRS. A. & S. GATTI, the proprietors of the Adelphi Theatre, have agreed to purchase the Hampshire Hog public-house, No. 410, Strand, and the house No. 409 adjoining, together with the Nell Gwynne Tavern in Bull Inn-court, for the purpose of enlarging the theatre. It is proposed to provide a new separate entrance to the pit on the east side of the present entrance; to enlarge the pit by setting back the back wall and adding to the pit portions of the sites of the houses Nos. 409 and 410, Strand; to provide a new staircase to the dress-circle and upper circle; to rebuild the refreshment bars, and to provide additional lavatory accommodation. The cost of the additions, &c., is estimated at 25,000*l.* The architect is Mr. Spencer Chadwick, of Parliament-street.

THE *Times* has published several letters, since the Hampton Court fire, in regard to the danger to which the pictures there are exposed from occurrences of this kind, which seem to have rather a tendency to happen at the Palace. We have long thought that the magnificent Mantegna series should be somewhere else, in a place where it can be better seen and be more safe, as this is in fact one of the most valuable productions of Renaissance art in the country. There are a few other pictures which it might be worth while to remove and place in a more secure situation; of the bulk of the collection it would signify very little to any one if it were burnt, instead of hanging on the walls to deceive ignorant and unsophisticated visitors into the belief that they are looking at great works of art. The collection, *en masse*, is one which is depressing to the spirit of the more initiated, and it requires a look out of the window at the long alleys and canals and masses of trees bathed in sunlight (Hampton Court should only be seen on a bright summer day), to restore one's intellectual tone. But certainly we have no wish to burn down the house for the sake of this particular specimen of roast. Hampton Court itself is emphatically a place to spend a happy day (in summer), if it were not for the pictures.

THE Liverpool Architectural Society has forwarded a petition to the Privy Council in favour of the granting of the new Charter to the Royal Institute of British Architects, especially in regard to the improvement in architectural education which is likely to be facilitated by the new powers asked for by the Institute. The document concludes with the statement that the petitioners "are satisfied that under the powers proposed to be conferred on the said Royal Institute due provision will be made by means of federation or otherwise" for securing a closer connexion between architects practising throughout the United Kingdom and colonies. The unanimous vote of the Architectural Association in the same direction is mentioned in another column. Of course every one knows what this means; but there is certainly something ludicrous in all this trouble being taken to rebut a factious opposition by a parcel of mostly obscure persons who have no claim whatever to represent the profession at large.

THE exhibition at Mr. Wallis's gallery can hardly be said to contain any work of great interest among the larger pictures; Delug's "Philippina Welsler pleading to Ferdinand I." (42) is rather commonplace; Bouguereau's "This Sickness is not unto Death" (102) is, like all his works, a good piece of painting, but not in his best vein; and Bille's "Harvest of the Poor" (68) has,

if we remember rightly, been here before; it is a fine work, however, in the school of pastoral pathos,—if one may so call it,—of which Jules Breton was the founder. Among the smaller works exhibited are some of the first excellence in their way, especially four small and highly-finished paintings placed on the settee in the middle of the room; the accepted place for works of this class in Mr. Wallis's gallery. One of these, "Hush!" (119) is by Chevreillard; an old priest dozing after lunch, with his legs piously reposed on the chair before him, while an old dame keeps watch and ward at the door; in character and in finish of detail the artist has seldom surpassed this. Two others are by Seiler, the best follower of Meissonier whom we have, "The Aquafortist" (120) and "The Recognition" (118), a very small and beautifully composed interior, where an old gentleman waves his hand from the window to a passing friend. The fourth, "A Dealer in Curios" (117), by Allan-Schmidt, is a perfect *tour-de-force* of minute realism, though with less artistic feeling and character than the other three. Spring's "Village Orchestra" (45) is another admirable work, a study of four or five figures of remarkable individuality of character. Heffner's "Castle of Ostia" (38) is an effective landscape, but this artist is becoming sadly mannered, the same receipt, with the line of light in the horizon, being repeated over and over again. Windmaier's little landscape, "Winter Dream" (101) is a poetical work, deriving its inspiration from Munthe, one or two of whose inimitable snow-pieces are also usual among the contents of the gallery.

WE understand that Mr. Christian has completed his examination of the designs for the Liverpool Cathedral.

THE Sanitary Registration of Buildings Bill, for the compulsory examination of houses, proposed for approval by Mr. Mark H. Judge, at the meeting of the Society of Medical Officers of Health last week, is certainly a very crude measure in its present form, especially in its want of any provision for the proper definition or constitution of the competent sanitary officers who are to go into houses and report on their condition. At the same time, the dead set made by the medical authorities who took part in the discussion against architects and engineers, was just as crude and one-sided. We may point out, however, that the first thing to do in regard to sanitary inspection is to get a staff of inspectors not only competent, but unhampered in their power of action by superior and sometimes interested officials. Until this is done, it is of little use to draft Sanitation Bills.

FRENCH AND ENGLISH HARBOUR WORKS.

THE great harbour works now in course of construction at Boulogne bid fair to form a far more practical and practicable link in the means of intercourse between France and England than could have been afforded by the Channel Tunnel, had that hairbrained fancy proved commercially, as well as physically possible, and unobjectionable from a military point of view. The silver streak could long since have been bridged, in a mode far less objectionable to the most squeamish passenger than by a drive for twenty-four miles through the bowels of the earth, by the means of such a vessel as the *Great Eastern*, but for the fact that no ports existed of sufficient magnitude to accommodate such a craft. The French are in earnest as to the removal of this stigma from their own coast. By the construction of additions to the 646 yards of the present east pier, which will amount in all to a length of more than three miles of piers, mole, and breakwater, an area of 340 acres of basin will be sheltered from the waves and currents of the Channel. The new south-west pier starts from under the cliffs of Chatillon, west of the town of Boulogne, and already stretches seawards for 1,472 yards. To this straight part of the pier will be added 218 yards of curved wall, and a breakwater is to be carried for 654 yards more. At the end of this is to be a

passage 272 yards wide, with a depth of from 26 ft. to 27 ft. of water at the lowest spring tides. The mole, which is to start from the end of the open passage, and which is not yet commenced, is to be 646 yards in length. A second opening is then designed, at the north-east corner of the basin, which is sheltered by the before-mentioned prolonged east pier. In the centre of this noble harbour will be an oblong pier, 430 yards long and 218 broad, intended for passenger and goods traffic; on either side of which dredging will provide a depth of 26 ft. of water for all classes of vessels to moor alongside. The railway terminus will be erected on this pier.

Of the sum of 680,000*l.* voted for this harbour, 600,000*l.* have already been expended. It is said that double the amount of the original vote will be required. The stimulus thus given to the commerce of Boulogne is already very considerable. The export and import traffic now ranks next to that of Marseilles and of Bordeaux, and is daily on the increase. 323 fishing-boats, of 80 tons burden, manned by 5,024 men and boys, and six schooners of 150 tons each, now hail from the port of Boulogne; and as much as 130 tons of fish are landed at one time. In 1885 the herring fishery alone brought into Boulogne 27,000 tons of herrings; and other fish amounted to 6,000 tons. The total value was upwards of 400,000*l.*, of which the herrings alone fetched 240,000*l.* Lobsters, crabs, and the like, are not included in the above.

The activity shown by France in the promotion of both ocean and inland navigation, contrasts very forcibly with the neglect of our own Government to enforce such measures for the furtherance of commerce as rank beyond the limits of private enterprise. During the last twenty years France has expended 11,176,632*l.* on seventeen harbours; Belgium, 2,700,000*l.* on two harbours; Germany, 1,110,379*l.* on five harbours, besides an unknown but enormous cost on Danzig, Wilhelmshaven, Königsberg, and Memel. These four States, together with Spain and Italy, have spent, during the period named, 432,000*l.* a piece on forty-eight harbours, and larger sums on four or five more.

In our own country, during the five years 1876-1882, the number of ascertained shipping casualties on our coasts has averaged 3,300 per annum, out of which 497 vessels per annum were totally lost. The annual loss of life incurred has been 738. The Select Committee on Harbour Accommodation of 1883 and 1884 reported that on the east coast of Great Britain, with the exception of the natural advantages afforded by the estuary of the Thames, by the Firth of Forth, and by Cromarty Forth, there is not a single harbour which is adapted to the requirements of the Navy in time of war. Two works, one at Dover and one at Peterhead, have been determined on by the Government, to be carried out by convict labour. The Committee justly held that to delay the construction of National harbour works for the miserable economy to be secured by the use of convict labour is a great mistake, and urged that the construction of the harbours which they recommended should be carried out at the national expense, as in the similar case of fortifications.

Urgent as appeared to be our need of harbour accommodation in the opinion of the Select Committee appointed to examine the subject, a twofold weight is added to the considerations which they advance by the activity displayed at Boulogne. In the event of a war with any naval power, Brighton and the long line of towns and scattered residences that dot our coasts lie at the mercy of any enemy that can obtain even a momentary command of the Channel. It would tax the best resources of Great Britain to meet such a fleet as might easily ride at anchor in the 340 acres of the new Boulogne Harbour. And if, under stress of weather, our Channel fleet had to seek the shelter of the Thames, a French expedition might leave Boulogne, inflict incalculable mischief on the Kent and Sussex Coasts, and be back again within the shelter now providing, long before our men-of-war could arrive to guard the shore. It is hardly possible to insist too strongly on the national importance of the defensive measures which are rendered imperative by the hasty preparation, in time of peace, of a naval shelter on the Continental seaboard at the point nearest to our coasts, of which such irresistible use could be made,—if we continue supine,—in times of war. It is

not one public writer, alone, who claims attention: it is the voice of an important and authoritative Parliamentary Committee, echoed back from the active din of the French harbour builders.

OLD HOUSES OF THE SEVENTEENTH CENTURY AROUND LONDON.

THERE exists in the environs of London a rapidly-diminishing number of houses of the middle or end of the seventeenth century, and the beginning of the succeeding one, together with a few of earlier date, which deserve to be described before they pass away. So rapid is the disappearance of these buildings, that it is not at all an unusual thing for one of them to be noticed with all its familiar surroundings, only to find the site covered with small houses and streets on the occasion of the next visit to the locality, the frequently spacious grounds around them being valuable to the speculative builder and land jobber. Within only a few recent years comparatively many well-known and important houses have thus disappeared, among which may be noted Putney House; the Manor House, Stockwell; Tradescant's House, South Lambeth; Kennington Mansion House; Kensington House; the Great House, Plaistow Broadway; Chiswick Manor House; and many others, whilst fire has also removed several. Many of these appear to have never been recorded by the pencil. It is true that, in an artistic sense, the designs of some of these old mansions, and of others that remain, were not all that could be wished, owing to their plainness of outline, and the absence of decorative features. Still, since the true origin of the so-called "Queen Anne" style is to be traced in these buildings, and their designs indicate some marked contrasts to modern practice, in which there is so much diversity of outline, it may be as well to present some examples of what these houses were like, while they yet remain to us. These examples, we trust, will be as useful to posterity as to ourselves, and we may refer to a series of examples given in the pages of the *Builder* some years ago, of the ancient timber houses which, for the most part, then existed in London. The progress of modern requirements and modern change have almost entirely obliterated the buildings then illustrated, and very few of the series now remain. Many, in fact, are recorded only by the sketches referred to.

The numbers of houses for good families erected in the environs of London, show plainly that the more wealthy citizens had at the period under review already begun to adopt the habit of living outside the City boundary, to a larger extent than many are at first likely to suppose. On no other theory can the number of houses of importance be accounted for, although it can be supposed that the regulations forbidding the erection of buildings within and around the City, must have retarded the habit to a great extent.

These laws must ever be the occasion for our surprise as examples of arbitrary and blundering legislation; and in these days of the continuous overgrowth of the City, must excite our wonder that at any single period it could be thought possible to restrain the increase of a large city by such means. Still more so when we find them renewed reign after reign, and during the period of the Commonwealth, as well as after. There are, however, numerous evidences that a wealthy landowner could, and did, get some dispensation and relief, either by means of some court influence or otherwise. Thus, Charles I. in 1640 gave licence to Thomas York to build over St. Clement's Inn-fields, and in 1642 to Mr. Gervase Holles, to erect a specified number of houses and streets westward of what is now Clare Market. The Bill of 1657, for preventing the increase of buildings, had a clause permitting the Earl of Clare to continue their erection, notwithstanding the covenants of the Act.

There is a curious document printed by Lysons in the 3rd vol., p. 447, of his "Environs of London," ed. 1795, which exhibits the mode of operation resorted to by owners of estates desirous of realising their building value. In 1673, Philadelphia, Lady Wentworth wishing to pay the heavy debts contracted by the Earl of Cleveland in the civil wars, wisely concluded that the enhanced value as building land of some part of the Manor of Stepney would aid her project. She accordingly solicited the

King's licence to build upon what was then called West Heath, being a portion of the land on the south side of the Mile End-road, with part of the west frontage to the road to Stepney. Sir Christopher Wren was employed to survey the land, and he gave his opinion that the site was eligible for building, and the position con-

venient for the erection of habitations for mariners and manufacturers who served the shipping; that it was much more wholesome than the neighbouring places; and that there was no objection, except the increase of buildings, contrary to the statute, which limited buildings within three miles of the city. There is a curious plan attached to the report of no little interest, as showing the changes which have come over this now densely populated part of London in 213 years. The old earthen mount, known as Whitechapel Mount, thrown up during the civil wars, one

1680, and that printed by Mr. R. Chiswell about 1707, show them.

The reference to this building scheme of Lady Wentworth's having brought us to Stepney, let us turn to a row of houses opposite

FIG. I.

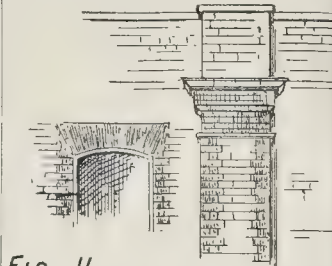
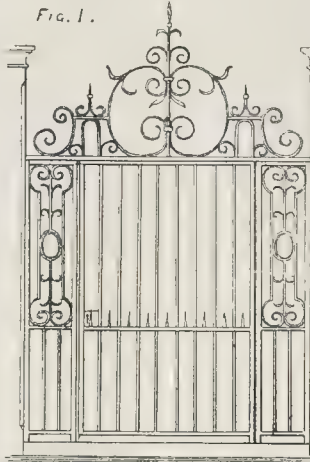
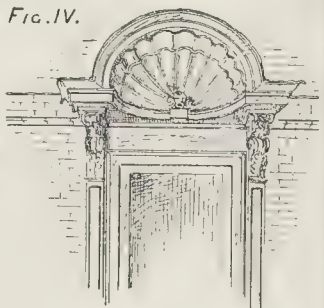


FIG. II.

to the portion of land included in the scheme, on the road leading to Stepney Church. These stand on land within the Manor of Stepney,

FIG. IV.



and, doubtless, its laying out followed very shortly after the buildings referred to. This road is the now familiar Stepney-green, but old maps call it Mile End Old Town, or Stepney-green.

venient for the erection of habitations for mariners and manufacturers who served the shipping; that it was much more wholesome than the neighbouring places; and that there was no objection, except the increase of buildings, contrary to the statute, which limited buildings within three miles of the city. There is a curious plan attached to the report of no little interest, as showing the changes which have come over this now densely populated part of London in 213 years. The old earthen mount, known as Whitechapel Mount, thrown up during the civil wars, one



FIG. III.

of several, at the entrances of the main roads to London, and here called the Fort; the old Stepney burial-ground, acquired during the plague of 1665; and several other points curious for observation in the present altered state of things are all set forth. The certificate signed by Wren being given in full by Lysons, there is no need to do more than thus refer to it, but it may be added, that licence was given to Lady Wentworth by order of Council, March 21st, 1672-3. Buildings were doubtless soon commenced, and, indeed, Seller's Map of London,

Roque's Map, 1746, shows the east side all built upon, but only a portion of the west side. The "green" proper, a narrow strip of land, has recently been enclosed and planted by the Board of Works, and thus preserved as a recreation-ground and health-resort in a district where it is much needed.

At the north-east angle of the Green are several of the original houses. They are of the square, "upright" type of house in fashion towards the close of the seventeenth century. One or two of them have good door-cases, and a

few fragments of wrought iron of the entrance-gates and railings may be noted here and there. Whittington House has a good wrought-iron gate, of which we give a sketch (fig. 1). Proceeding southwards we come to Montgomery House, a very characteristic example of a class of plain designs then very common. The ornamentation consists only of two projecting pilasters, with cut and ganged red-brick caps, shown in sketch fig. 2. Next to this, lying more away from the road, is a noteworthy mansion, which was evidently once detached,

stairs, carved and bracketed ends, and turned balusters. The cornices to the rooms are heavy, and without enrichment. It is, however, to the elaborate and excellent wrought-iron work that our special attention must be directed. Like almost all other houses of this date, the ironwork is abundant and good. Fig. 5 shows the design of the railing of the external steps; Fig. 6 that of the panels of the landing. The approach is of squares of black and white marble, laid diagonally, another usual feature. The main entrance-gate is

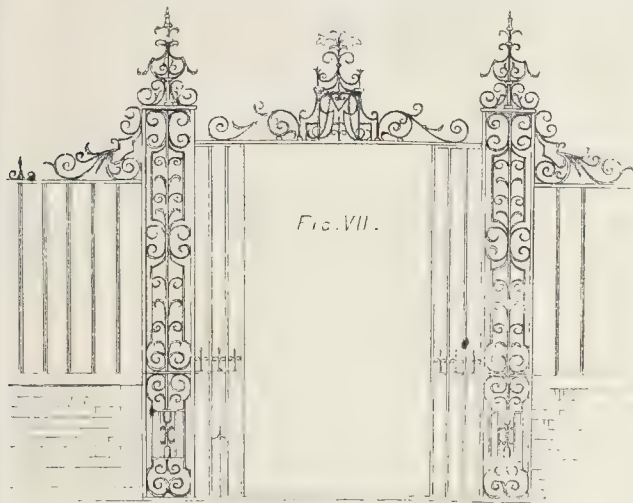


Fig. VII.

although it is now touched by Montgomery House, which is evidently, therefore, of a little later date. This House, now numbered 37 and 39, Stepney-green, is shown by fig. 3. It is of a type of house of rather earlier date than can be assigned to this specimen, for the entwined letters G and M, in the entrance-gate, point to the reign of William and Mary as the period of its erection. It is built of good reddish-grey bricks, laid Flemish bond, with ganged arches and dressings of bright red bricks, such as were once common in almost all works of this

shown by fig. 7, and a portion of the railing to the left and right by fig. 8. This ironwork is well executed, but it is in great need of repair. The house is now used as a Jewish Home. The illustrations are sketches merely, and are not measured or drawn to scale.

Stepney-green has been almost entirely cleared of the other old houses which were once numerous along its extent,—the Green having been a favourite resort. A few old houses still exist to the north-west of the parish church, and Stepney-square is composed of a quaint group

Fig. VIII.

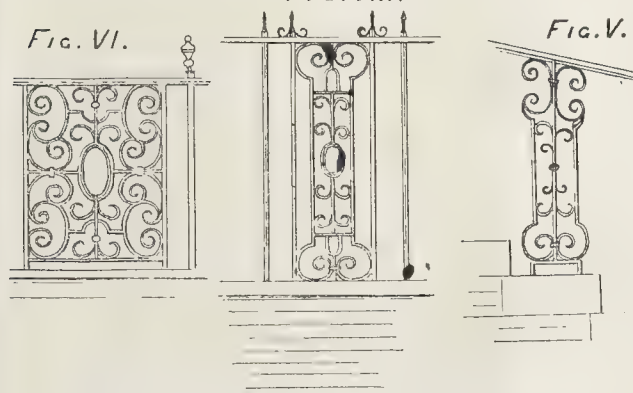


Fig. VI.

Fig. V.

period, of very good quality and texture. The cornice is of wood, the modillions and mouldings being laid on to a solid wood fascia. The hood to the entrance-door (fig. 4) and the pronounced outline of the dormer windows belong to the rather earlier class of design already referred to, the enrichments under the hood are most probably of plaster or composition, as were those of a very similar doorway existing until recently at the old Mansion House, Kennington. The entrance leads into a central hall, and internally the staircase is a good piece of joinery, with curved soffits to the

of plain buildings of late seventeenth-century date. Beyond a few fanlights to the entrance-doors there is nothing special in their design.

Acton Local Board.—At the ordinary meeting of the local board for the district of Acton, held at their offices on the 16th instant, it was resolved by the unanimous vote of the Board to increase the salary of Mr. C. Nicholson Lailey, their engineer, from 250*l.* to 500*l.* per annum, Mr. Lailey undertaking to devote the whole of his services to the work of the Board.

THE CROSS IN HERALDRY.

In the last decade of the eleventh century the Council of Clermont was held under Pope Urban the Second, when, amidst cries of "God wills it," a crowd of enthusiasts pledged themselves to drive the Saracens from the Holy Land, and while taking the oath received from his Holiness the sacred badge of Christianity, and became "bearers of the cross." Such was the inauguration of the Crusades, the outcome of the burning eloquence of Peter the Hermit, or Little Peter, as he was more generally known.

To distinguish the various nations engaged in this great enterprise the crosses borne were differentiated in colour, and Cussans tells us that the English assumed a white one, and wore the badge sewn or embroidered on the right shoulder of the surcoat, and that the French chose red and the Flemings green, while the Crusaders from the Papal States were known by two cross keys.

According to Sir George Mackenzie, the Scots at the first Crusade wore the cross of Saint Andrew, the French a white cross, the English one of gold, the Germans a black cross, and the Italians a blue one.

In the third Crusade Colnbiere says the French appropriated the red cross which had hitherto been borne by the Spaniards. The question is one of interest, but the element of uncertainty enters into it. Some writers hold that the French added the fleur-de-lis to each end of their badge, and thus arose the cross flory, while the Papal warriors affixed a transverse piece to every limb, and formed the cross-croset, which may be described as four small crosses springing from one centre.

The Knights Templars subsequently assumed the blood-red cross of martyrdom, and bore it with eight points; and the Hospitallers took the same form in black and at times in white.

The Crusading Kings of Jerusalem adopted the cross potent surrounded by four crozets, all in gold, on a silver shield, in defiance of the well-known rule in heraldry (that metal shall not be placed upon metal), but in reference to the wings of the dove, covered with silver and feathers of gold, spoken of in the thirteenth verse of the sixty-eighth Psalm. The five crosses are said to symbolise the wounds of Our Saviour.

Godfrey de Bouillon was said to assume this coat of arms from another cause, and that was to court inquiry of all who might behold the unauthorised combination of metals, and lead them to ask if it were not a false one. "Perhapse," says Ellen J. Millington, "also from the same pious motive which induced him to refuse the crown of Jerusalem, desiring that even the necessary ensigns of human honour should be made to him tokens of humiliation."

The crosses of heraldry are numbered by hundreds, and many of them are very beautiful in form, and it is something marvellous to think of the ingenuity of the sciences (or art) that could produce so many shapes and varieties to this "brilliant addition to the splendour of the shield," as Monle describes it. Berry's "Encyclopædia Heraldica" enumerates three hundred and eighty-five different crosses. Well might old Gerard Leigh say he was "weary of them."

Our national cross of St. George is, perhaps, the earliest example of the emblem of Christianity that is to be met with in heraldry, and perhaps the best known and most frequently met with. This is the one borne by the knight in Spenser's "Fairy Queen," "the deare remembrance of his dying Lord," the blood-red cross of martyrdom.

We can only name a very few of the crosses borne in armour, but they are amongst the leading ones:—

Cross anchored, so named from the anchor-like termination of the limbs.

Cross of St. Andrew, on which this saint is supposed to have suffered martyrdom; it is in the form of an X.

Cross annulety, or with rings at the ends.

Cross avellane, so called from its resemblance to four filberts (*nux avellana*).

Cross boutonée, or budded at the ends.

Cross Calvary, elevated on three steps, said to be symbolical of Faith, Hope, and Charity.

Cross fourchée, or forked at the ends.

Cross Maltese, ending in eight points, to typify the eight beatitudes.

Cross moline, or millrind, from its resemblance in the terminations to the iron attached to the millstone.

Cross pattée or formée, spreading out at the extremities.

Cross patriarchal, with two horizontal arms, sometimes called a double cross.

Cross of St. Patrick, the same in form as that of St. Andrew.

Cross pommée, ending in balls or apples.

Cross tau, that of St. Anthony; it is T-shaped, and always appears on the left-hand side of the garment in representations of this saint.

Cross urdée, terminates in points, or with wedge-shaped ends.

Cross wreathed, formed of the twisted garlands, by which the crest is joined to the helmet, probably derived from the wreathed turban worn by Saracens. The family of Seresby bears this cross in red and blue.

Here our list terminates (lest our readers be wearied), but we have only touched on the fringe of the matter.

Some of our oldest families bear plain crosses alone. We instance a few from Parker's "Glossary of English Heraldry":—Argent, a cross sable, Raynsford; argent, a cross vert, Hussey, Lincolnshire; azure, a cross argent, Aylesbury, Warwickshire; azure, a cross or, Shotton, Norfolk; or, a cross gules, Corsby, Scotland.

These are simple bearings, and, therefore, the more dignified, the very simplicity of these "old coats" shows their early adoption before so many varieties had to be devised for the many families desiring to see the cross in some shape or form on their shields.

The Sneyd Kynersleys of Loxley, Staffordshire, have a cross potent in their arms, derived from a crossading ancestor who followed King Edward I. to the Holy Land, and received there the honour of knighthood from that monarch.

In the Middle Ages, merchants' marks began to be used. They were generally composed of a monogram or initials, and the cross was frequently added. Some of these devices are to be found in our churches. At Hitchin, in Hertfordshire, some interesting examples are to be seen. In those days traders were not allowed to bear coats of arms or shields, and these merchants' marks were adopted by successful adventurers in commerce.

Many of the mottoes accompanying crosses have direct reference to them, breathing a spirit of devotion and hope. We give one or two selections: "Crux dum spiro spero," "Virtus sub cruce crescit," "Fidei coticula crux," "In hoc signo spes mea," being fair examples of them.

We must not forget that for one of these heraldic figures we go to the heavens themselves and use that beautiful constellation known as the Southern Cross for the arms of some of our Australasian bishoprics.

The early Christians loved to trace the resemblance of the cross in natural objects, and Rhabanus Maurus (a ninth-century writer) beheld with fond imagination this ever-welcome form in his surroundings. He says "Birds aspiring to reach the heaven, spread their wings in the form of a cross. The ship that floats upon the wave displays in its mast and spreading sails the figure of a cross; and man, when he stands erect to pray, or when in swimming he parts with his body the yielding wave, extends his arms in the likeness of a cross."

What would this enthusiast have said had he known that the stars themselves lent their shining orbs to form the adored figure?

Tertullian also bears remarkable testimony to the all-pervading influence of the cross amongst its early disciples. He tells us that "at every commencement of business, whenever we give in or come out of any place, when we dress for a journey, when we go into a bath, when we go to meat, when lights are brought in, when we lie down or sit down, and whatever business we have we make on our foreheads the sign of the cross."

In our own day we have a lady writer eloquently discoursing on the same theme, and observing that, "On the earthly battlefield, and in the hidden but no less deadly strife waged in the deep recesses of the human heart, the cross has been alike the symbol of victory and the object of adoring love," and she further describes it as the badge for nearly every order of knighthood and the reward of heroism. Can we wonder that such a symbol should be sought after?

Planché, in his "Pursuivant of Arms; or,

Heraldry founded on Fact," has something to say about the cross, and, as usual, it is very much to the purpose and extremely practical:—

"Admitting," he begins, "that nothing was more common in the early days of Christianity than to paint crosses of different forms upon the shield or embroider them on the standard, and that numerous instances may be produced from illuminated manuscripts previous to the Conquest, the Bayeux tapestry and other authorities, of such a practice being continued to the period when heraldry burst upon the chivalric world in its full glory; most of the peculiar crosses which form regular heraldic figures may be traced to metal clamps or braces to strengthen and protect the long kite-shaped shields of the eleventh and twelfth centuries."

MACCLESFIELD CHURCH.

THE old church of Macclesfield, in Cheshire, the designs for the complete restoration of which, as prepared by Mr. James Stevens, are given in our present issue, was founded in 1278 by Eleanor of Castile, Queen of Edward I., the then Lady of the Manor, and, as appears by an enrolment on the chartulary of Chester Abbey, was subject to the Mother Church of Prestbury. Of the church then erected not a vestige remains,—unless it may be that the basement of the present tower dates from the time,—and, unfortunately, nothing has been preserved that can help to a clear idea as to its architectural characteristics, except a rude representation of the fabric on the seal used by the rural deans of Macclesfield previously to the consolidation of the rural deaneries of the diocese; this, which is certainly not altogether reliable, shows a building comprising a nave, clearstory, and south aisle crowned with an embattled parapet; a chancel extends from the eastern end of the nave, and at the west in an embattled tower surmounted by a lofty octagon spire. Every trace of this building disappeared generations ago, and the only portions of the present structure that have any claims to consideration on the score of antiquity are the tower, which is of the Perpendicular period and somewhat ornate in character, and two chantry chapels on the south side, one belonging to the Leghs of Lyme and the other founded by Thomas Savage, Archbishop of York, who died in 1507, and whose heart is buried within its walls. These chapels, though much injured by time and neglect, exhibit many interesting architectural details.

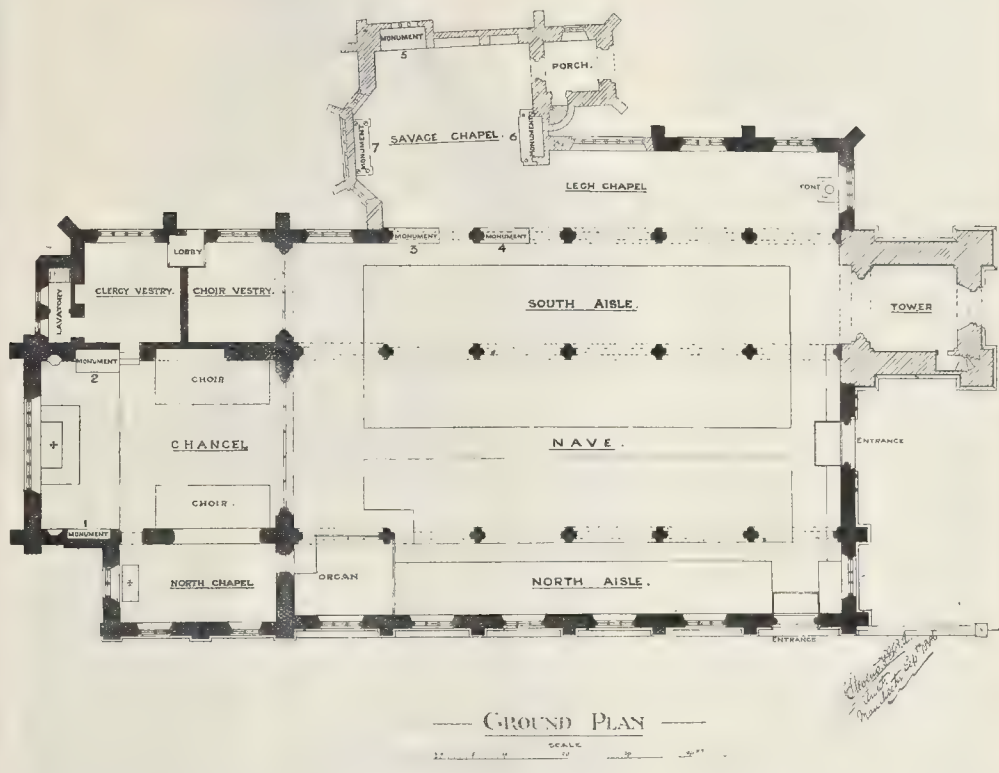
The old church,—whether Queen Eleanor's or one that succeeded it, it is not clear,—was pulled down in 1739, when another of larger dimensions was erected in its stead, in that crude, feeble, and incongruous style that prevailed in the middle of the last century. The building then raised comprised a nave with north and south aisles, separated from it by a series of heavy square pillars, with cylindrical columns above, supporting semicircular arches; a gallery extended over each aisle and round the western end, and this, as well as the body of the church, was filled with pews of the ordinary high-backed box-like type. The original plan was materially departed from, and the area considerably enlarged by extending the building northwards, and at the western end, so as to bring it towards the face of the tower. In this arrangement the chancel was placed at the eastern end of the north aisle instead of at the termination of the nave, and in this form it remained until 1819, when the eastern end of the church was rebuilt and a new chancel added, the old one thenceforward serving the purposes of a baptistery. At the same time an attempt was made to repair the timber work of the roof, which had begun to show signs of weakness and decay. The work was done, however, in a very perfunctory manner, and being hidden from view by the intervening plastered ceiling, the actual condition remained undiscovered until the recent removal of the eastern gable for the erection of the new chancel, when opportunity was afforded for a careful examination, and it was then found that the roof timbers were in such a decayed and dangerous state that it became absolutely necessary for the safety of the worshippers to remove the side and west galleries and to tie the piers with iron rods, &c. As previously stated, the tower was originally surmounted by a lofty spire, but this, being found in a dangerous condition, was taken down in 1740,

when the body of the church was in course of re-erection, though the stone-work from which it sprang may still be seen projecting from the masonry of the inner walls above the bells. The tower itself is Late Perpendicular work, well proportioned, with much that is interesting in the details. It is pierced on the west face with a pointed doorway, the sides, spandrels, and space above the arch being profusely ornamented with niches, panels, quatrefoils, and other sculptured work. The second story is lighted by a large three-light window with pointed and traceried head, surmounted by a label mould, and above this is a three-canopied niche enriched with crocket-work, with a sculptured figure occupying the central recess. The space above the clock-dial contains the bells and is pierced on each side with double pointed openings filled with louvres. Surmounting it, and immediately beneath the parapet, is a band enriched with carved quatrefoil work. The parapet walls are embattled and have evidently originally had the addition of a pinnacle springing from each angle, and intermediately from the centre of each battlement; but these have long since disappeared, though, as will be seen from Mr. Stevens's design, the intention is to restore them. A noticeable feature of this tower is the large number of heraldic shields affixed to the outer walls. There are sixteen in all, representing the armorial insignia of the principal families in the neighbourhood at the time the tower was built, and who were probably the chief contributors to the cost.

In the spring of 1882 a committee was appointed to carry out the work of restoring and, where necessary, reconstructing the fabric of the church. Mr. James Stevens was instructed to prepare plans, elevations, and sections, and these having been approved, application was made to the Consistory Court at Chester, and a faculty obtained, no opposition being offered by any one interested. Tenders were afterwards obtained for the first section of the work, which embraced the extension of the chancel eastward, as also of the north aisle, which now terminates in a small chapel, and the addition of clergy and choir vestries on the south side. The contract was undertaken by the late Mr. H. S. Aspinwall, and the work carried out in a thoroughly substantial and satisfactory manner. During the progress, however, difficulties of an unexpected kind arose, and had to be provided for. It was found that the graves and vaults in the nave and chancel, as well as in the baptistery adjoining, had been carried down so much below the foundation of the piers and walls that the greatest care had to be exercised to prevent the whole fabric collapsing. Means were taken to prevent the foundations of dry rubble from sliding further, large quantities of hydraulic concrete being used for the purpose, the whole area of the nave and chancel having arches of the same material carried over the surface after the vaults had been filled in. Upon this was laid, in Portland cement, Wareham's wood-block pavement. Some of the old openings in the walls at the chancel end were built up and new ones made, the main body being lengthened to the extent of another bay or span of the groined roof, 4½ yards in extent, with north aisle and chapel termination. The clergy and choir vestries on the south side are fitted with entrance-lobby, lavatory, &c. The heating apparatus is placed in a fireproof-chamber under the north chapel. The chancel is paved with marble mosaic, with the figure of St. Michael, to whom the church is dedicated, in Italian mosaic; and the walls of this part of the structure, as well as of the chapel and vestries, are lined with ashlar in Alderley stone. The east window of the chancel, which is of seven lights, is very effective, and the tracery of this and the other windows are in Cefn stone, the external walls being of parports from the Tegsnose quarries with Alderley ashlar. The whole of the roofs and doors are in the best oak and of substantial workmanship, and it should be added that the carvings, both internal and external, in the chancel and north aisle, are the work of Mr. Loveless, representing Mr. Harry Hems of Exeter. Excepting the concreting of the floor and the laying of the wood-block pavement, the larger section of the work projected has yet to be done. This will necessitate the removal of the heavy cumbersome piers which disfigure the interior, and of the double tier of Palladian windows, and, in fact, the entire reconstruction of the north side. A reference to Mr.

THE CHURCH OF S MICHAEL

MACCLESFIELD



Illustrations.

CASTLE OF LÖWENSTEIN, WERTHEIM.

THE picturesque and romantically situated town of Wertheim-on-the-Main owes not a little of its interest and beauty to the noble old Castle of Löwenstein, which looks down upon it from its lofty rock.

A more charming picture is not to be found in Germany than that presented by the quaint old town with its lofty watch-tower, covered bridge, and red stone church tower, backed up by the great rock, crowned with the ruins of Löwenstein.

The foundation of the Castle of Löwenstein dates back to the tenth century, but no portion of the existing building is earlier than the fourteenth century, of which date are the keep and ruins of the chapel. The outer walls and towers shown in our illustration are works of the sixteenth century. The great tower with the bell suspended from a projecting dormer, is called the "Record Tower," and a curious legend is related concerning it. It is said that one of the counts of Löwenstein in the eighteenth century had determined to pull down the ruins of the castle, which had been partially destroyed and rendered uninhabitable by the Swedes under Gustavus Adolphus in the thirty years' war, but that strange noises resembling the groans of some one in pain were heard to proceed from the tower. Upon entering the principal chamber of the tower a parchment document was found fixed to the wall condemning to death any one who should destroy the castle. Whether this was a trick, or whether the more rational explanation to which we are about to allude, is the truth, the castle has fortunately escaped destruction, and the old record tower is still retained in a habitable condition. The probable explanation of the singular circumstances connected with the old tower is this. Löwenstein, like several other castles in Germany, conveys a title with

its possession, and it is by no means improbable that the Count of Löwenstein, who contemplated its destruction, was ignorant of this fact until he discovered some ancient title-deed or document preserved in this tower which enlightened him upon the subject in time to prevent his perpetrating an act of vandalism, and probably vitiating his own title. A very remarkable feature at the Castle of Löwenstein is the structure called the "altana": it consists of a kind of balcony supported upon a lofty arcade of semicircular arches projecting from the outer balium of the castle to the edge of the fosse. On one side it is protected by a wall pierced with loopholes, and on the other it shows a delicate tracery parapet. Although the whole work is of the same date, it is singular that, while the arches and square tower at the end are quite Italian in character, the parapet is purely Gothic. What was the object of this curious building is not quite clear, but in all probability it served several distinct purposes. Possibly the solid tower or pier at the end may have borne a crane for drawing up provisions, &c., from the fosse. The loop-holed side was evidently for defence, and protected the castle from an attack made upon it from the level ground on that side. The ornamental balcony offers beautiful views of the surrounding country. The great pier or solid tower is capped by a large projecting cornice, which bears a stone platform. Now, whether this platform was originally protected by an open parapet like the rest of the "altana," or whether it supported a look-out turret, it is difficult to say. The word "Altan" or "Altana," really means a balcony or platform, but it is singular to find such a structure connected with a Mediaeval castle, and it would be interesting to know whether other examples of it exist which might throw some light upon the particular use or uses of the one in question. Possibly some reader of the *Builder* may be able to throw a light upon the subject.

Stevens's drawings will show that this side will be divided into six bays, and the aisle will be lighted by five three-light pointed windows, with richly-traceried heads of Perpendicular character, the sixth bay from the east being occupied by the entrance doorway. The clearstory is lighted on each side by six windows of three lights each, with pointed traceried heads, harmonising in design with those in the north aisle. These windows are of comparatively large proportions, the object being to give as much additional light as is possible in the body of the church, necessitated by the fact that the structure, on three sides, is closely hemmed in by other buildings, which tend to darken the ground-floor windows. The western termination of the north aisle has a pointed window of three lights, similar in design to those on the north side, and one of five-lights is placed over the western entrance to the nave. On the south side, the Savage and Legh Chapels already referred to, and which possess many interesting architectural features, have through the liberality of the owners, the late Marquis of Cholmondeley and Mr. W. J. Legh, of Lyme, been given up for the use of the parishioners, and will be absorbed in the church; they will be put in a state of thorough repair, care being taken, however, that only such alterations in the details are made as may be necessary to adapt them for the purposes of public worship.

This important work is unfortunately at present stayed for lack of funds. It is much to be regretted that in a town like Macclesfield, which is associated with many stirring events in English history, and even now is accounted the chief seat of manufacturing industry in the county, there should be any hesitation or delay in responding to the appeal for the necessary means to place the church in such a condition as will render it more comely and decent, and better fitted for the purposes for which it was originally intended.

The castle of Löwenstein, Wertheim, is constructed, for the most part, of rubble of a reddish colour. The quoins, windows, &c., are of a very fine ashlar, of a beautiful rose tint. The castle appears to have been entirely covered with plaster, which seems to have been painted with decorative devices.

The town of Wertheim possesses a very fine ancient church, with a very singular rood-screen, and a noble fourteenth-century monument to the memory of "George, Count of Wertheim, and his two Wives," about which there is an absurd tradition to the effect that he was allowed to have two wives at the same time. I fancy this arises from the fact that such representations are uncommon in Germany, though common enough in England. There does not appear to be the slightest foundation for supposing that Count George was guilty of bigamy. Nor even, if he were, is it at all likely that his crime would have been recorded by one of the most exquisite mural monuments in the whole of Germany.

The monument consists of a large triangular-headed canopy, divided into three compartments by pinnacled buttresses, so as to form three niches, each of which is occupied by a statue above life size. The figures are splendidly carved in red stone. Unfortunately the sculptor of this remarkable work is unknown.

At Wertheim the river Tauber flows into the Main. Although it is an insignificant stream and unnavigable, few rivers in Europe are, in proportion to the length of their course, richer in ancient towns and villages. Amongst others are Brombach, with its twelfth-century Cistercian abbey church; Bishofsheim, with a fine old church and castle; Oberwiltzhausen, with its singular round church; Detwang, with a church containing three finely-carved Mediaeval reredoses; Rothenburg, one of the best-preserved Mediaeval towns in Germany; Creglingen, with a most interesting church; and other places of interest. There are, however, no means of conveyance, and the tourist who would explore this interesting district must use his legs. The inns, though small and humble, are clean, but a slight knowledge of German is indispensable.

H. W. B.

COMPETITIVE DESIGN FOR INSURANCE OFFICES, WELLINGTON, NEW ZEALAND.

This design, by Mr. Hurst Seager, was one of four, the author informs us, selected in competition by professional assessors, though not the one ultimately carried out. We give it as an example of the tendencies of architecture in New Zealand, which we presume it may be taken to represent to some extent. The author states that his object was to produce a building which combined convenience of plan with a certain dignity and richness of effect, without any costly amount of decoration.

PONT-STREET, CADOGAN-SQUARE.

THE mansions which we illustrate to-day are in course of erection on the south side of Pont-street, on part of what was "Prince's Ground."

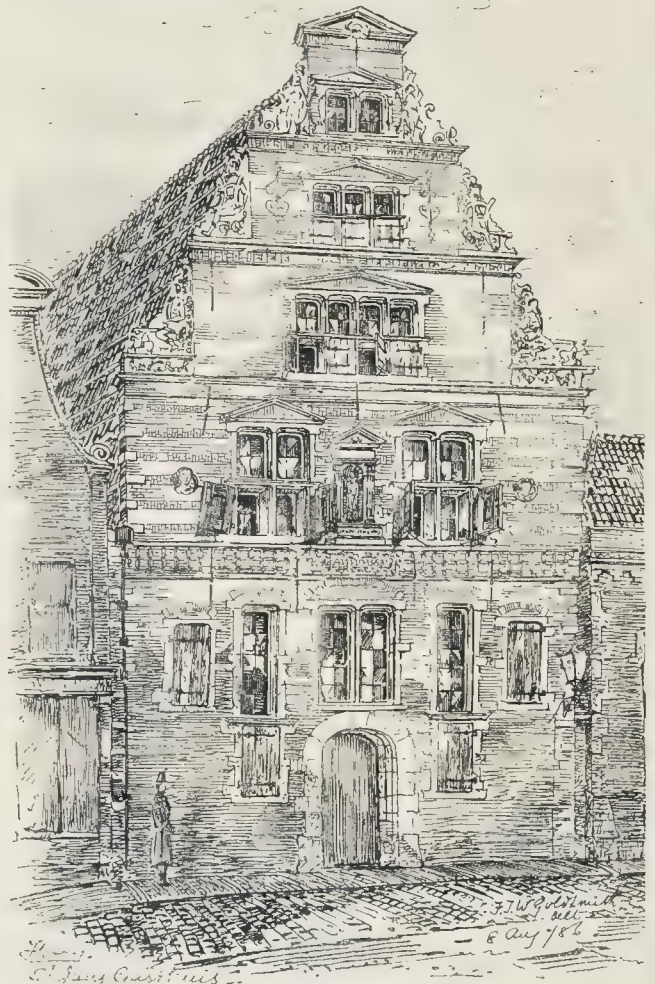
The general arrangement of plan is a front and rear block with centre area. On the entrance-floor are morning and dining rooms, and lounge, with a wide staircase-hall.

On the first floor are drawing-room and boudoir, 32 ft. by 20 ft. and 20 ft. by 18 ft. respectively. The upper floors contain the bed and dressing rooms, and the basement a suite of four servants' rooms, with offices. There are two staircases, five water-closets, and two bath-rooms. The facings are of hard bright red bricks, the dressings and bays of white stone. The style is North German Renaissance.

The contractors are Messrs. Foster & Dicksee, of Rugby, and the works are being carried out from the designs, and under the superintendence of Mr. Edwin T. Hall.

WOMEN'S FAWCETT MEMORIAL.

THE memorial to the late Henry Fawcett, M.P., is placed in the Embankment Gardens, not far from Cleopatra's Needle. It is constructed of Aberdeen granite, the central feature and the stages above the niches being of bronze. The portrait bust, a cast of which was exhibited in this year's Royal Academy, is by Miss Grant, of Chelsea. The modelling was done by Mr. George Frampton, the casting by Mr. Thos. Elaby, and the granite by Messrs. MacDonald, of Aberdeen. The general design of the whole is by Mr. Basil Champneys.



St. Jans Gasthuis, Hoorn.

THE "KING'S ARMS," 254, EDGWARE-ROAD.

THE elevation of this building has been carried out in red facing bricks, with Portland stone bays and dressings. Grey granite from the Carnseu Quarry, Penryn, has been used for the ground-floor. The painted glass supplied by Messrs. Gibbs & Howard; the enamelled iron ceiling and tile work by Messrs. Simpson & Sons; and the general works and fittings by Mr. F. Mark, builder, from the designs and under the superintendence of Messrs. C. Eales & Son, architects, Welbeck-street, W.

Our illustration is from the original drawing which was this year exhibited in the Royal Academy.

ST. JANS GASTHUIS, HOORN, N. HOLLAND.

HOORN, the most famous of the Dead Cities of the Zuider Zee, contains many interesting and picturesque buildings, mostly dating from the end of the sixteenth or commencement of the seventeenth century.

St. Jans Gasthuis, dated 1563, is a good specimen of the brick and stone work of the period.

The entrance door is wide, and the jambs

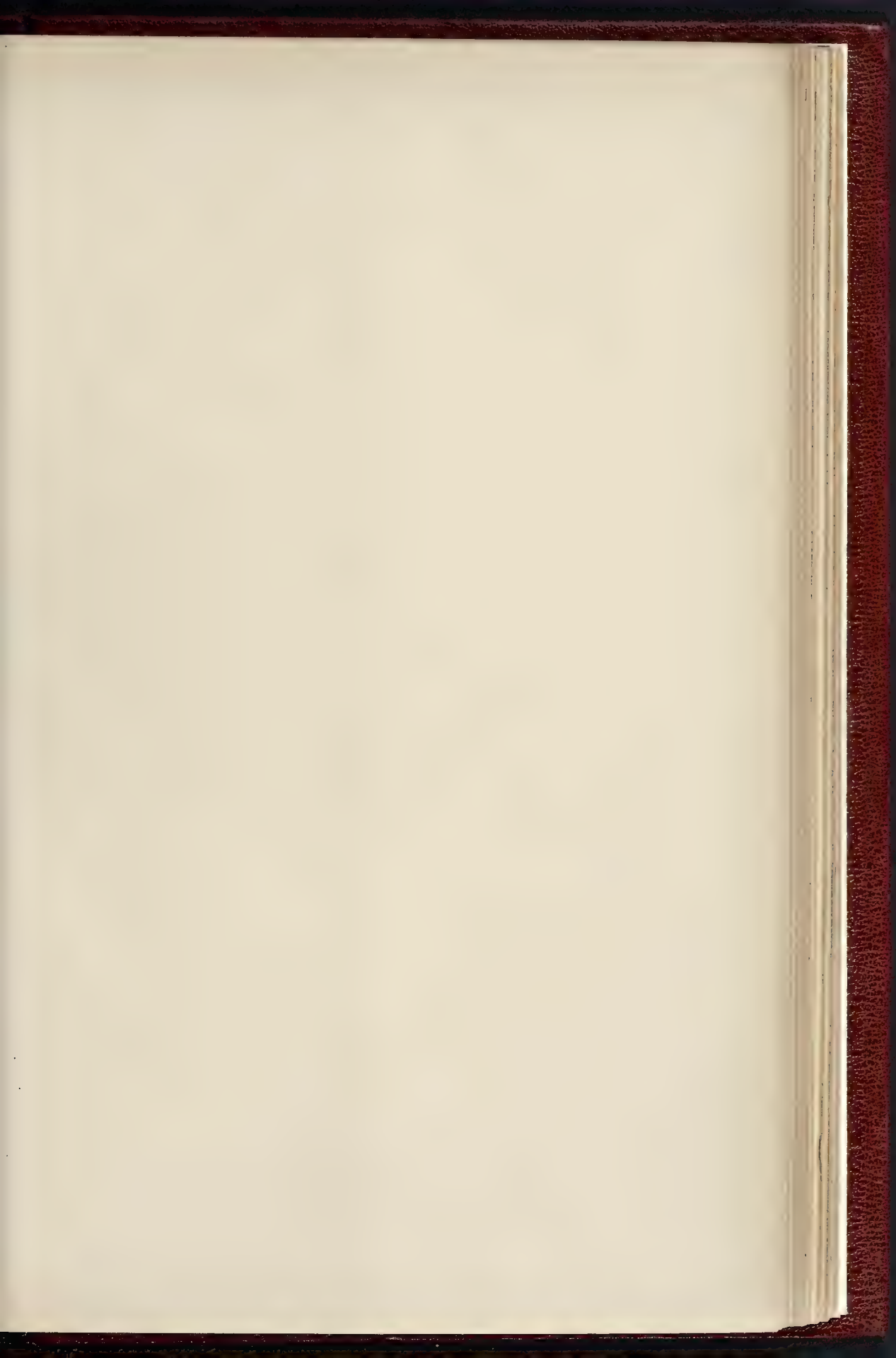
(which are parallel) are played at an angle of about 55° with the front wall. The same treatment is followed out in the window reveals throughout, a very common thing in North Holland.

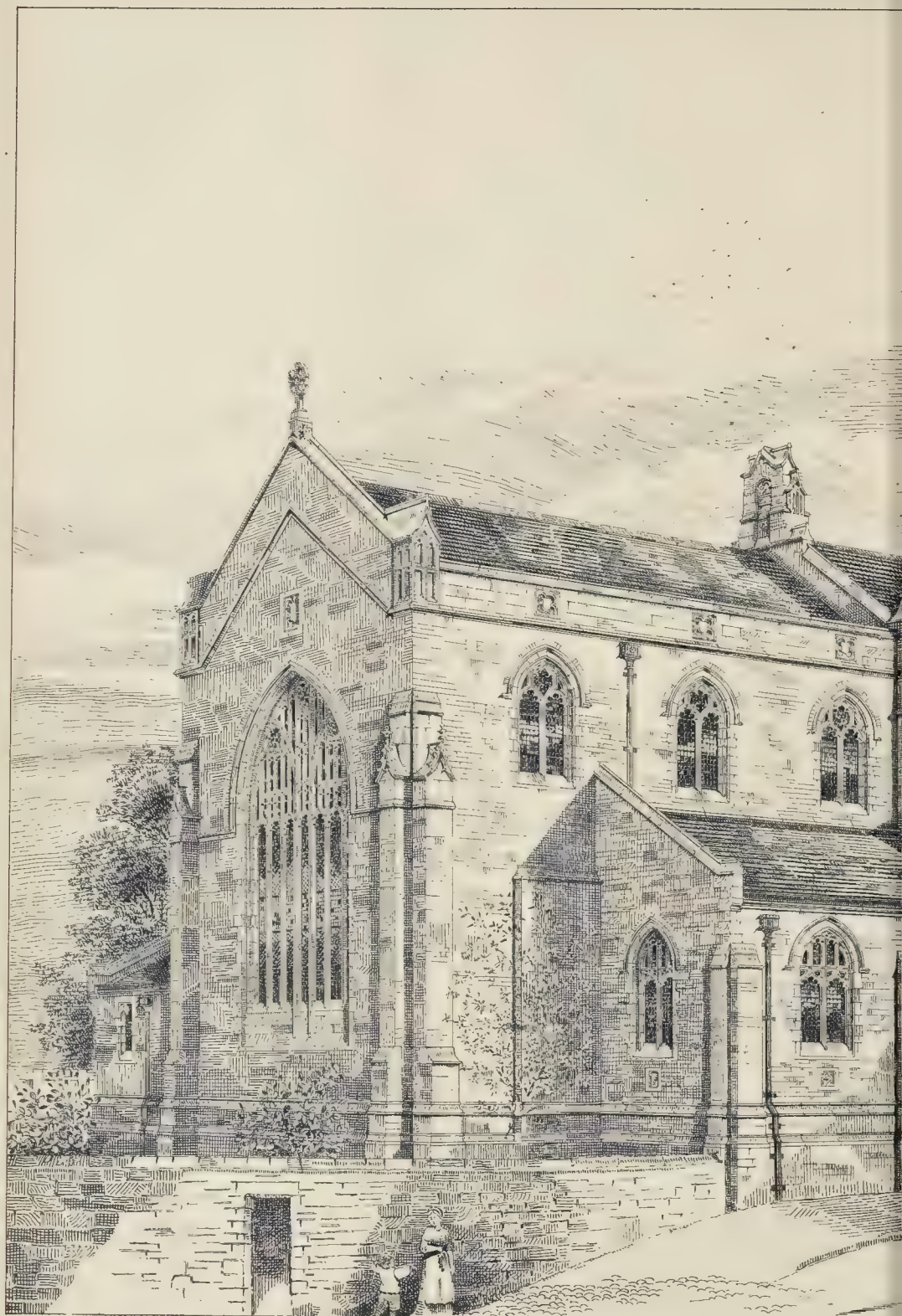
The windows in this front have stone jambs, mullions, and heads, and all the strings, bands, and quoins are stone. The window jambs, &c., have a fillet and circular chamfer worked on the angles, except the lower part, which are only rebated for the shutters, and the glass is set well behind these.

Under the second-floor windows is a frieze of brickwork, with stone strings, about three courses deep top and bottom, and in the centre of this frieze is a carved stone panel, with the date "ANNO 1563." Above this is a pedestal and niche, with a statue, probably representing St. John, and in old German lettering on the pedestal, "Dit is sint Jans Gasthuis." The wall-space in this story is divided into alternate bands of plain and ornamental brickwork, as shown in the sketch. A pattern like this is used in the bands under the windows of the fifth and sixth stories. The bricks are red, and average 8½ in. long, and four courses rise about 7½ in.

The carvings at the side gable, and all the other stonework are painted a light cream colour.

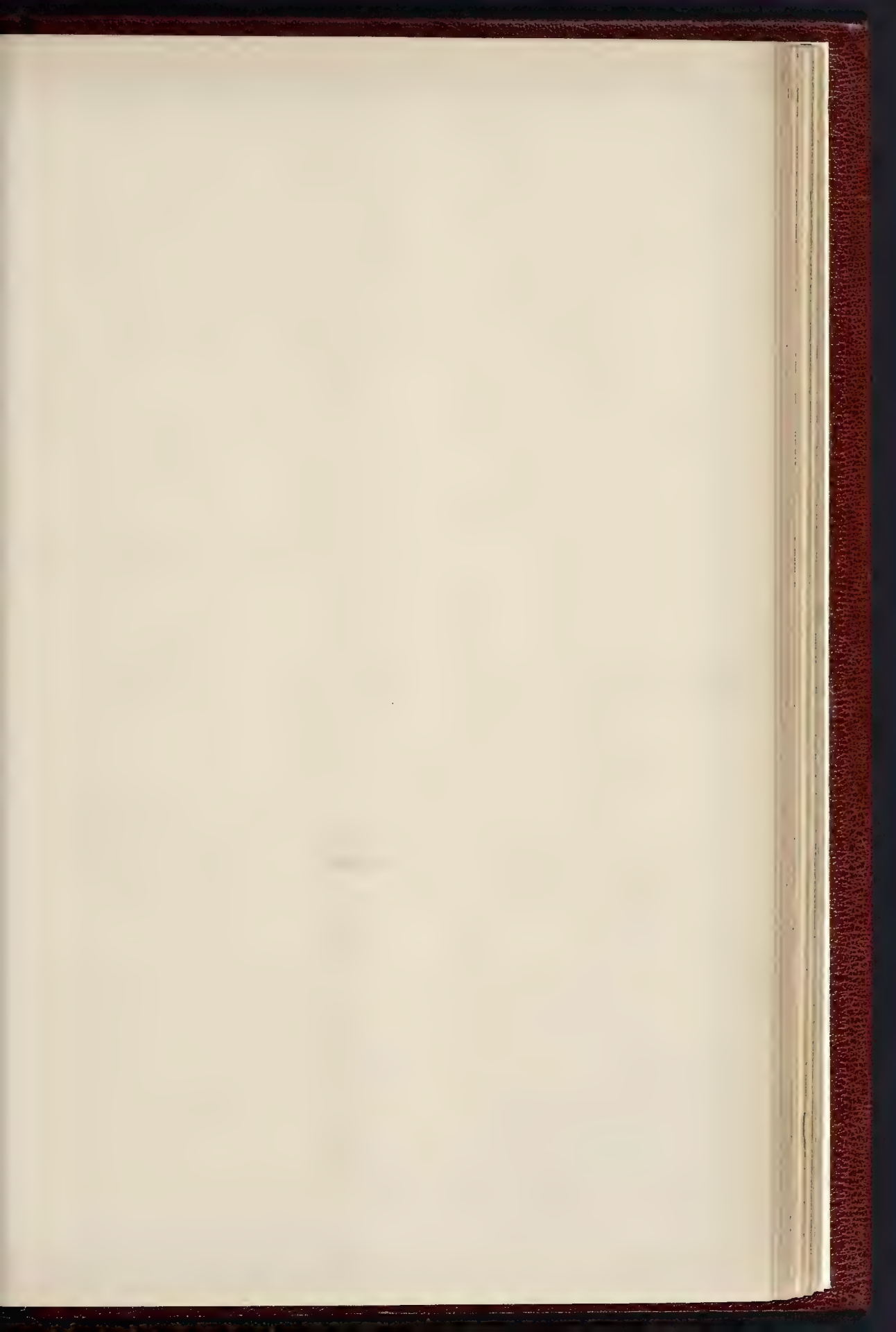
Apparently the ridge makes the same angle with the main wall as the jambs do.



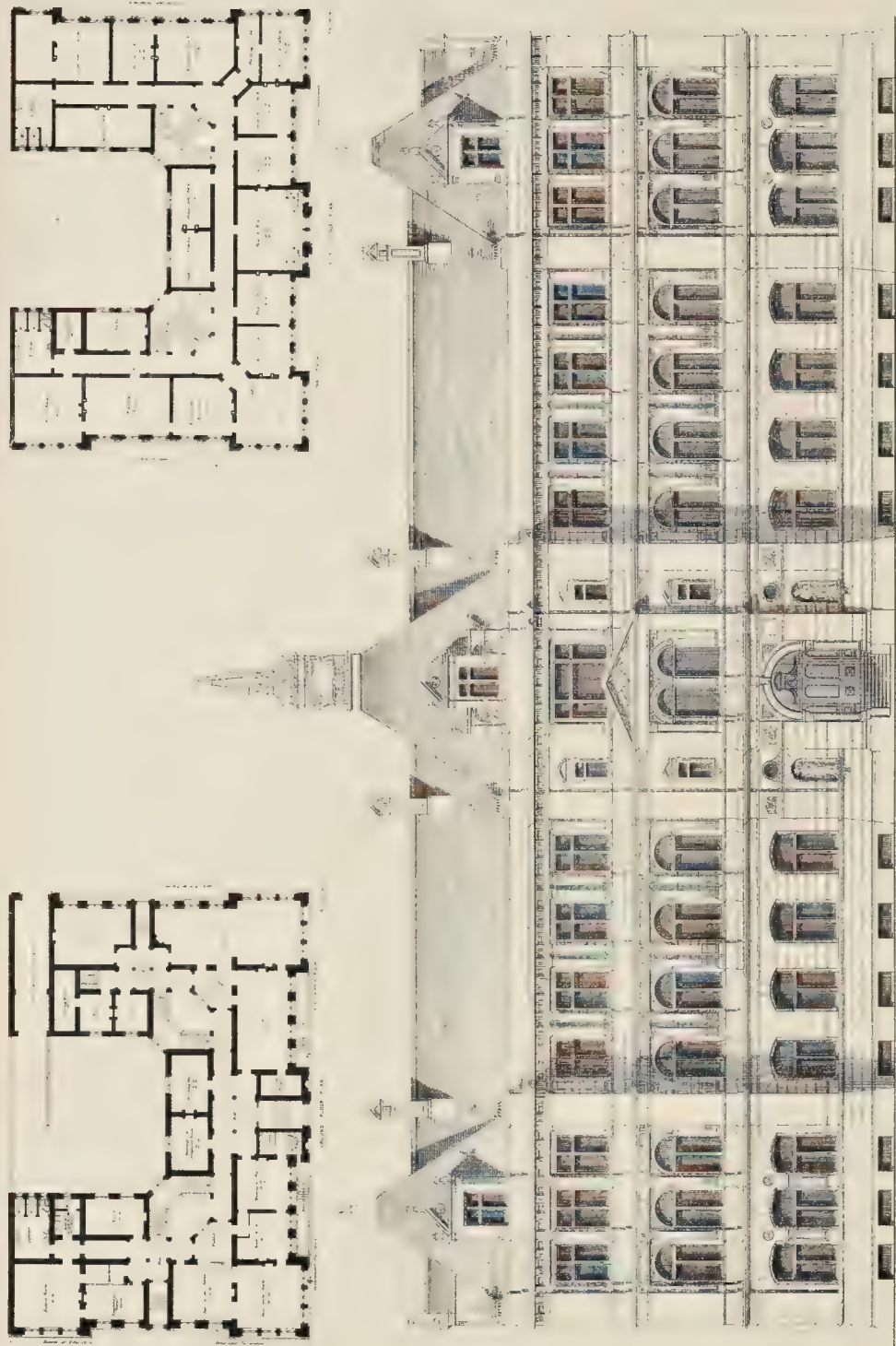


PARISH CHURCH OF ST. MICHAEL, MACAO

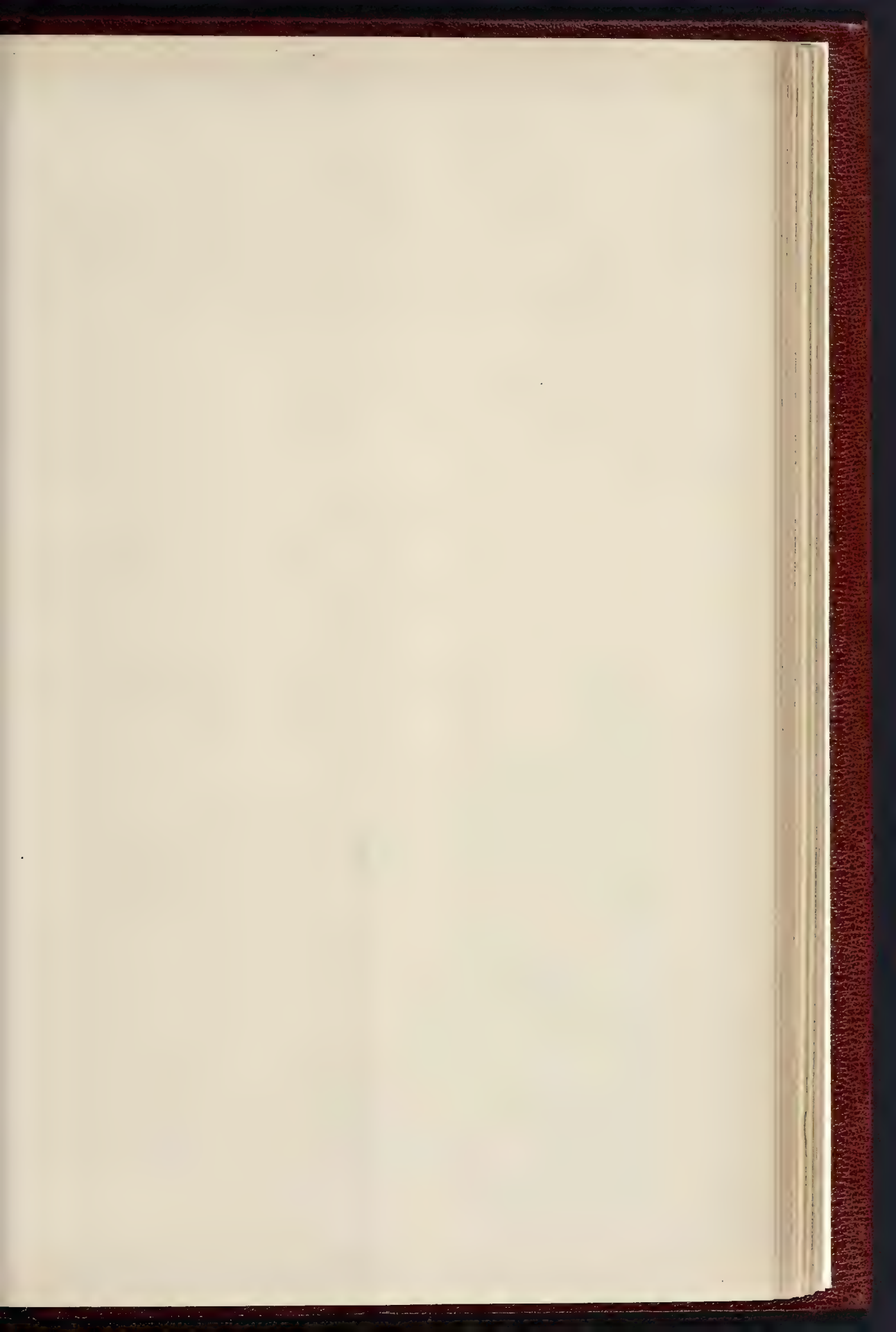




THE BUILDER, NOVEMBER 27, 1886.

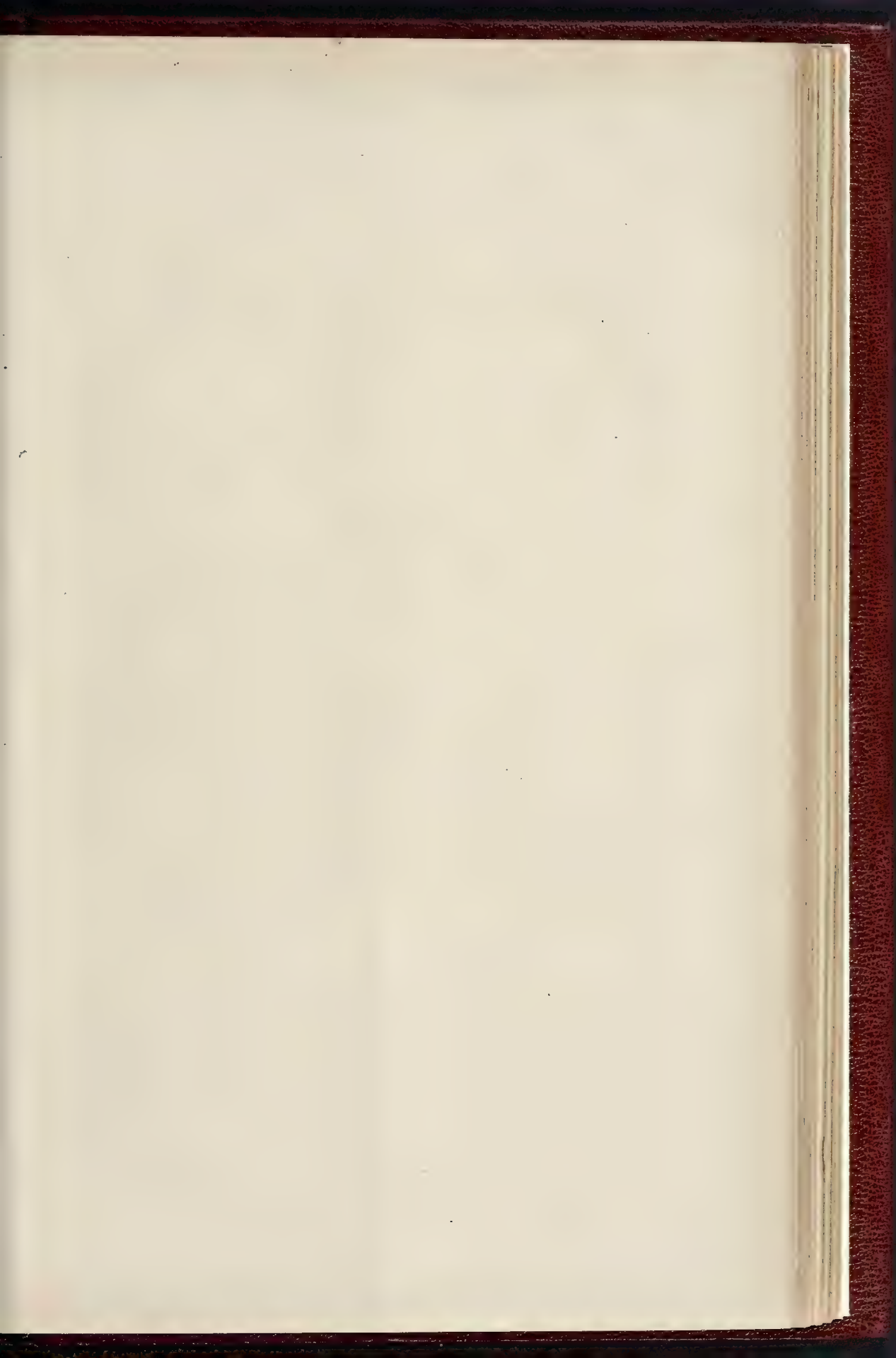


FRONT ELEVATION

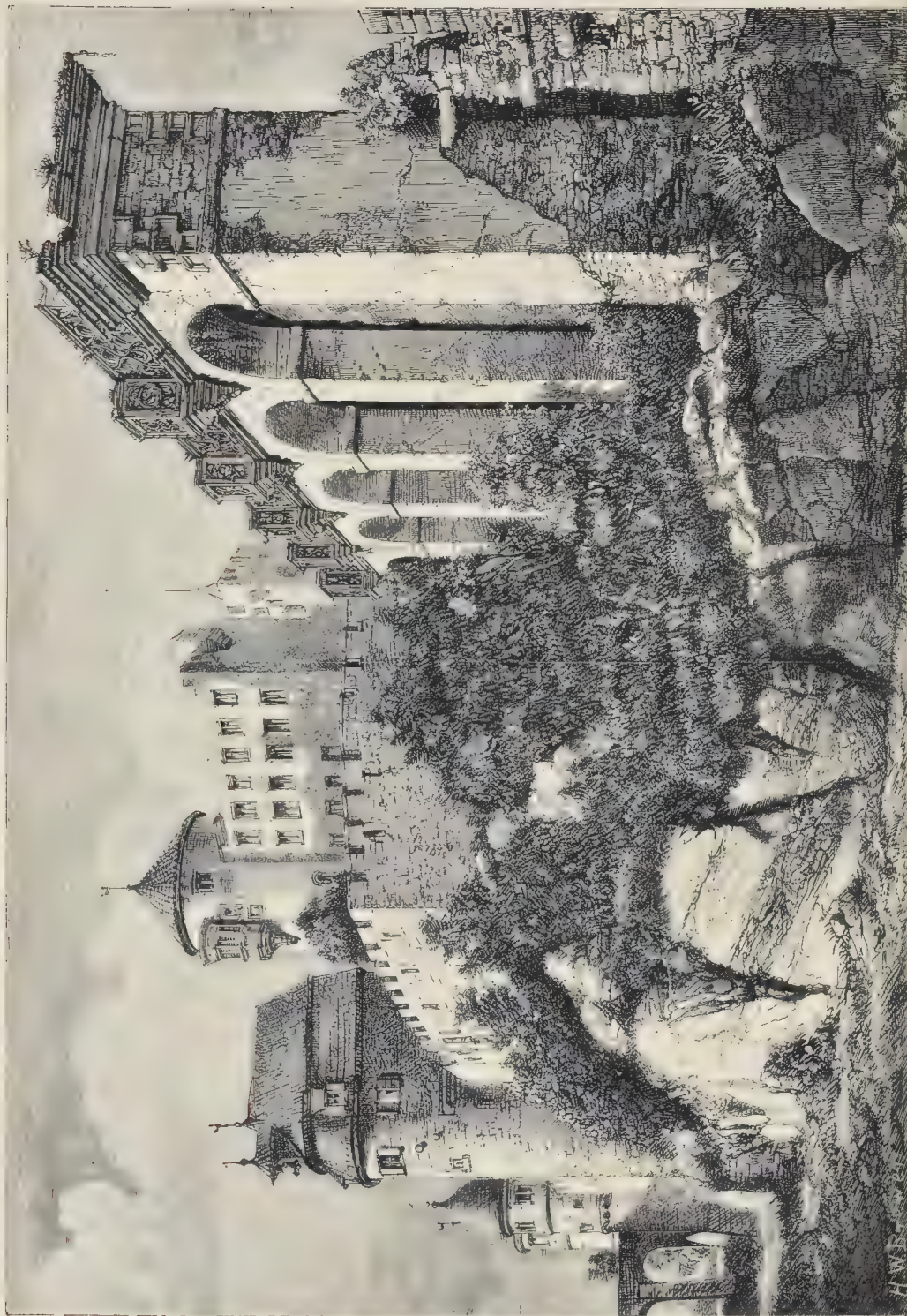


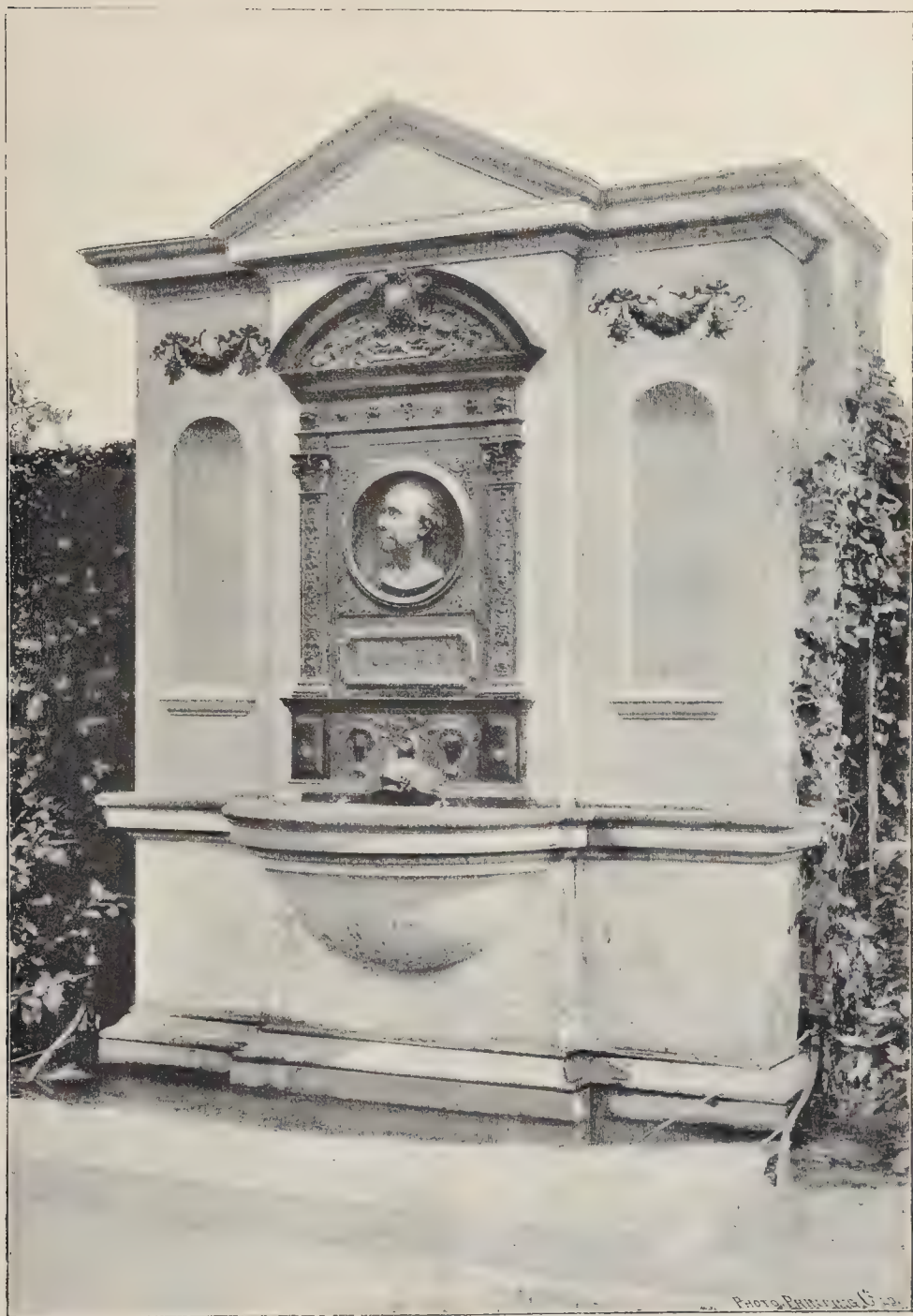


HOUSES IN PONT STREET, CADOGAN SQUARE.—MR. EDWIN T. HALL, F.R.I.B.A., ARCHITECT.



THE BUILDER, NOVEMBER 27, 1896.

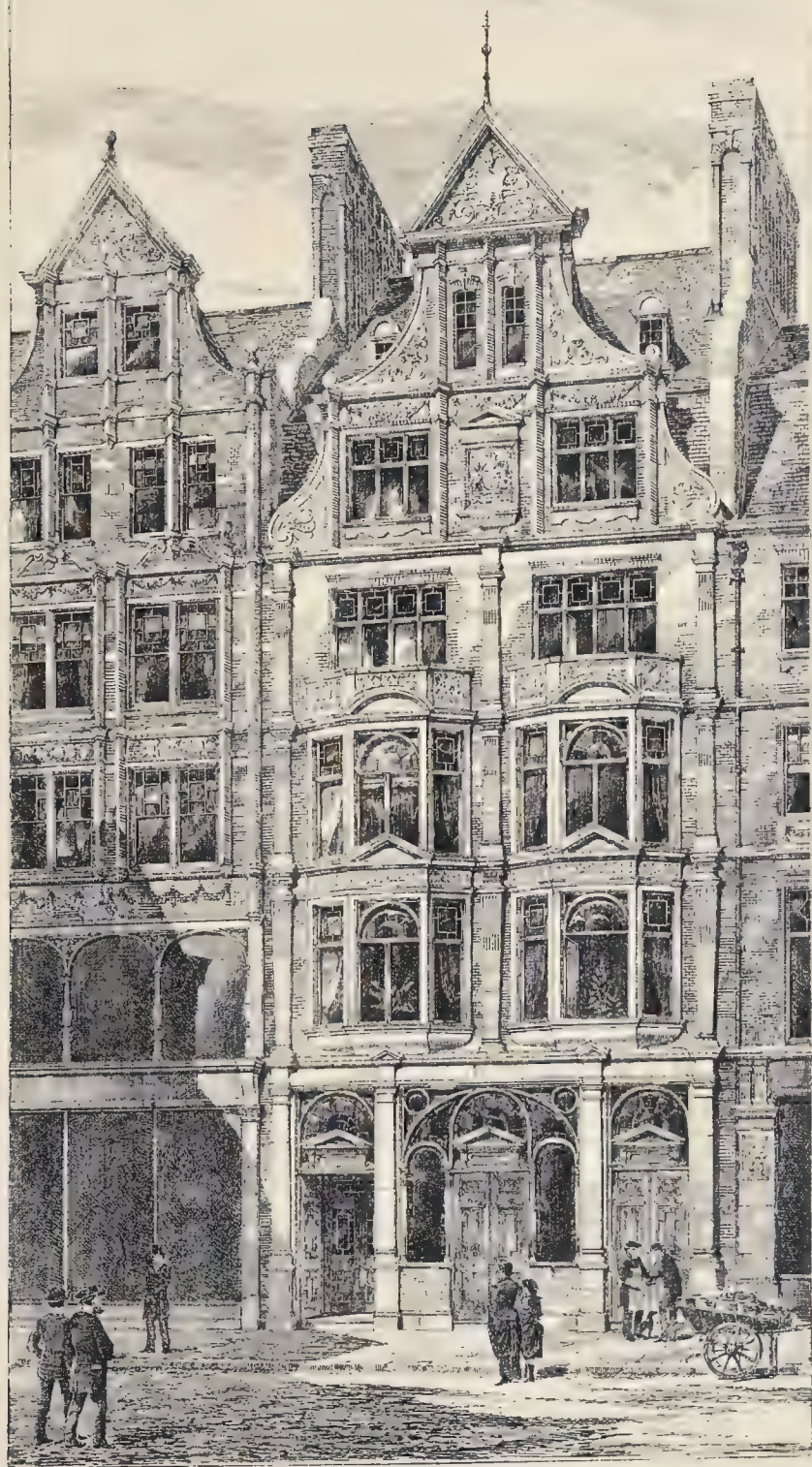




THE WOMEN'S FAWCETT MEMORIAL, EMBANKMENT GARDENS.

MR. BASIL CHAMPNEYS, ARCHITECT;

MR. GEORGE FRAMPTON, SCULPTOR FOR THE DECORATIVE PORTION; THE HEAD BY MISS GRANT.



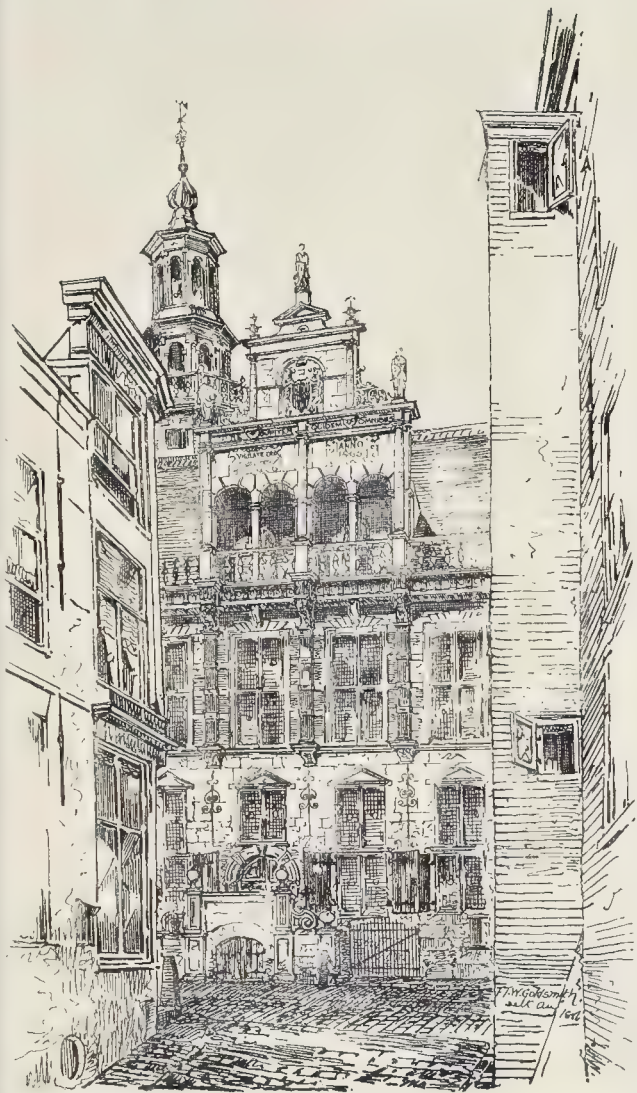
PREMISES IN THE EDGWARE ROAD.—MESSRS. C. EALES & SON, ARCHITECTS.



VIEW OF THE CHURCH BEFORE RESTORATION



PARISH CHURCH OF ST. MICHAEL, MACCLESFIELD.—MR. J. STEVENS, F.R.I.B.A., ARCHITECT.



The Stadhuis at the Hague.

THE STADHUIS AT THE HAGUE.

THE Stadhuis has been restored and enlarged. The part shown in the sketch is the oldest, and is dated 1565. The lower part is built in stone, the windows have stone mullions and transoms, and small lead-lights, like those in the upper story. This part is built of brick, with white stone bands. All the window dressings, cornels, and cornices are of the same material. The pilasters have flutings, and are divided in height into four parts by stone bands. On the caps of these pilasters rest the cornels which carry the upper part, built in a fine white stone. It is divided into two bays by Ionic attached columns; each bay has two circular-headed openings, and by setting back the wall here a balcony is obtained. Above these arches on the right is a panel with the date "ANNO 1565," and on the left "Vigilate Deo Confidentes," and on the cornice over "Ne Jupiter quidem omnibus." In the panel over the arms of the Netherlands, and on the right, left, and centre of the gable respectively figures of "Faith," "Hope" and "Charity." The fêche seen in the sketch is on the front, towards the Grootte Kerk.

This and the foregoing illustration are reproduced from sketches by Mr. F. T. W. Goldsmith.

Association of Municipal and Sanitary Engineers and Surveyors.—A meeting of the members of the Lancashire and Cheshire District is to be held at Warrington this Saturday, November 27th. Members will assemble in the Council Chamber of the Town-hall, at 11 a.m. After the appointment of an honorary District Secretary, the following paper will be read and discussed:—"Public Health Act, 1875, the 150th Section—Remarks on its operation, and suggested remedies for its defects." By Mr. W. Spinks, A.M.I.C.E., Dukinfield. In the afternoon, under the guidance of Mr. Longdin, Borough Surveyor of Warrington, the members visit Mersey-street Gas Works to inspect air-compressors for working Shone's ejectors for Latchford Sewerage, thence to Latchford, to inspect Shone's system in operation. They will subsequently visit Howley-lane Intercepting Depot for collection of excreta, Lythgoe's-lane Intercepting Depot, and, if time permits, the Manufacturing Depot at Longford, Infectious Diseases Hospital, &c.

CHURCH PLANNING.

THIS was the subject of a paper read by Mr. J. D. Sedding at the meeting of the Architectural Association on the 19th inst.

Mr. Sedding remarked that, like every other architectural topic, the subject of church-planning had its historical as well as its artistic, its technical, and its practical sides. Architecture was something that had grown with the growth and progressed with the progress of mankind. Old buildings represented ideas that had "broadened down from precedent to precedent." Historical training and personal familiarity with old work were essential to the church-planner, but it was not from its historical or archaeological side that designers usually approached the subject. It touched the practical life-work of the elder men and it touched the aspirations of the younger men. To the latter he would say: "Do not take up this or any other subject as undigged specialisms." Nowadays we had our "church," our "house," our "cave," our "workhouse," our "theatre" architect. For a young man with a future to cultivate one branch of an architect's work at the expense of the rest was bad, for it was bound to make his work groovy, modish, and partial. Places of worship were of the earliest and noblest of historic buildings. He found a certain similarity in all alike, which was incident to the common incentive for their erection. Art and religion here joined hands. A creed was, after all, something to a man if it could prompt even the heathen to reverence and sacrifice. Heathen temples had always made noble Christian churches, because the heathen was in noble mood when he built them. There was such a variety of types of churches, each type having its own nursery-ground of local initiation and its sequel of wider influence when transplanted into the great garden of the world that he must leave the subject of the underlying motif alone, beyond sending his hearers, for reference, to Willis's "Architectural History of Canterbury Cathedral" which gave an admirable insight into Early church-planning. But to speak of the Basilican type of our churches and of the "Canterbury Influence" was to tell only half the tale. For the rest, his hearers should go to Mr. Micklethwaite's capital little tractate upon "The Growth of English Parish Churches." He would also refer them to Mr. G. G. Scott's valuable "History of English Architecture," and to Mr. Birch's learned treatise "Concerning the Fabric of the Church and the Form thereof," in the "Transactions of the St. Paul's Ecological Society." It was his purpose now to glance at the development of primitive types of church-planning, as seen in different countries. In northern lands there were the churches of Canterbury, Wells, Mailbronn, Gelnhausen, Noyon, and Albi,—all typical, and all with their screens and nave altars. The Italian type is very different, even though monastic hands reared these fabrics as well as those already named. The characteristic of the two Florentine churches of Sta. Croce and Sta. Maria Novella, and the church of S. Domenico at Siena, is that these churches took the shape of the tau (T), there being practically no upper arm to the cross that forms the basis of the outline of the church. Further, in the southern type nearly the whole of the church is given up to the people's use, while in the northern type the choir and sanctuary, which the monks and canons appropriated, consumed usually a full half of the whole church. Our parish churches were largely built by, or under the direct influence of, the monastic orders, the Benedictine influence being very prevalent. Mr. G. G. Scott summed up what, in his opinion, were the characteristics of parish churches thus:—(1) square end; (2) transepts lower than nave and not forming a crossing bay in the nave; (3) central western tower. Mr. Scott holds that, with rare exceptions, a tower should always be on the centre line east and west, either at the crossing or in the centre of the west end, the former being the collegiate or conventual type, the latter the parochial. Looking at church-planning as a practical science, he (Mr. Sedding) would say that a plan of a house of God should be fashioned to express and to evoke reverence; it should be simple and dignified, convenient without sacrifice to its devotional aspect; it should be beautiful yet useful; it should never lose a certain savour

of old times to remind church people of their long ancestry, yet all the while it should smack of the practical ideas of the present to secure a sense of reality; and it should suit equally the wants of ministers and people. That was the *rationale* of modern church-planning as he understood it, and, in view of all that, he would say a word upon the errand of the architect who built new churches or restored old ones. When he went into an old un-restored church which was chock-full of incongruities that shook the pedant's nerves, he was not a bit disturbed. He saw the slow accretions of slovenly times and the result of the Puritan inundation. There was a conglomeration of churchwarden naughtinesses innocently done, whose abstract propriety it never occurred to people to question when they were so familiar with them. But a faultily-arranged cathedral or parish church, modern or restored, made one gnash one's teeth. When he found,—as, alas! in nearly all the choirs of our cathedrals, and in a majority of parish churches,—the building huddled up with fittings that obscured architectural features, that prevented orderly movement, that ignored attainable artistic effects, that hindered the observance of liturgical rule, that produced disorder and took away the dignity of the building and all sense of sanctity, when one found altars jammed up or glued to east walls and their view intercepted by furniture, steps ill-disposed, higgledy-piggledy seats cramping passages, and things standing where they ought not,—then he traced a bungler's work; then he knew that however long the tail of initials attached to his name, the architect was deficient in skill, or care, or knowledge, or artistic or religious sense. "Some one had blundered," and the "some-one" was the blind architect who led his blind clients into this doleful ditch. Of course, one must not expect perfection in a revived science that was based for the most part on the results of recent ecclesiastical research and the experiments of a few able architectural practitioners. He was bound to say that there was some excuse for ordinary practising architects, for they had really had no proper technical instruction: what they knew they had picked up for themselves. Moreover, in the conduct of church work they mostly had to do with committees, and even supposing that they (the architects) knew their business, the principles of church-planning were as much in the committeeman's line as the counsels of perfection. The committeeman was utilitarian or nothing. Like the man in a popular play, he "wants to sit down" in church, and wants to provide for others to "sit down," regardless alike of the purpose or the capacities of the structure. Philistinism of a scarcely more intelligent kind was sometimes found even in diocesan boards and in architectural boards of church-building societies. After showing that an architect might often get his own way by a common-sense way of putting his case to objectors, Mr. Sedding went on to say,—

As I am addressing young students, presumably for their edification, I will venture to give a hint or two upon planning and then proceed to demonstration. In planning a new church, having settled your general proportions, begin planning at the altar. This is God's house, and there are certain matters connected with the decencies and dignities of worship which are arbitrarily required, and it is well to comply with these at the outset. The altar will be of variable length, from 6 ft. upwards, to suit the width of the church, and from 3 ft. 3 in. to 3 ft. 6 in. high. One finds the tables of modern altars as much as 3 ft. wide, even where the space in front is cramped for room; but 1 ft. 9 in. or 2 ft. is ample for the ministrations of the priest. The footpace, or *placem*, should never be less than 3 ft. clear in front of the altar; and the deacon and sub-deacon's steps from 2 ft. wide. Having arranged for these three steps, as many more may be added as the size and character of the church demands. The method of returning the upper steps is rarely found in old English churches, the Benedictine builders used to carry all the steps across the chancel unreturned at the sides, as may be seen, for instance, in Gloucester Cathedral at the high altar and the Lady-altar. A common but cruel error, both for priest and communicant, is that of placing the communicant's rail on the topmost of two steps set close together. I have economised space in planning a new chancel by making the low chancel screen do duty as communicants' rail, as one sees done abroad. I

need not here urge what is becoming a thing generally accepted as needful and right,—a second altar for early celebrations. I remember that on our Oxfordshire excursion we came upon several churches where second altars were provided, and the practice commended itself even to some of us who are not churchmen as both convenient in itself and as adding wonderfully to the artistic interest and furnished character of the sacred building. Vestries should be large and conveniently placed. It was the Bishop of Liverpool who said the other day that modern vestries were mostly like the Black Hole of Calcutta!

Chancel seats vary according to the size of the church. I do not know that we gain much by having return stalls, except by pleasing what the Americans call our desire for "archaeological accuracy." But I should always put them in an old collegiate church, and wherever desired by the bishop. Avoid the isolated person's desk in the chancel, it is an abomination. Put it out in the nave without a scruple if it is wanted. My notion of a really popular service is, however, to have the minister in the pulpit as they do in Nonconformist chapels and Roman Catholic churches. Avoid ugly gaps in chancel or nave seats. The chancel seats in new and restored churches mostly give one the impression of having been chucked down by the carpenter when the dinner-whistle went, and he never finished his job. Surely, as in houses so in churches, furniture should fit into a place. I know that Mr. Redtape would be shocked to know that any one advocated the hacking away of stonework, in order to fit your seats into their places; but, then, he is a man accustomed to strain at gnats and swallow camels. What the old masters did I do, and for the same reasons, and in the same unscrupulous manner. Nave and aisle passages should be as wide as possible,—aisle passages never less than 5 ft. wide, to allow for processions, if you can get the room, and always provide a good space in front of the chancel screen, and an unbenched bay at the west end of the church if possible. That there should be screens to fence off the chancel from the rest of the church, both a sense of reverence and an eye for art would seem to demand. A high screen always gives interest and scale to a church. What a pitiful sight is an old cathedral victimised into an unobstructed tunnel for the sake of a vista: why, one can get a longer vista down Gower-street any day! As to screens, the question whether your screen is to be high or low, close or open, should be determined by reference to the character of the people for whom the church is built. Cultivated people like high close screens of wood or iron; poor people like low screens, or open screens, if high; and they like a large rood, with the figure of the Saviour upon it, and this will either rest on your high screen, or, if there is no high screen, upon a trussed beam across the church. Always endeavour to get parlous screens: they add much to the artistic effect of a church where there are arches opening into chancel aisles.

The question of galleries is growing in importance. The churchman does not like them because they smack too much of the auditorium, with their stepped seats varied in height, and the architect thinks they are apt to destroy dignity. But where they are in the mind of the architect from the first they can be made to produce excellent effect. Mr. Pearson's churches at Kilburn and Red Lion-square show what effects can be got by galleries by a skilled architect. The Jesuits' Church at Antwerp gives an admirable treatment of galleries where they have even got altars at the east end of galleries. A most interesting Mediaeval example of galleries is to be found in the Church at Flavigny, in France, where galleries stretch over three south aisle chapels, at the west and east ends of the nave. (See King's "Mediaeval Architecture," vol. i.)

I venture now to give a few detailed examples from cases that have arisen in the course of one's own practice. An ounce of demonstration is worth many pounds of theoretic talk. I spoke just now of the misery of a pinched sanctuary. The treatment I have followed at St. Matthew's, Sheffield, and hope to shortly carry out at another modern church, St. Bartholomew's, Bethnal-green, is to add to the length of the chancel by absorbing into it the first bay of the nave. True, I am taking from the body to give to the head, but the head was disproportionate, and I am only making it of the proportionate size it should have been at the first.

In the case of a new church the local committee objected to the waste of space in my sanctuary, which was really not an inch too long. So I reduced it by bringing the east wall 6 ft. further west, and I took a corresponding space out of the nave beyond the structural chancel, and so it is built, and every one is pleased, myself included. At Henley-on-Thames I have to deal with a somewhat difficult problem. Here is a church with a peculiarly scattered wide plan,—a church with nave and double aisles (one a modern aisle), and the chancel a mere tunnel, with choir-seats so closely packed together that you can barely sit in them. If there is to be a "popular" service with a large choir here, it is clear that the choir must be brought out of the tunnel into the nave, which is what I propose to do.

At Box Church, Wilts, is a case of even more problematic character. Not only is the chancel very narrow, but the central tower is narrower still, only 12 ft. across, and the tower arches very low. To complicate matters, the church demands extension. The radical "restorer" would pull the old tower and chancel down, which ought never to be done. By bringing the choir west of the tower, and by forming a sanctuary under the tower, this destruction is avoided.

At Axbridge, where there is a long chancel and central tower, and wide nave with nave aisles, we have brought the choir under the tower. But in this and the other cases the old single row of stalls with "returns" have been restored in the old structural chancel. In Axbridge Church, as at Chard, the altar is projected some feet from the east wall. Practical reasons, such as affect the ordinary administration of worship, seem to me to justify such disturbance of the nave or chancel arrangement as I have indicated. No structural alteration is entailed in either of the cases named: in fact, the old structural chancels are made as they were in time past, return-stalls and all. Of restoration generally I would say,—save all you can of the immediate past, recover all you can of the far past, and accommodate things as well as you can to the wants of the living church at the least cost to the history of the building.

I had purposed to make a few detailed remarks upon the subject of cathedral church planning, and with Mr. Beresford Pite's valuable collection of cathedral plans before me, it is hard to resist, but time will not permit. On one point only I should like to say a word. At the outset we considered church-planning (including cathedrals) historically, and afterwards we dwelt upon its practical side. Now it seems to me that if there is one feature more than another that has historical and practical value in our cathedrals,—one feature that connects them with the past, and renders them practical for Divine worship of the approved popular kind in the present day,—it is the choir-screen. There is a wonderful consensus of opinion among both ecclesiastics and architects about the folly of our cramming our ordinary Sunday congregations into the choirs of cathedrals. No one defends the practice. Every one knows it to be in direct violation of the intention and true capacities of the fabric, and yet in desiring to mend matters the thoughts of reformers run only upon destructive and not upon constructive lines. They like to be radically original, to show what bold reformers can do! There are two ways of meeting the difficulty about the choir-screen that cuts our cathedrals in twain. The first way is to shirk the root of the matter by doing something that, while it relieves the strain upon the choir, does not really advance the popularity of the service in which a nave congregation is supposed to participate. The present undignified huddled-up arrangement of a cathedral service in choir is "popular" just because it is centralised,—altar, singers, canon, congregation,—all together. But once decentralise the service, and the "popularity" of the service is gone. The altar, the singers, the canons are far away. To cultivated people who use service-books it does not much matter whether the altar is 400 ft. or 500 ft. distant. Their minds follow what their ears cannot catch; but to poor people everything should be centralised, open, and easy of access. To remove the screen, then, is not to untie the knot, it is only to cut it!

It is a scandal to the English Church that she cannot make the naves of her cathedrals as useful for Sunday popular services as the choirs are for the week-day choir-offices. The old builders knew their ground: they knew

what they wanted, and they provided it. The old builders had to meet precisely the same case as ours,—they had to provide a popular service for the people in the nave, and so they put a people's altar in the nave,—perhaps under a canopy,—and if we were not so pig-headed and prejudiced nowadays we should meet the same identical needs by using the same identical means. Lord Grimthorpe has done many execrable, foolish things at St. Alban's, and has given to the nineteenth century a supreme example of how *not* to restore a historic building; but at least to him be given this negative praise,—he has not yet removed the nave altar and high stone screen behind it.

Mr. Sedding then proceeded to refer to, and comment upon, in general terms, the interesting and instructive collection of modern church plans kindly lent to him for the purposes of the lecture. The first thing to note was that Gothic still held the field for churches, as was to be seen in the work both of the elder and of the younger men, of the provincial as of the London architect, of the Roman Catholic as of the English Church designer. Amongst the plans exhibited and referred to were those of Mr. Norman Shaw's Church at Bedford Park; the late Mr. Street's Church of All Saints, Clifton; Mr. Norman Shaw's design for the Harrow Mission Church; Mr. Pearson's Church of St. Augustine, Kilburn; Mr. Bentley's new R.C. church at Brixton; Mr. Bodley's church at Roath; Mr. Waterhouse's church at Red-ditch; Mr. Gilbert Scott's church at Leamington; three churches by Mr. Ewan Christian,—viz., All Hallows, Bromley-by-Bow, St. Matthew's, Cheltenham, and St. Dionis's, Parson's Green, Fulham;—Mr. Johnson's church at Gosforth; Mr. Blomfield's church at Portsea; Mr. Fergusson's plan for the Church of St. Nicholas, Whitehaven; Messrs. Somers Clarke and Mickelthwait's churches at Gainsborough and Horbury; Mr. William White's new church at Battersea; Mr. Nicholl's plan for Wellingborough R.C. church; Mr. Tasker's Conventual Church at Highgate; Mr. Ernest Lee's church at Brentwood; and churches by Mr. Leonard Stokes, Mr. N. Wilson, and Mr. Vacher. In concluding his paper, Mr. Sedding said that a review of the church plans above enumerated afforded much cause for congratulation in the character of the "Gothic" they presented. It was not bloodless and simply reminiscent as it used to be, and there was much that was original that was at the same time a true complement of traditional work. With so much sign of vitality before them, who would talk of confiscating the hard-won laurels of the Gothic school? The evidence of free handling one saw here and there was a clear justification for holding on to the study and practice of Gothic as one of the styles that, where suitably used, could aptly and grandly render nineteenth-century thought. Another matter of congratulation to him (he spoke here personally only) was that the ground plans evidenced the recovery of the English church from the blighting malison of the Puritan. The plans exhibited looked like those of houses of God, and not merely like places for people to hire pews in. Let his hearers take away from the consideration of this intricate subject three simple lessons. Firstly, let them remember, in the words of Pope,—

"Something there is more useful than expense,
And something prettier 'er'n to taste,—his sense."
Secondly, let them see that, though their works in church-planning might be small, they brought a large spirit to bear upon them. Nothing was petty in church-building. The smallest details might be done well or ill. Thirdly, let them, while working in the wild scurmage and hurrying bustle of nineteenth-century life, remember that their churches had still their ancient signification. Let them so work that Kingsley's words might ring in the minds of worshippers,—

"All without is mean and small,
All within is vast and tall;
All without is harsh and shrill,
All within is hush'd and still."
If they would realise the true meaning of a church they would be better architects in purpose and achievement. Their calling would gain dignity, their minds would learn more pliancy; their art would take higher range; their buildings would be more inspiring in themselves and be more serviceable to their fellow men. He that planned a good church was the friend of God and the friend of man.

[Some notes of the discussion which followed will be found on another page.]

NEW THREAD MILLS, PAISLEY.

Messrs. COATS, one of the principal thread manufacturing firms on the Clyde, are now erecting new mills which will give employment to several thousand females in addition to the 6,000 already engaged in thread-making in Paisley. The new building has a frontage of 392 ft. in length, with a depth of 132 ft.; and the parapet is 95 ft. above the ground. It consists of five stories; the ground floor being occupied by warehouse room, and by accommodation for scutching and carding. The first-floor will be occupied partly as bale and mixing-rooms, and partly for spinning purposes. The second and third floors will be devoted to spinning; and the top floor to spooling, hank-winding, ticketing, and packing. On this floor alone 700 hands will be employed. There will be three grand staircases, and five hoists. The foundation is of stone; the superstructure of red pressed brick from Wortley in Yorkshire. The interior is lined with white glazed bricks. The construction is fire-proof; rolled girders and joists being laid with cement concrete 8 in. thick; the stairs are of concrete, laid on wrought-iron. The engine-house is 80 ft. long and 38 ft. wide, to contain a pair of patent tandem engines of 1,600 horse power. The fly-wheel is upwards of 100 tons in weight, and 35 ft. in diameter; and has forty grooves for ropes to drive the machinery of the mill. The chimney, octagon in shape, is 300 ft. high, and 42 ft. in diameter at the base. It is built of pressed bricks. A spool-house, yarn-store, and gate-house have been erected in connexion with the mill, and schools for the half-timers are in course of erection. The second of these great buildings is an addition to the Anchor Thread Mills, which is being erected by Messrs. Clark & Co. The several floors and the flat roof are constructed on Homan's patent fire-proof system, which combines wrought-iron with Portland cement. The concrete used is so fire-resisting that a slab of it was put into a furnace and exposed to the heat for thirty hours, at the end of which it was found intact, and required a heavy sledge hammer to break it up. For 6 ft. above the floor, each story is lined with a new fire-resisting alabaster cement, known as Robinson's cement. There are five floors, the area of each being about 3,500 yards. The ground and top flats are each 18 ft. high, and the other flats 15 ft. 9 in. There are 173 iron columns on each floor, or in all 865. If joined end to end the main girders would be $3\frac{1}{2}$ miles in length, and the rolled iron joisting, if placed in the same way, would measure 23 miles. The building, which will cost some hundred thousand pounds, is to be devoted to the purposes of finishing and warehousing. The engines, having 25-inch and 41-inch cylinders, will indicate between 400 and 500 horse power. There are at the present time in connexion with Messrs. Clark's mills nearly a quarter of a million of spindles, and their annual output of finished cotton reaches the total of 1,875 tons. The mills are at present driven by engines of 8,500 horse power. The production of thread in Paisley has nearly trebled since 1872.

The Late Mr. Valliamy.—At the last meeting of the Metropolitan Board of Works, Mr. E. Lawrence moved:—"That it be referred to the Works and General Purposes Committee to consider and report as to the desirability of obtaining power to pay to the widow of the late Architect (who served the Board upwards of twenty-five years) one-half of the commutation value, according to the Government tables, of the pension that had been voted to him." This was seconded. After some discussion, Mr. Shepherd moved, as an amendment, that it be referred to the Works Committee to consider the question of the superannuation allowance recently voted to Mr. Valliamy, and report to the Board thereon. This was seconded and accepted by Mr. Lawrence, and was carried by 21 votes to 8.

Obituary.—The death recently took place of Mr. Ambrose Poynter, who had attained to a great age. He was appointed one of the three referees, "Official Referees" they were called, under the Metropolitan Building Act of 1844, 7 & 8 Vict., c. 34. This Act worked very badly, and was superseded by the Act of 1855. The Official Referees were pensioned, and Mr. Ambrose Poynter has enjoyed his pension ever since. Of late years he has been blind, but otherwise has had good health. He was the father of Mr. E. J. Poynter, R.A.

BUILDERS' BENEVOLENT INSTITUTION.

An election of pensioners on the funds of this Institution took place on Thursday afternoon last, at Willie's Rooms, St. James's, Mr. Basil E. Peto (President) in the chair. There were two vacancies for men, for which five candidates applied. The following is the list of the candidates, with the number of votes polled for each, according to the report of the Scrutineers (Mr. Thomas Stirling and Mr. T. F. Rider), viz., Ebenezer Robinson, Camberwell, aged seventy-two, builder, 1,784 votes (including 953 from last election); James Pickering, Clapham, aged sixty, builder, 318 votes (including 74 from last election); John Emery, Kentish-town, aged sixty-five, builder, 1,799 votes (including 200 allowed for former subscriptions); Edward T. Roberts, Wandsworth, aged sixty-seven, builder, 786 votes (including 60 allowed for former subscriptions); and George N. Cott, Brixton, aged sixty-eight, builder, 227 votes.

John Emery and Ebenezer Robinson were therefore declared to be the successful candidates.

Mr. T. G. Smith proposed, and Mr. Richardson seconded, a vote of thanks to the chairman; a similar compliment being paid to the scrutineers, and to the other gentlemen who had taken part in the proceedings.

THE OFFICE OF SUPERINTENDING ARCHITECT.

At the meeting of the Metropolitan Board of Works on the 19th inst., Mr. Geo. Edwards, Deputy-Chairman, moved, on the recommendation of the Works Committee:—"That the resolution of July 2nd, 'that the salary of the Superintending Architect be 1,500*l.* a year, inclusive of travelling and incidental expenses,' be revoked."

A long discussion followed for and against the motion, which was ultimately carried by thirty as against thirteen. On a division the motion was confirmed by thirty as against twenty-one.

Mr. Edwards then moved:—"That the resolution of the same date, 'that the age of the person to be appointed to the office of Superintending Architect be not less than thirty-five, and not more than fifty years,' be revoked."

This was carried by thirty-eight to four.

Mr. W. R. Selway then, in pursuance of notice, moved:—"That the resolution of the Board of the 2nd of July, 'that the duties of the office of Superintending Architect do remain as at present,' be revoked." He reminded the Board that the appointment was made under the Building Act, and the Superintending Architect's duties were defined in relation to certain proceedings of District Surveyors, and it was expressly declared that he was not to undertake any other duties excepting such as the Board might impose upon him. The Board had, however, travelled very widely from the regulation mentioned. When the late Superintending Architect was appointed, he had nothing else to do but to discharge the duties of that office, but the Board afterwards gave him the charge of regulations re petroleum and the supervision of "baby-farms," but of those and other anomalous duties he was subsequently relieved. The duties at present imposed by the Board upon the holder of the office were thus enumerated by the hon. member:—"The superintendence of the work of seventy-one district surveyors, the consideration of a yearly average of 300 cases of frontage questions, 100 plans of new streets, applications for special buildings, dangerous structures, the charge of the architectural design and construction of all the Metropolitan Fire Brigade Stations, the superintendence of over 1,900 acres of parks and open spaces, the direction of the requirements of theatres and music-halls, respecting construction. The direction of the construction of artisans' dwellings; and in addition to these there was the management of all the estates of the Board. Six millions and a half of money, or over a million a year upon an average, had been expended on property required in connexion with street improvements, bridge approaches, artisans' dwellings schemes, &c., and for the valuation of all this the Superintending Architect was responsible. The Board's estates, from which there was a revenue of 100,000*l.* a year, and other estates not yet dealt with of the value of 2,055,000*l.* odd, which would bring another recompense of half a million yearly, were also under the supervision of the late Superintending Architect. Under these circumstances, he (Mr. Selway) was strongly of opinion that what ought to be

done was to re-arrange the Architect's Department, as it appeared to him that one man was unable to attend to its present multifarious duties.

Mr. J. Jones seconded the motion, which, after considerable discussion, was lost by 26 to 22 votes on a show of hands, and by 28 to 22 on a division.

THE ARCHITECTURAL ASSOCIATION.

The third meeting of this Association for the present session was held on the 19th inst., at No. 9, Conduit-street, Mr. J. A. Gotch (President) in the chair.

The Chairman.—Before we proceed to the business of the meeting, I would call your attention to the post-card which you have all received, with regard to the proposed memorial to the Queen in regard to the Supplementary Charter which has been applied for by the Institute, and I will conclude by moving a resolution from the chair. A very few words will suffice to preface that action. The Association, of course, as a body, is not concerned in matters which relate to professional practice to any great extent, and it would not, as a rule, interfere in what may be called the political matters of the profession; but as an educational body it is very much interested in such portions of the proposed Supplemental Charter of the Institute as affect education; and, as a large part of the new powers to be granted by that Charter will affect architectural education, both as to the means of increasing educational advantages, especially in connexion with the Architectural Examination, the Committee, after considerable deliberation, think it most desirable that this body, being interested so deeply as it is in educational matters, should do what it can to support the petition for the Supplementary Charter. Therefore, without further remark, and not to keep you from the entertaining paper with which Mr. Sedding is about to favour us, I beg to move from the chair:—

"That the Architectural Association should memorialise the Queen in Council in support of the Supplementary Charter presented by the Royal Institute of British Architects, inasmuch as it will, if granted, materially advance the special educational objects which the Architectural Association has in view."

Mr. Leonard Stokes seconded the motion, which was carried by acclamation.

Mr. H. D. Appleton (Hon. Secretary) then read the memorial, which set forth that the petitioners constituted a society which had been established for more than forty years, was composed of architects and architectural students, numbering over a thousand members, resident in London and the provinces; that the petitioners' society had for its chief object the furtherance of architectural education; and that the provisions of the proposed supplemental Charter of the Royal Institute of British Architects now before Her Majesty in Council were calculated to promote the advancement of architectural education, to the benefit of the public. They therefore prayed Her Majesty in Council to grant to the Royal Institute of British Architects the proposed Supplemental Charter.

The Chairman added that this memorial would be signed by the President, Vice-Presidents, and other officers of the Association, and would be forwarded at once.

Mr. J. D. Sedding read a paper on "Church Planning," for which see a previous page.

The President, in inviting discussion, said he invariably found himself the better after listening to Mr. Sedding's views, although he could not always agree with them. In many things their views were diametrically opposite, but, at the same time, everything that Mr. Sedding put forward he had found to be most suggestive. That evening they had been favoured with an excellent paper, with the scope of which he entirely agreed. The paper, too, was marked by a quality which was so important in architecture, that one should do the very best to solve the particular problem one had in hand at the moment. Mr. Sedding represented a particular school or set of views, consequently his church architecture would assume certain characteristics; but he had entirely omitted an extremely interesting type of church, which, equally with his own churches, illustrated the views held at the time of their erection. He referred particularly to the City churches of Wren, which were as different from Mr. Sedding's

ideal of the church of the present day as it was possible for two types of churches to be. Nevertheless, there were many such churches of extreme beauty and excellence in architecture, illustrating a certain set of views which were then held, and which no doubt Mr. Sedding would consider the effect of "the blighting malison of Puritanism." And further, it was quite conceivable that even nowadays there might be men holding views nearly approaching those which produced the churches of Wren's time. Therefore the young architect ought not to go into the work of church-planning with preconceived notions that there was only one type, and that a High Church type, because in that case he might find himself diametrically opposed to the views of his clients. In the present day there was a great deal of life among those who built churches; the parsons and the architects were acting and reacting on each other, the result being a tendency towards a more distinctly ecclesiastical type of thought, which, no doubt, was quite right. Mr. Sedding had laid some stress on the value of an "ambulatory," but there were people who did not consider an ambulatory essential to salvation. It had also struck him as curious to hear Mr. Sedding using the term "narthex," which, when it had a real practical use, was the place reserved for catechumens. When, therefore, a narthex was made to a modern church it seemed to him that it had no *raison d'être*. Mr. Sedding had also referred to the desirability of having a second altar. Owing to the conditions of life at the present time it was difficult to get a large congregation at the early morning services; therefore a second altar, attached to a smaller space, chapel or otherwise, was obviously a great convenience, and would avoid the desolate appearance which he had sometimes observed at services in parish churches. Mr. Sedding had regretted that at the Architectural Association excursions the members sometimes sketched cottages instead of church architecture. It did not, however, fall to every man's lot to build so many churches as Mr. Sedding, and to some men domestic architecture was of chief interest. He did not think it was entirely owing to the fact that there was a cessation of interest in church architecture, but the tendency of late excursions had been rather in the direction of a preference for domestic buildings. One thing was certain,—whether the members agreed with Mr. Sedding or not they must all be of opinion that he had given them a most interesting paper.

Mr. William White, F.S.A., proposed a vote of thanks to Mr. Sedding. With regard to the City churches, it seemed to him that although they were so diverse from the old Medieval buildings in the matter of architecture, yet the general feeling of church-planning did succeed not only through their generation, but subsequently. For in all cases thoroughly well developed chancels were to be found; and he maintained it was the grand scheme, so to speak, of the English church, as distinguished from all outside churches, to have a thoroughly distinctive chancel, apart from that portion of the church which was appropriated to the laity. No one now attempted to carry on the service in a well-conducted church without a choir, and it was impossible to organise an efficient choir without a properly developed chancel. When he produced the plan of St. Stephen's, Battersea, he did not consider it his "ideal" of what a church plan ought to be, but it was the "ideal" of what that particular church should be. It was the last, he believed, of the Bishop of Rochester's ten churches, intended to provide accommodation in the best possible manner for the poor. Had he known, however, to what flights Mr. Sedding intended to carry his auditors, he would have brought a plan which better represented his ideal of what a church ought to be, viz., that of new St. Mary's, Battersea Park. This was a large and well-developed church, where the clergy could hold their conferences, and which consequently had a good sized building attached to it on the north side of the chancel. It was specially designed as a "Minster Church" to the large parish. As to chancel steps, it was not so much a question of whether there should be a number of these at the chancel, or the altar, but that they should be so carefully graduated as to give a good perspective to the chancel from the nave; for unless care was taken a great deal of dignified effect would be lost. Another thing which was objectionable in so many modern churches was the height and crowding

together of the stalls. A narrow chancel should only have a single row of stalls and not a row for boys on either side, otherwise it became inconveniently crowded and took away all the dignity of the effect. About thirty years ago he took some details of Lincoln Cathedral, when he found the original choir-stalls, designed to a great extent with higher erections, were far lower than the great majority of the stalls now put into the chancels of even small village churches. He would, therefore, caution his hearers to beware of making their stalls too high, thus lowering the chancel and taking away its dignity. There was one point to which Mr. Sedding had not alluded, but which was of practical interest, viz., that of building a church with the largest span of nave possible and the smallest narrowness of aisles. Unless great care were used in the proportions of a large church very considerable difficulties might ensue in the acoustic effects. Again, if the finest effect had to be produced for a limited sum of money, it was necessary to have aisles rather than one broad span; and to widen the aisles rather than the main roof.

Mr. E. C. Robins, F.S.A., seconded the resolution, adding that what had impressed him that evening more than anything else was the enthusiasm displayed by Mr. Sedding in describing his subject. Architecture depended as much on enthusiasm in its study as upon anything else. For himself, he might say that, until he read Ruskin's "Stones of Venice," he had never felt the enthusiasm for architecture which he had ever afterwards experienced; it being quite a revelation to find the thoughts Ruskin put into one's mind by his description of the buildings of old. Some fifteen years ago he (Mr. Robins) read a paper before the Association on the subject of "Churches for Congregations"; but that evening they had heard a lecture on "Churches for the Clergy" (Mr. Sedding: "No, no") and for the services which seemed most to the minds of many people. He had very great sympathy with both sides; their differences did not trouble him at all; but he liked a church in which he could both hear and see, and which was at the same time grand and beautiful. Enthusiasm like Mr. Sedding's would make them do the humblest building in such a spirit as to render it a charming work.

Mr. C. M. Hudson remarked that Mr. Sedding had emphasised the altar-screen between the chancel and the nave as marking the distinction between the clergy and the laity; but it depended very much from what theological point of view we approached the subject. He should like to say a few words on the subject of organs and their treatment. Nowadays an organ was an essential part of the furniture of even a small parish church. The organ-builder had often a very considerable grievance. A large church was built. The congregation wished to have an instrument worthy of it, and so a specification was handed to the organ-builder for a fine instrument. He, perhaps, on examination, found he had only a small space in which to put it, and consequently a noble instrument was frequently spoiled by want of proper attention on the part of the architect.* More care should therefore be given to the location of organs. He spoke not only as an architect, but as a practical organist.

Mr. Sydney Vacher said he was convinced that a cheap church could be made beautiful by studying a good plan, and putting in simple and well-proportioned details, in the spirit of the old Gothic architects. One could not hope to do that well unless one was continually sketching old architecture. Every church architect was bothered by the organ-chamber, and very frequently the clergy wished to put in a bigger organ than the building would hold. A big organ in a small church was all very well, but he always fancied that the organ should be for the church, and not the church for the organ. With regard to the chancel, if there was plenty of money it might be spent freely upon that part of the building, by making it as glorious as possible. Everybody must be convinced that where a morning chapel could be had, it was a most desirable thing to have, besides being useful in every plan, by giving an exit for the communicants from the chancel. He would also design a church with as wide arches as possible from east to west, thus allowing the congregation to see to the utmost.

* The great German organ-builder, Schuler, on one occasion, we were informed, entirely declined a commission, rather than build one of his instruments in the conventional cramped English "organ-chamber."—Ed.

The vote of thanks was then put, and very cordially received by the members.

Mr. Sedding, in his reply, said he was very much disturbed by a friend of his in the room, imagining he went in for churches for the clergy, that being just the very thing he did not do. As to Wren's churches, surely St. Paul's was a noble building in the way of its suitability to divine worship, and would satisfy most people's idea of what a church should be. St. Peter's, Cornhill, had a chancel-screen, but they must not suppose that the old fellows were not quite sensible of the necessity of providing accommodation for the ministers; but there were only two then,—the parson and the clerk,—whereas now we had choirs, and our ideas of worship had expanded. Objection had been made to the altar-screen. He had said distinctly he was treating the subject historically, and then practically; and he had drawn a clear distinction between screens for churches which were attended by the rich, and those which had a poor congregation, because he held that what was perfectly admissible in a church meant for cultivated people, was quite inadmissible in a church built for the poor. The magnificent naves in the Roman Catholic countries showed how well the poor were provided for. Another point he had intended to allude to in regard to the Wren churches was this,—that they take fifty years of modern church-planning, and a similar period of the seventeenth century, and they would see the immense variety Wren had constructed, as compared with the moderns, with their continual hammering away at the Cruciform and Devonian types of church.

LIGHT AND AIR.

ALSO P. V. GWINNELL.

A CASE was heard before Justice Kekewich on Tuesday last, as to whether the raising the front wall in the rebuilding of the Marlborough Head by 20 ft. 6 in. had affected the light and air of No. 23, Great Marlborough-street, opposite, which is occupied by Messrs. Alsop, Mann, & Co., solicitors. The Marlborough Head is distant from the plaintiffs' windows at the nearest point 55 ft., and at the farthest point 75 ft. from the plaintiffs' premises; the total height, including the raised portion of the Marlborough Head, is 60 ft. 6 in. Mr. Warrington, Q.C., and Mr. Barber, Q.C., were the counsel engaged.

The surveyors engaged were Mr. Wilson and Professor Kerr for the plaintiff, and Mr. Chatfield Clarke and Mr. Banister Fletcher for the defendant. Verdict for the defendant, with costs.

Antiquities of the Isle of Man.—The third ordinary meeting of the current session of the Liverpool Architectural Society was held in the society's rooms, on Monday evening last, Mr. G. E. Grayson, president, in the chair. Messrs. T. Harnett Harrison, Henry Sholmerstone, and Edgar Eccles were elected members. A paper was read by Mr. J. H. M'Govern on the "Antiquities of Kirk Braddan Cemetery and Peel Castle, Isle of Man." Mr. M'Govern stated that Ptolemy classed the Isle of Man under the head of Irish islands, and the Manxman belonged to the Goidelic branch of the Celtic race. Referring to the Runic crosses at Kirk Braddan, he pointed out that the difference between the Celtic and Scandinavian runes was that the former were known by their ornaments of geometric interlacing of Celtic names, and the latter by their draconic ornaments and Norse names. The inscriptions are in a Norwegian dialect, and written with a Scandinavian alphabet; the letters are termed runes, and the alphabet bears the name of the Futhork from the first six runes. The origin of the runes has been from the Hellenic alphabet used in the Greek colonies on the Black Sea, sixth century B.C. Mr. M'Govern held the Round Tower in the castle grounds to be of Irish Celtic design. The round towers were used as belfries for summoning people to worship in connexion with chapels, and not, as some authorities held, as watch towers like the Danish ones, or as ecclesiastical prisons.

Liverpool.—The Welsh Presbyterian chapel, in David-street, was re-opened on the 8th, after alterations and additions, from the designs of Mr. T. G. Williams, of Liverpool. The main features of the alteration are the different construction of plan, which formerly had transepts, the main walls being removed and rebuilt in a line with the transept walls on the east and west sides of the chapel.

APPARATUS FOR SUN-COPYING OR HELIOGRAPHY.

The heliographic copying of engineers' drawings is now used in many of the engineers' and architects' offices in Europe and America. Its advantages are rapid and faithful reproductions of the most intricate tracings of drawings and caligraphy. The various processes for producing white on blue, black and blue on white grounds, are described in the last volume of the Institution of Civil Engineers, in a paper by Mr. B. H. Thwaite on Heliography.

The ordinary apparatus for heliographic printing consists in a printing-frame large enough to take the tracings to be reproduced, and a developing bath. The latter, if of the ordinary form, takes up a considerable amount of floor space in an office and requires to be replenished with water almost every time it is used. The annexed figure 1 shows the arrangement invented by Mr. Thwaite, C.E.

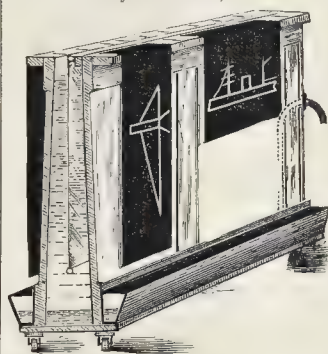


Fig. 1.

This developing bath possesses the following advantages:—

It is compact; self-clearing, as all the salts unacted upon are precipitated to the bottom and can be drawn off every few months. It is far more effectual and rapid than the ordinary bath. It has been used continually for six months, and, although it has only once been replenished with clean water, it is still quite perfect in its action.

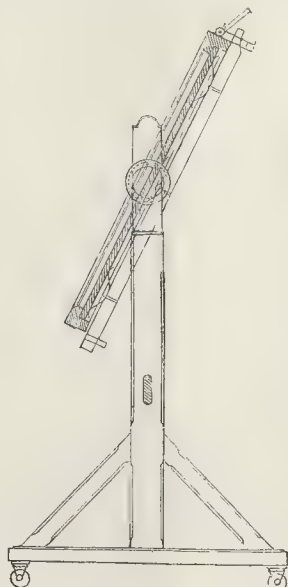


Fig. 2.

The printing-frame used by Mr. Thwaite is shown by fig. 2. It is so arranged as to be easily adjusted to the rays of actinic or sunlight. The heliographic apparatus and prepared

paper can be obtained from the Victoria Drawing Office, 15, Ashcroft-buildings, Victoria-street, Liverpool.

CASES UNDER THE METROPOLITAN BUILDING ACT.

SPACES IN THE REAR OF DWELLINGS.

An important decision was given, on the 17th inst., by Mr. D'Eyncourt, the magistrate at the Westminster Police Court, in the case of Clarkson, District Surveyor of North Chelsea, v. Thorn, which had reference to the provision of open spaces in the rear of dwellings, as required by Section 14 of the 1882 Act (45 Vict., ch. 14). The Section states that:—

"Every new building begun to be erected upon a site not previously occupied in whole or in part by a building, intended to be used wholly or in part as a dwelling-house, shall, unless the Board otherwise permit, have directly attached thereto, and in the rear thereof, an open space exclusively belonging thereto . . ."

The sizes of the spaces are regulated to suit the frontages,—150 ft. for 15 ft. frontage; 200 ft. for 20 ft.; and 450 ft. for 30 ft. and more. The magistrate decided in effect (1) that a coachman's rooms over stables bring the building of which they form part under Section 14; (2) that even when the rooms of such a building are lighted from a street (or mews) adjoining, the open space must still be left in the rear, as enjoined by the Section; and (3) that "a site not previously occupied in whole or in part by a building" means the site of the individual building in question, and not the whole plot or field, of which the site of the individual building once formed part.

The case was one in which Mr. S. Flint Clarkson, District Surveyor for North Chelsea, summoned Mr. A. Thorn, builder, in respect of No. 5, Henniker-mews, Callow-street, part of the Elm Park Estate, the premises selected being similar to a number of others proposed for the same mews. The depth of the building was about 17 ft., and the frontage being 32 ft., a clear space of 450 ft. was named in the Notice of Irregularity as required under Section 14. Mr. Clarkson conducted the case personally; Mr. Thorn being represented by counsel (Mr. Mead).

The builder's notice before commencing was for "Stables, with coachman's rooms over." Mr. Mead contended that these might not be intended for residential purposes, stating that, as much loss and possibly penalties might be involved if an order were made by the magistrate, all objections should be brought forward, and very strict proof be required. A plan of the rooms was produced by the District Surveyor, showing that they consisted of living-room, bedroom, scullery, and water-closet,—a small residential flat,—reached by a staircase from the ground story. The scullery and water-closet were to be lighted from the roof, and the living and bed rooms by windows in the front wall, next the mews. Mr. Mead contended that the 29th Section of the Act of 1855 would therefore apply, and not Section 14 of the 1882 Act; and, that if this contention were correct, no open space would be required in the rear of the building.

The site of the building in question formed part of Chelsea Park,—that is, of the grounds surrounding the mansion-house so called, which was pulled down a few years ago. The distance between the nearest corner of the mansion-house and No. 5, Henniker-mews, would be about 300 ft. It was pointed out by the District Surveyor that in the Act of 1873, which is to be construed as amended both with the Act of 1855 and that of 1882, "site" is defined, and limited to the area of the individual building. Mr. Mead cross-examined on this point, and it was stated that these spaces in the rear of buildings secured a current of air on both sides of buildings used for dwellings; that otherwise a block of new buildings, 30 ft. to 40 ft. thick, forming "back-to-back" dwellings, might run for a long distance without any open space except the narrow streets. Mr. Mead stated he would not press his argument on this point.

On the Magistrate stating that he should be prepared to make an order in accordance with the notice of irregularity, Mr. Mead consulted with his client, the District Surveyor. Mr. Thorn promised that the buildings should not be used as dwellings, and agreed to make such alterations in the internal arrangements as would, in the opinion of the District Surveyor, render them unfit for dwellings. Mr. D'Eyncourt upon this agreed to hold over the matter for a month in order that such works might be done.

WOODEN BALUSTRADES OVER BAYS AND PORTICOS.

SEVERAL builders carrying on operations in Canfield-gardens, West Hampstead, have appeared before Mr. Cooke at the Marylebone Police-court, on summonses taken out by Mr. Thos. Blashill, the District Surveyor, for erecting wooden balustrades over the bays and porticos in front of houses, the material being combustible, and therefore, it was contended, contrary to the requirements of the Building Act.

Mr. Blashill said the object of the summonses was to test a point which both he and the defendants

desired to be decided by the Court. He relied on the first clause of the 24th section of the Act, in which it was laid down that the material to be used must be "brick, tile, stone, artificial stone, slate, cement, or other fireproof material." The houses in question were attached to other houses, and did not come within any exceptional clause. He had examined the material of which the balustrades were made, and found it to be wood. A number of houses had been built in the same way, and in order to test the question he had taken out the summons, and now asked for an order for the removal of the balustrades.

Mr. Estcourt, one of the defendants, said he had stopped using the wood, but he submitted that the balustrades did not form any part of the main building. They were quite separate, being fastened by a hook and eye at each end of the balustrade, the hook or eye being fixed into the main building. They were, in fact, very much like a fire-guard which fastened on to a grate, and could be lifted off at will. Hundreds of houses had been done in the same way. The hooks were fixed into the wall on either side of the balustrade.

Mr. Cooke said that looking at the object of the balustrade, and after hearing the explanation of the defendant, he did not think it formed part of the building, which, in his opinion, must be enclosed or not removable. He had never before had such a case before him for decision, and he was quite ready to give it further and more careful consideration if it was desired.

Mr. Blashill said he would not ask for that, but was willing to leave it in the hands of the magistrates for him to decide without delay.

Mr. Cooke said that as that was so, he should decide that the balustrades in question did not form part of the building, and the summonses would be dismissed.

SCIENCE AND ART DEPARTMENT EXAMINATIONS.

SIR,—Now that the result of the examination in building (Science and Art Department) is known, may I ask you to publish the following comments, which may have the effect of altering a far too stringent rule?

The examination consists of two parts,—Part I. a paper of questions, and Part II. preparation of design. It is the latter I wish to refer to.

If the answers to the question-paper are satisfactory, a printed form is supplied to the candidate with particulars of the design required, which is something like the following:—"The candidates to prepare a design for a country residence with the following accommodation: dining and drawing rooms, each 320 ft. superficial; library, study, eight bedrooms, with the usual offices. Elevations to be drawn to a scale of $\frac{1}{4}$ in. to the foot, plans and sections to $\frac{1}{2}$ scale; also a small block plan, with a short description of the works and detail drawings where necessary." This, sir, to be done in the short space of twenty days.

Now, I was under the impression that this examination was for the advancement of technical knowledge of workmen, foremen, &c., and not for persons who could devote the entire twenty days to it. Is it not inconsistent to suppose that any man engaged in business during the day could possibly prepare such a design properly coloured and finished in such a short space of time. The question is answered by looking at the results. It is seldom more than five persons pass out of hundreds who try.

A COMPETITOR.

SANITARY INSTITUTE EXAMINATIONS.

SIR,—Will one of the successful candidates in the recent Examination under the Sanitary Institute of Great Britain kindly tell me the best works to study in preparing for a future Exam.? If so, he will greatly assist,

SANITAS.

PRIME COST AND PAINTING IN TINTS.

SIR,—I shall be glad to have the opinions of your readers upon the above subjects.

1. "All prices of articles mentioned are to be P.C. prices in London; add, therefore, profit, carriage, and fixing, and include same in contract."

Is the term "P.C." in the above clause generally understood by architects and builders to mean the prime cost after the deduction of all discounts, including the cash discount, if any?

2. "All work to be done in four oils, in tints." Does the word "tints" mean that the work may not have more than two colours or shades of colour on it, or would it allow of three or more colours or shades of colour?

B. H.

WATER-COLOUR DRAWINGS.

SIR,—May I ask, through your columns, if there are any safe means of eradicating damp spots from water-colour drawings; or, failing that, if it is possible to stop the mischief from spreading when it has once put in an appearance?

Any information on the subject will greatly oblige,

COLLECTOR.

ALL SAINTS' CHURCH, PETERBOROUGH.

SIR,—In your paper of last week (p. 749, ante) it is stated that the design of Mr. J. Martin Brooks was placed second. This is not correct. The design placed second was by Messrs. Weatherley and Jones, under the motto "Ad te Domine"; and it is only fair to these gentlemen and to all concerned that the mistake should be corrected.

ONE OF THE COMMITTEE.

** The statement was made on Mr. Brooks's authority. We had already received a contradiction of it from Messrs. Weatherley and Jones, on receiving which we wrote for authoritative information to the Secretary of the Committee. He informs us that Mr. Brooks's design was certainly placed second on architectural merit alone, but that considerations of cost put it out of court practically, and that Mr. Brooks may, therefore, have had reason to think he was justified in the statement. We must hint, however, that strict accuracy in statements made for publication is very desirable.

CONCRETE FLOORS.

SIR,—Some of your readers will remember a letter I wrote you last year descriptive of the floors of the Phoenix Fireproof Warehouse, Sunderland, where many of the slabs are 23 ft. by 12 ft. 6 in., clear of iron or other supports, and about 12 in. thick, the admixture being 1 of cement to 4 of broken brick aggregate.

These floors were designed, as I think I stated in my letter, to sustain a safe load of 2 cwt. per foot in addition to their own weight (there being 1,800 tons of their own weight in the building).

A few days ago, having some extensions of this same warehouse to superintend, I found considerable areas of the flooring loaded with 4 and 5 cwt. per square foot!

No one about the building doubts the enormous strength of these floors now, though they were regarded with great suspicion when erected about six years ago.

FRANK CAWS.

Sunderland, Nov. 23, 1886.

CORSE HILL STONE.

SIR,—In your description of the New Dispensary and Relief Station, Battersea, contained in your issue of the 30th ult. (p. 649), we notice you describe the window heads and sills of this building as being out of red Corse Hill stone.

It is true that Corse Hill stone was specified to be used by the architect; but, unfortunately, as in many other instances which we could name, another and inferior stone has been substituted.

We shall be glad if you can kindly find a space for this letter in your columns, as these continued substitutions of inferior stones for Corse Hill are materially damaging the reputation of the stone and our trade; and not only so, but it is an infringement of our trade mark, for which parties knowingly using inferior stone as Corse Hill render themselves liable for damages.

SAMUEL TRICKETT & SONS.

The Student's Column.

STONE QUARRIES.—XXII.

SANDSTONES.

THE compact and fairly durable limestones found in the southern parts of England have, to a great extent, prevented the more extensive use of sandstones in that area, and we do not therefore see so many buildings constructed in the metropolis of the latter material. But when we inquire into the kind of stone used in the central and northern counties, we shall find that nearly all the principal buildings are made of sandstone, with the exception of some of those in the eastern-central counties, round about Lincoln, &c. All the large manufacturing towns furnish good examples of the sandstone of their respective districts, and the remarkable facility of working and the durability of many of them have caused them to be very favourite materials with architects. The trying atmosphere of nearly all our manufacturing towns, containing, as it does, such a great proportion of the acids so injurious to the preservation of stone, has severely tested the quality of the materials of which they are built. What with chemical works, potteries, iron works, and the like, the sandstones in a few local instances have been even more severely tried than in the general London atmosphere, and they have frequently been found to be equal to the test. The question, then, which naturally arises is, why such durable materials do not find their way in larger quantities into the London market? Is it that their appearance is against them? Or is it because they are not sufficiently known? We suspect it is rather from the latter than the former cause,

influenced, perhaps, also by pecuniary considerations.

After the colour of a sandstone to be used in a certain edifice has been determined, the next point usually looked at is its chemical analysis. We do not at all see why this should be so, or why all other things should be subservient to its chemical composition. Any one who chooses to reflect on the subject will soon see that as sandstones in the vast majority of cases are almost wholly made of grains of sand, and that as this sand is mostly quartz, and quartz is silica, the chemical composition of a sandstone is generally from 93 to 96 per cent. of that oxide, and the remainder, chiefly lime, iron, and alumina, varies almost as much in quantity from specimens from the same quarry as from those obtained from widely separated areas. The information which the chemical composition of a sandstone imparts, from a purely practical point of view, is thus shown to be almost valueless in estimating its durability. Even when the analysis shows the presence of 1 to 2 per cent. of lime, it does not tell us how it is distributed in the stone,—whether it exists in some hard crystalline mineral (which, like the quartz grains, has been derived from the destruction of crystalline igneous rocks) or whether it forms part of the cementing material compacting the grains of sand; and these are the points which must be settled before a satisfactory conclusion can be arrived at. Again, if the analysis shows that the sandstone under discussion contains, say, 98 per cent. of silica, it fails to indicate that any of this is present in the form of a matrix. Some writers would seem to imply that from the mere fact of a stone containing such a very high percentage of silica, it must also of necessity be hard and brittle, by reason of some proportion of that chemical forming the matrix. Surely they would be willing to admit that a loose sand may have this identical composition, and that as there is every degree of cohesion from this loose sand to a firmly compacted sand (that is, sandstone), the principal thing to look for is not so much the chemical constitution as its degree of cohesion. Now, the degree of cohesion is found by two methods:—(1) By immersing the stone in water and calculating the amount it absorbs; and (2) By subjecting it to a gradually increased thrusting stress. We have previously pointed out the advantages of the one method over the other, but it will be obvious that something more is yet required to make our investigation on durability complete. If the power of resisting deleterious agents, of a closely compacted sandstone (one consolidated by pressure alone) and of one having a siliceous matrix, were the same, all would be well, but the latter is by far the more durable kind of stone, and the best method of detecting these differences is by microscopic analysis.

The sandstones used in building are largely obtained from the carboniferous formation, though the quarries (exceedingly few in number) in the stone actually associated and intimately stratified with the coal-measures, do not produce such excellent materials as those in the more massive deposits of sandstones and grits of the period, by reason of their containing more or less argillaceous matter as well as iron. The following is a brief summary of the mode of occurrence of the deposits of the carboniferous period, which can be recognised, with modifications, in all parts of the country*:

Coal Measures.

1. Red and grey sandstones, clays, and sometimes breccias, with occasional seams of coal.
2. Chief coal-bearing series of yellow sandstones, clays, and shales.
3. Gannister beds, flagstones, shales, and thin coals, with hard siliceous pavements.

Millstone grit, flagstones, and shales, with thin seams of coal.

Limestone Series.

1. Yoredale group of shales and grits, passing down into shales and limestones.
2. Thick limestones in the south and centre of England and Ireland passing northwards into sandstones, shales, and coals.
3. Lower limestone shale of south and centre of England,—the calciferous sandstone group of Scotland.

* See Geikie's "Text-Book of Geology" (1883), p. 737.

The above brief table will enable the student to see that the Carboniferous, unlike the Oolitic period, is very variable in character at its outcrop;—in other words, the long strip of carboniferous rocks stretching from Devonshire, in a north-north-easterly direction, roughly speaking, changes from a limestone into a sandstone as it reaches the northern counties and into Scotland, whereas the oolite running parallel with them for a considerable part of the distance maintains its limestone character almost from beginning to end. Thus it is that the chief sandstone quarries are situated in the northern counties, and Scotch buildings are almost entirely dependent upon them (and granites) for the material of which they are constructed.

We may mention, in passing, that the rocks belonging to the secondary epoch* (from which in England we obtain such a large proportion of our building materials), are represented in Scotland by a few insignificant patches, hardly worth noticing from an economic point of view.

We will now describe a few of the more important sandstone quarries in the United Kingdom.

Bramley Fall Stone.

This stone is named after the township of Bramley, near Leeds, where quarries have been worked for many centuries. Owing to the demand for the stone, several quarries have been opened along the valley of the Aire, offering great facilities of transport to all parts of the kingdom by means of the Aire and Calder Navigation, and by the Leeds and Liverpool Canal. We are informed that since the introduction of railways, the original Bramley Fall quarries have almost ceased working, but that the name has been perpetuated and now refers not only to stone in the district, but also to stone of a similar nature from quarries some distance from Bramley. It has, in fact, become a general term. Some of the largest quarries are at Calverley Wood, near Bradford; Duffield Bank, near Derby, where the stone is of a light brown colour, and of which Bishop Ryder's Church and St. Mary's Bridge, Derby, has been constructed. Others are at Fletcher Bank, Hayshaw Moor, Horsforth, Knaresborough, Little Eaton, Meanwood, and Westwood (called Westwood in Blue Book), near Headingley. The stone at the last-mentioned place is of a light-brown colour, and has been used in Westminster Bridge, the Grimby and Jarroo Docks, &c. There are numerous other small workings to which we will not refer.

The original Bramley Fall stone was a medium-grained sandstone of the Millstone grit series and was remarkable both for strength and durability. The Abbey of Kirkstall, near Leeds, which was built in the twelfth century, and destroyed in that turbulent period of English history,—the Commonwealth,—is an example of the early use of this material. The stone in the ruins is still in a good state of preservation.

Architects frequently specify thin stone for templates, bases, steps, landings, and copings to be worked out of Bramley Fall, only 4 in. to 8 in. thick. Mr. Trickett says that this mistake has caused some quarriesmen and producers to substitute inferior top stone for good rock, because it there occurs in thinner beds. He further says that thin stones cannot be obtained out of the best Bramley Fall rock except at a very wasteful expenditure of the stone.

Thus we find that, as a rule, it occurs in large blocks. It is cut with wedges, and, considering its hardness, is worked with facility, being largely used for general engineering works, docks, locks, engine-beds, bridges, large sluices, &c., both at home and abroad.

In the course of our inquiry, we have often met with the results of crushing, specific gravity, chemical analysis, and other tests in regard to this stone, more particularly in connection with its comparison with other stones. In some cases the results were compared with limestone, which, as the student may now be aware, is an absurdity in itself, as it points to nothing of any value. In others elaborate results have been recorded, but the quarries from which the materials experimented upon were obtained were not stated, and so they were rendered useless. As far as our knowledge of the subject enables us to judge, the widely different kinds of stone known as Bramley Fall, able us to arrive at almost any result desired,

from the highest character,—as showing durability,—to the lowest. We do not, in this connexion, refer to the stone which usually comes to London, and which, as a rule, is of tolerably good quality, but would rather take the stones as a class. Such latitude, of course, enables a competitor to quote whatever figures suit his purpose. Whenever the student, therefore, sees experiments recorded on Bramley Fall stones, not accompanied by an exact description of the quarries from which they were obtained, he had better put them aside as worthless.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

15,436, Gullies and Traps. R. Oates and F. J. Green.

The improvements are in the direction of economy and to provide means for readily and easily cleansing the gullies and traps. The gully is made with a partition or diaphragm in a hole, through which a rod or cleaning instrument may be introduced. The hole is covered by a lid when not in use. The traps are made with an additional hole as an inlet for fresh air, and they may be used alone as a terminal trap or in combination with another trap, which is then called a continuation trap. This latter trap may also be made with an inlet for fresh air.

15,608, Movable Partitions, Doors, &c. D. and E. Glaister.

The idea of this invention is so to arrange the parts of movable partitions, doors, window-sashes, or shutters, that when one part is moved in one direction, say up or down, the corresponding part shall be moved in an opposite way. This is effected by a balanced arrangement of the separate parts of the partition or shutter.

15,609, Securing Doors, &c. D. and E. Glaister.

A second patent of the same inventors relates to an arrangement of the flooring around or near a doorway or means of exit, whereby a lever is depressed by the weight of the person coming along and the catch of the door is automatically released, causing the door to fly open. This is specially applicable to theatres and places where panics may possibly occur.

11,577, Roofing Tiles, &c. W. Bull.

This patent relates to the form of the roofing tile as well as to the machinery constructed to produce it. The object is to provide tiles exceptionally light, which can be readily joined in either cross or longitudinal section, and will keep comparatively cool even in hot climates; a further object being to produce the tiles rapidly, and at small cost. The tiles are somewhat similar in appearance to the bricks used for a damp course, having tubular openings running through them. The ends of the tiles are ingeniously adjusted, one end being made as a hook over, and the other under, so that, when brought together, they are effectually fastened.

11,775, Improved Tile Stove. J. P. Helles.

The principal improvement is in providing an increased radiating surface by altering the shape or form of the stove. Two cylinders are made one inside the other, and the hot air circulating between is given off by the outside radiating surface of the outside tube.

8,873, Paving and Building Stones, &c. E. Grach.

In stones for floors and ornamental work, undercut or intersected projections are made, which act like hooks, and catch in the mortar or cement used as a basis or foundation for the stones. When the mortar hardens, the stones or flags do not get loose, owing to the hold the hook-like projections have in the mortar or cement.

NEW APPLICATIONS FOR PATENTS.

Nov. 12.—14,637, F. Worrner, Fastener for French Windows, Doors, &c.—14,668, J. Watson, Ventilators.—14,674, W. Scott and Others, Portland Cement, &c.—14,692, E. Cowper, Locks, Latches, and Bolts.

Nov. 13.—14,755, T. Dewsbury, Circular Hole Metal Ventilator.

Nov. 15.—14,768, A. Day, Draught and Dust Preventer for Doors, &c.—14,782, R. Jay, Metal Cisterns, &c.—14,794, E. Anstey and E. Houl, Fixing Door Knobs to Spindles.

Nov. 16.—14,837, H. Bromhead, Skylight or Fanlight Opener.—14,848, G. Barker, Ventilating Buildings.—14,880, H. Lake, Metallic Lathing.

Nov. 17.—14,838, J. Brown, Window Sash Fastening.—14,915, W. Jones, Water Waste Preventer.—14,922, J. West, Water-closets.—14,934, T. Cook and W. Boyens, Raising, Lowering, and Holding Window Sashes.

Nov. 18.—14,972, T. Fawcett, Brick and Tile Pressing Machinery.—14,979, W. Blessley, Iron-stoneware.—14,992, H. Walker and R. Carey, Hydraulic Lifts.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,121, H. Harris, Window-Fasteners.—11,509, T. Whitehead, Chimney Cowl and Ventilator.—

12,031, M. Syer, Syphon Water-waste Preventer.—12,099, E. Gilles, Ventilator for Sash Windows.—13,597, J. Parsons, Fall Pipes and fixing same.—11,371, F. Bosshardt, Intercepting Noises caused on Floors and Excluding Draughts from Buildings.—11,889, F. Lyte, Pigments.—12,492, W. Wood and A. Simmonds, Treating the Surfaces of Wood to Imitate Stone.—13,045, J. Thropp, Carpenter's Braces.—13,055, A. Gray, Window-Fasteners.—13,537, D. Lyon, Flushing Apparatus and Water-waste Preventer for Water-closets, &c.—14,007, H. Campbell, Outside Shop Window Lamps.—14,053, T. Messenger, Warming Buildings with Hot Water.—14,245, W. Stuttle, Hot-water Boiler for Heating Conservatories and Buildings.—14,322, J. Smeaton, Water-closets.—14,375, D. Burne, Chimney Cows and Ventilators.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

14,730, J. Denny, Lock Blocks for the Construction of Fireproof Ventilating Ceilings, &c.—502, J. Jex Long, Open Fire-grates.—551, J. Stanley, Smoke-consuming Fire-places.—770, W. Benson and L. Gunning, Flooring Tiles, Bricks, &c.—977, J. Nichols, Nails.—2,777, C. Duncombe, Locks.—12,597, H. Treasore, Lock-up Ventilators.—13,088, E. Marland, Securing Chimney-pots.—15,613, T. Gray, Door Locks.—829, J. Stidder, Flushing Water-closet Pans.—842, W. Wardle and M. Shillito, Ventilating Fans.—2,072, E. Hewari and J. Martin, Gully Pipes.—11,590, E. Banfield, Indicating Apparatus for Water-closets, &c.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

NOVEMBER 12.

By BROAD, PITCHARD, & WILTSKIRE.
Holloway—20, Seven Sisters road, 71 years, ground-rent 30l. 41,150
Witchapel-road—No. 78A, term 54 years, ground-rent 32l. 1,110

NOVEMBER 15.

By G. A. WILKINSON.
Cheapside—No. 69, freehold 14,050
Islington—Improved ground-rents of 60l., term 68 years 1,290
Improved ground-rents of 30l. 10s., term 32 years 4s., 42, and 44, Cloudeley-road, and 32 and 24, Cloudeley-place, and improved ground-rents of 80l., term 16 years 1,430

By A. CHANCELLOR.

Richmond hill—The freehold residence Gloucester House 2,710
1 and 2, Gloucester-villas, freehold 4,470

By NORRIS & SHOFFER.

Sydenham—The residence Beaulieu, leasehold 453
The residence Beauville, leasehold 425

By GRAY & SON.

Bayswater—15 and 17, Shrewsbury-road, 73 years, ground-rent 20l. 930
10, Shrewsbury-road, 73 years, ground-rent 10l. 750
1 and 74, Cornwall-road, 73 years, ground-rent 20l. 1,370
10, Shrewsbury-road, 69 years, ground-rent 8l. 625

NOVEMBER 16.

By RUSHWORTH & STEVENS.
Hyde Park—29, Park-lane, leasehold 4,003
Woolwich—129, High-street; 24, Thomas-street, five houses in Powis-street; 10 and 16, Hare-street; and ground-rents of 122l. 18s., term 12 years 8,000

By TOMLIN & SONS.

Forest-gate—A plot of freehold land 152
Bow—14 and 16, Gawthorne-street, 61 years, ground-rent 6l. 10s. 485

By P. D. TUCKER.

Charing-cross—No. 3, Duke-street, freehold 4,500
8, Buckingham-street, freehold 2,800

By FAREBROTHER, ELLIS, CLARK, & CO.

Peckham—38 to 48 even, Bleheim-grove, freehold 2,001
1 and 2, Rochfort-cottages, freehold 600
Wood-green—1 and 2, Palsco-road, freehold 270

By ROGERS, CHAPMAN, & THOMAS.

Pimlico—83, Cambridge-terrace, 61 years, ground-rent 9l. 601
88, Alderney-street, 45 years, ground-rent 8l. 550
117, Alderney-street, 46 years, ground-rent 9l. 630

NOVEMBER 17.

By HORNE, SON, & EVERFIELD.
Westminster—213, 22, and 23, Millbank and wharfage, 47 years, rent 320l. 100
Hyde Park—24, Sunset-gardens, 90 years, ground-rent 18l. 3,000

By A. & A. FIELD.

Homerton—39 to 47 odd, Holmbrook-street, 38 years, ground-rent 11l. 6s. 395
12, 14, and 16, Holmbrook-street, 38 years, ground-rent 6l. 15s. 190
Stepney—54, Bromley-street, 21 years, ground-rent 2l. 215
Commercial-road, E.—15, Anthony-street, 14 years, ground-rent 2l. 6s. 6d. 120

NOVEMBER 18.

By BRADLEY & CO.
Southend, Royal-terrace—Three plots of freehold land 950
Alexandria-street—Eleven plots of freehold land, 2,331
Three plots of freehold back land 791

By G. A. BICKERTON.

Westminster-grove—11 and 13, Kidare-terrace, 64 years, ground-rent 14l. 1,450

By MARLER & BENNETT.

Kensington—90, Laibroke Grove-road, 77 years, ground-rent 12l. 650
Chelsea—16, Haker-street, 67 years, ground-rent 8l. 455
Kilburn—3, Oxford-road, 72 years, ground-rent 6l. 600

* See p. 77, ante.

By H. RUTLEY.	
Regent's Park,—4, Fitzroy-road, 64 years, ground-rent 51 8s.	2510
Camden Town—116, Arlington-road, 81 years, ground-rent 51.	295
Caledonian-road—14, 16, and 18, Bemerton-street, 65 years, ground-rent 18s.	905
By E. ROBERTS & HIVE.	
Chiswick—Ground-rent of 451, reversion in 3 years 6 to 10, Devonshire-place, freehold	1,100
Hackney—Ground-rents of 601, term 27 years	725
Ground-rents of 591, term 27 years	650
By NEWSON & HANCOCK.	
Islington—41, Gibson-square, 41 years, ground-rent 81.	500
62, Ball's Pond-road, 65 years, ground-rent 61 10s.	725
163, Liverpool-road, 13 years, ground-rent 71.	185
Pentonville—19 and 20, Baker-street, 25 years, ground-rent 101 10s.	306
Rotherhithe—1 to 4, William-street, 65 years, ground-rent 91 10s.	535
Dalston—20, Leathall-road, 51 years, ground-rent 51.	335
Farringdon-street—4, Bear-alley, freehold	370
Holloway 8, Midway Park, 65 years, ground-rent 41.	505
NOVEMBER 19.	
By A. BOOTH.	
Camden-road, 1, Rochester-road, 56 years, ground-rent 61.	710
By BAKER & SON.	
Finchley—Ground-rents of 601, reversion in 91 years	1,415
Ground-rents of 471 6s., reversion in 93 years	1,130
Ground-rent of 131, reversion in 96 years	840
Four plots of land, 15a, 10r 8p., freehold	3,735
Woodford—1 to 6, Tower-houses, freehold	750
Croydon—1 and 3, Leyton-villas; 1 and 2, Sussex-villas; 1 and 2, Pembroke-villas; 1 and 2, Egin-villas; 1 and 2, Rutland-villas; and 1 and 2, Eleanor-villas, freehold	2,000

MEETINGS.

SATURDAY, NOVEMBER 27.	
Association of Municipal and Sanitary Engineers and Surveyors.—Meeting of the Lancashire and Cheshire District at Warrington, 11 a.m.	
MONDAY, NOVEMBER 29.	
Society of Arts (Cantor Lectures).—Mr. Lewis F. Day on "The Principle and Practice of Ornamental Design." 8 p.m.	
Royal Academy.—Professor A. H. Church on "The Chemical Study of Old Paintings and Drawings: Trials of Pigments." 8 p.m.	
TUESDAY, NOVEMBER 30.	
Institution of Civil Engineers.—Renewed discussion on "Concrete as applied in the Construction of Harbours." 8 p.m.	
Birmingham Architectural Association.—Mr. John W. Bradley on "Illuminated Books." 7.30 p.m.	
WEDNESDAY, DECEMBER 1.	
Architectural Union Company.—Twenty-ninth Annual General Meeting. 4 p.m.	
Royal Academy.—Professor A. H. Church on "Classification of Pigments: Changes of Pigments." 8 p.m.	
Society of Arts.—Adjourned discussion on Dr. D. Meymott Tidy's paper on "Sewage Disposal" (Sir F. Abel, F.R.S., in the chair). 8 p.m.	
FRIDAY, DECEMBER 3.	
Architectural Association.—Mr. T. Priddin Teale, F.R.C.B., on "Fireplaces." 7.30 p.m.	
Royal Academy.—Professor A. H. Church on "The Chemistry of some Selected and Restricted Palettes." 8 p.m.	
Institution of Civil Engineers (Students' Meeting).—Mr. H. H. Dalrymple-Hay on "Hanging Circular Curves." 7.30 p.m.	
SATURDAY, DECEMBER 4.	
Association of Public Sanitary Inspectors.—Mr. W. Hearne on "House Drainage in London." 6.30 p.m.	

Miscellaneous.

Liverpool Master Builders' Association.—The annual dinner of the members of this Association was held on Thursday, the 18th, at the Adelphi Hotel. The chair was occupied by Mr. J. Leslie, the President, and the company included, besides many members of the association, several well-known Liverpool architects, one of whom, Mr. E. Kirby, proposed the toast of the evening, "The Liverpool Master Builders' Association," remarking that as a member of the Association he could say that it deserved all the support it could get from that society and from architects individually, because it would be impossible for architects to carry out satisfactorily the commissions with which they were entrusted were it not for the aid which they received from the members of the Association. It also deserved consideration from the inhabitants and the capitalists of the city; and it was a high honour to the association that Liverpool had twice chosen one of its members, Sir David Radcliffe, as its chief magistrate, and that the present President of the Association had filled the office of Mayor of Bootle. He hoped that the coming year would see the clouds roll by as regarded the building trade. Mr. Litt responded. He said the objects of the Association were not to interfere with working men, but, in carrying out a most important business, to look to the general good of the whole community.

Sale of Building Land at Leytonstone.

On Monday evening Messrs. Baker & Sons submitted for sale, at the Thatched House Hotel, Leytonstone-road, 238 plots of freehold building land, forming a portion of the Cann Hall Estate, belonging to the Imperial Property Investment Company. The estate, which occupies an area of about fifty acres, is situated at Leytonstone, near Stratford, within a few minutes' walk of the Maryland Point and Forest Gate stations of the Great Eastern Railway, and extends eastward from Leytonstone-road to the boundary of Wanstead Flats. It has been laid out for the erection of upwards of 1,500 houses and shops, twelve roads, each 40 ft. in width, having been formed on the estate, and the main drainage extending over the whole of it. A large portion of the estate has already been sold, and building is now actively proceeding. There was a large attendance at Monday's sale. The auctioneer, having alluded to the very large demand for medium-sized houses in the neighbourhood, the sale proceeded. The whole of the lots offered have frontages of from 15 ft. to 16 ft., and depths of from 80 ft. to 100 ft. The first portion of the property submitted comprised twenty shop-plots, having frontages to the Cann Hall-road, one of the principal business thoroughfares on the north boundary of the estate, but after some of the plots having been sold at 771. each, the auctioneer, on behalf of the vendors, withdrew most of the remaining lots facing that road, stating that the lowest price at which they could be sold was 801. each. A corner shop-plot having a frontage to Cann Hall-road of 16 ft., and a return frontage of 105 ft. to Bourne-road, was sold for 901. Seven adjoining plots, having similar frontages, were sold for 821. each. These were followed by the sale of several lots in Ramsay-road, at prices varying from 551. to 621. each. Two plots having frontages of 21 ft. to Melbourne-road, and a depth of 110 ft., were sold for 761. each, whilst six other plots in Trumpington-road, 16 ft. frontage and a depth of 70 ft., realised 541. each. Several plots of a like area in Thorpe-road adjoining were sold at from 551. to 561. each. Altogether about one half of the plots were sold.

Fees of District Surveyors.—It appears from a return made to the Metropolitan Board of Works that the total gross fees received by District Surveyors during the year 1885 amounted to 46,7921. and some odd shillings and pence, showing a falling-off of upwards of 5,0001. from the total amount received during the previous year. The gross fees received in forty-six districts varied from 81. to 5791. : in one of these districts the receipts did not amount to 1001. ; in six districts the receipts amounted to less than 3001. each; in fourteen the amounts were less than 4001. each; in sixteen less than 5001. each; and in nine less than 6001. each. In twenty-five districts the receipts ranged from 6211. to 1,7331., which last amount was the maximum. The smallest return is from the District of the detached part of Clerkenwell near Muswell Hill, which produced 81. 10s. only, and the most remunerative district is the district of St. Giles, Camberwell, which produced 1,7331. It is evident from these figures that the building trade has shared in the prevailing commercial depression.

Cantor Lectures.—The first course of Cantor Lectures at the Society of Arts is announced to be on the "Principles and Practice of Ornamental Design," by Mr. Lewis Foreman Day. The first lecture, on Monday evening next, November 29, will deal with the anatomy of pattern. The subject of the second and third lectures will be the distribution of ornamental design and the fitness of ornamental form respectively, while the fourth and concluding lecture will treat of natural form and ornamental treatment. These lectures are open to members of the Society of Arts, who have also the privilege of introducing friends. A limited number of tickets are available for the use of art-workers, actually employed in any handicraft connected with the decorative arts. Application for them should be made to the Secretary of the Society.

Mr. Browning's Proposed Residence at Venice.—Mr. Browning is happily quit of his almost completed purchase of the Palazzo on the Grand Canal at Venice. It proved on inspection that all the foundations were in a dreadful condition, and that an enormous expense would have been involved to render the place habitable by persons with English ideas of comfort and decency.—*World.*

British Archæological Association.

A meeting of this Association was held on Wednesday, November 17th, the Rev. Prebendary Scarth in the chair. Admiral Tremlett announced the discovery of a sepulchre, near Carnac, having the chambers connected by passages, the sides of which were formed of upright slabs of stone. Mr. Loftus Brock F.S.A., exhibited a series of penates from Cyprus. Mr. Irvine sent sketches of several recently-discovered sepulchral slabs covered with patterns of Saxon date, at Market Deeping and its locality. Mrs. Henry forwarded for exhibition some prehistoric relics found on the side of Helvellyn, about midway up. The chairman described some of the curious Saxon crosses at Gainsford and Darlington Churches. Mr. Thomas Blashill exhibited a series of photographs of some of the sarcophagi of Rome, of Classic and Christian times; also three of those in the Museum at Arles, one of which is similar to another in the Church of St. Trophime. A paper was then read by Mr. Thomas Morgan, F.S.A., on the results of the recent congress at Darlington, the general features of the places visited being passed in review, and attention drawn to the lines of the Roman roads intersecting the district. The second paper was by Mr. C. Lynam, on Esccombe Church, the recently-discovered Saxon buildings, which was visited during the congress. A third paper was then read by Mr. E. Walford, on "The Early Literary History of Darlington," attention being specially called to a local newspaper published for a few weeks only in 1772.

Metropolitan Drawing Classes.—We are asked to mention that Prince Henry of Battenberg will present to the students of the Metropolitan Drawing Classes the Queen's prizes awarded by the Science and Art Department. The ceremony will be held in the Guildhall, on Wednesday evening, December 1st, at eight o'clock, under the presidency of the Right Hon. the Lord Mayor, who will probably be supported by the Sheriffs, the Bishop of London, Sir P. Magnus, John McGregor ("Rob Roy"), and other members of the Local Science Committees. The prizes have been gained chiefly by working men engaged in the building and engineering trades. About 800 artisans, after the labours of the day, attended these classes for study and self-improvement, in order to become more efficient workmen. The work of the present session has already commenced in twenty-eight centres.

Gas and Water Rating.—The Scientific Publishing Company announce the forthcoming publication of a work on Rating Gas and Water Undertakings, and on the Law of Parochial and County Assessment, by Mr. William Griffith, barrister-at-law. The book will be divided into two parts, Part I. dealing with the principles and rules used in rating gas and water undertakings, and Part II. with the methods of making and enforcing payment of parochial and county rates. An appendix will be added, giving a *précis* of Acts of Parliament relating to valuation assessment, and rating of gas and water undertakings.

Dissolution of Partnership.—We are asked to mention that the partnership subsisting between George Wright, Alfred George Wright, and William Austin Wright, trading as George Wright & Sons, of 113, Queen Victoria-street, London, E.C., has been dissolved by mutual consent. Mr. George Wright retires from the firm, and the business will in future be carried on by Messrs. A. G. & W. A. Wright under the old style and title of "George Wright & Sons."

The Church of St. Mary, East Leake, Nottinghamshire, was re-opened on the 18th inst., after extensive reparation. The Decorated windows in the chapel in the south aisle of the nave, almost unique and of very interesting workmanship, have been made secure, and the eastern one filled with stained glass by Mr. C. E. Kempe. The builder was Mr. W. Belton, of Leake, and the architect, Mr. W. S. Weatherley, of London.

PRICES CURRENT OF MATERIALS.

	TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G.	..... ton	6	10	0	7	0	0
Teak, E.I.	..... load	9	0	0	14	0	0
Sequoia, U.S.	..... foot cube	0	2	4	0	2	7
Ash, Canada	..... load	3	0	0	4	10	0
Birch	.....	2	5	0	3	10	0
Elm	.....	3	10	0	4	10	0
Fir, Dantsic, &c.	.....	1	10	0	4	0	0
Oak	.....	2	10	0	4	10	0
Canada	.....	3	0	0	6	0	0

LONDON.—For sanitary improvements and general repairs at 30, Beethoven-square, for Mr. Augustus C. Soovell. Mr. Mark H. Judge, architect.—
H. Totes & Sons (accepted).....£290 0 0

LONDON.—For sanitary improvements, alterations, and additions at 16, Grosvenor-place, for Lieut.-Colonel Rosier. Mr. Mark H. Judge, architect, Park-place-villas.—

Drainage Contract.
Sprake & Foreman (accepted).....£201 0 0

Plumbing Contract.
Joseph Hume (accepted).....350 0 0

Hot Water and Fire Services.
Thomas Boulton (accepted).....285 11 0

LOWER CLAPTON.—For additions to schools, Bendsham-road, Lower Clapton, in the Hackney Division, for the School Board for London. Mr. T. J. Bailey, architect. Quantities by Mr. T. T. Green:—

Williams.....£7,081 12 9
Shurmut.....£,284 0 0
Hicks.....4,965 15 0
Taylor.....4,948 0 0
Stimpson & Co.....4,813 0 0
Godfrey & Son.....4,800 0 0
Atherton & Lattin.....4,500 0 0
W. Johnson.....4,579 0 0

LUTON.—For paving and roadmaking, for the Town Council of the Borough of Luton. Mr. W. H. Leete, Borough Surveyor.—

Aston-road.
Capper & Co., St. Alban's.....£200 0 0
Pryor, Luton.....185 0 0
Kingham Luton.....179 0 0
Wright, Luton.....174 16 0
Dunham & Son, Luton.....172 0 0
Waller, Luton.....180 0 0
Haselgrove, Luton and St. Alban's.....147 0 0

Cromwell-road.
Capper & Co.....£820 0 0
Pryor.....720 0 0
Haselgrove.....695 0 0

Hillside-road.
Ford.....£240 0 0
Dunham & Son.....230 0 0
Capper & Co.....230 0 0
Pryor.....185 0 0
Waller.....184 0 0
Haselgrove.....182 15 0

Tunstall-street.
Capper & Co.....£200 0 0
Wright.....480 0 0
Dunham & Son.....475 0 0
Pryor.....422 0 0
Haselgrove.....403 0 0

Hubert-street and Langley-street.
Wright.....£599 2 6
Capper & Co.....575 0 0
Dunham & Son.....585 0 0
Waller.....550 0 0
Pryor.....550 0 0
Haselgrove.....495 0 0

Arthur-street.
Kingham.....£235 0 0
Capper & Co.....230 0 0
Waller.....225 0 0
Dunham & Son.....225 0 0
Wright.....219 0 0
Pryor.....230 0 0
Haselgrove.....197 0 0

NOTTINGHAM.—For the erection and completion of proposed additions to Albany Works, Carlton-road, Nottingham, for Mr. Joseph Wright. Mr. Herbert Walker, C.E., architect, Nottingham:—

Wheatley & Maule.....£1,439 0 0
J. H. Clarke, Loughborough.....1,352 0 0
W. Bains.....1,329 11 0
Evans & Woodcock.....1,320 0 0
T. Cuthbert.....1,318 0 0
J. Turton.....1,316 0 0
E. Hind.....1,308 0 0
H. Vickers.....1,299 0 0
J. F. Price.....1,290 0 0
Wool Bro.....1,290 0 0
G. Bell & Sons.....1,283 0 0
H. Scott (accepted).....1,260 0 0

* The others are of Nottingham.

Ironwork.
G. R. Cowen & Co., Nottingham.....£294 12 0
Butterley Iron Co., Alfreton.....180 1 8
Goddard & Massey, Nottingham.....179 17 6
Stanton Iron Co., Alfreton (accepted).....170 3 7

SOMERSET.—For sanitary improvements and new system of drainage, at Sutton Court, for Sir Edward Strachey, Bart. Mr. Mark H. Judge, architect, 8, Park-place-villas.—
Edward Colston (accepted).....£257 15 0

WANDSWORTH.—For the erection of chapel in Mallinson-road, Bellingrove-grove, Wandsworth, for the Committee of the London Chapel Extension Fund. Mr. E. Speed, architect, Queen Victoria-street. Quantities by Messrs. Evans & Deacon, Adelaide-street, Charing-cross:—

J. D. Hobson.....£4,064 0 0
Laing & Son.....3,940 0 0
O. Craske.....3,419 0 0
Macey & Sons.....3,397 0 0
G. Lewis Smith.....3,279 0 0
W. Johnson.....3,141 0 0
J. Holloway.....3,175 0 0

* Accepted subject to reductions.

WILLESDEN.—For drainage works at Willesden, for the Metropolitan Railway Company:—

John Brooks, Watford.....£1,129 19 0
Jos. Mears, Collingwood-road.....1,048 0 0
J. Pizzey, Horsey.....925 0 0
Geo. Felton, Kilburn.....895 0 0
Geo. Butler, Camberwell-road.....870 0 0
Nowell & Robson, Kensington.....868 0 0
Rowland Bros., Fenny-Stratford.....819 0 0
R. Finnegan, Northampton.....850 0 0
J. G. B. Marshall, Brighton.....800 0 0
W. Neave & Son, Paddington.....732 0 0
Jas. Young, Buckhurst-hill.....723 8 8

* Accepted.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

W. K. M. O. A. H. C. H. B. D. F. J. M. S. (we should never advise the acceptance of a tender so low that it is manifest that little or no profit could fairly be made. The inevitable consequence is that the profit is made unethically, in its way, and is not a "thank" — J. H. B. — we cannot afford to do so.)
All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.
We cannot undertake to return rejected communications.
Letters or communications (beyond mere news items) which have been delayed, if at all, are not desired.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.

Six lines about fifty words or under..... 4s. 6d.
Each additional line (about ten words)..... 6s. 6d.

Terms for Series of Trade Advertisements, also for special Advertisements on front page (Complicated, usually, taken by Auction, &c., may be obtained on application to the Publisher.

SITUATIONS WANTED.

Four lines (about thirty words, or under)..... 2s. 6d.
Each additional line (about ten words)..... 6s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

* Stamps must not be sent, but all small sums should be remitted by Cash in Registered Letter or by Money Order, payable at the Post Office, Covent Garden W.C. to

DOUGLAS FOURDRINER, Publisher.

Addressed to No. 46, Catherine-street, W.C.

Advertisements for the current week (a notice must reach the Office before THREE o'clock p.m. on THURSDAY.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS.

MENTS or ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY morning.

PERSONS Advertising in "The Builder," may have Replies addressed to the Office, 46, Catherine-street, Covent Garden, W.C., free of charge. Letters will be forwarded if addressed envelopes are sent, together with sufficient stamp to cover the postage.

AN EDITION Printed on THIN PAPER, for FOREIGN CIRCULATION, is issued every week.

TERMS OF SUBSCRIPTION.

"THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 12s. per annum. Foreign: To all parts of Europe, Australia, and New Zealand, 26s. per annum. To India, China, Ceylon, &c. 30s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 46, Catherine-street, W.C.

Colonial and Foreign Postage.—An Edition of "THE BUILDER" printed on thin paper, for foreign circulation, is issued every week.

Best Bath Stone.

CORSHAM DOWN, } SUMMER DRIED.
FARLEIGH DOWN, }

BOX GROUND, COMBE DOWN.
WESTWOOD GROUND.

RANDELL, SAUNDERS, & CO., LD.,
CORSHAM, WILTS.

Bath Stone.

BEST QUALITY OF ALL KINDS.

PICTOR & SONS,

Box, WILTS. [ADVT.]

Douling Freestone and Ham Hill Stone

of best quality, in blocks, or prepared ready for fixing. An inspection of the Douling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES FRANK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADVT.]

Douling Free Stone For prices, &c., address S. & J. STAPLE,

HAM HILL STONE, Quarry Owners, Stone

and Lime Merchants,

BLUE LIAS LIME Stoke - under - Ham,

(Ground or Lamp), Ilminster. [ADVT.]

Asphalte.—The Seyssel and Metallic Lava

Asphalte Company (Mr. H. Glenn), Office, 38,

Poultry, E.C.—The best and cheapest materials

for damp courses, railway arches, warehouse

floors, flat roofs, stables, cow-sheds, and milk-

rooms, granaries, tun-rooms, and terraces. [ADVT.]

Asphalte.

Seyssel, Patent Metallic Lava, and

White Asphaltes.

M. STODART & CO.

Office:

No. 90, Cannon-street, E.C. [ADVT.]

MICHELMORE & REAP,

Manufacturers of

CHARLES COLLINGE'S PATENT.

COLLINGE'S PATENT HINGES,

LEVER, SCREW, & BARREL BOLTS,

Self-Acting "FALL DOWN" GATE STOPS,

and IMPROVED GATE FITTINGS of every Description

36A, BOROUGH ROAD,

DISCOUNT TO BUILDERS. LONDON, S.E.

BRABY'S PATENT GLAZING.

GLASS SET FREE.

ALLOWING EXPANSION AND CONTRACTION, AND PRECLUDING BREAKAGE.
ABSOLUTELY WATERTIGHT. PAINTING AND PUTTY SUPERSEDED.

OVER THREE MILLION FEET FIXED.

DRAWINGS AND PRICES ON APPLICATION.

— MODELS AND SECTIONS ON VIEW. —
LONDON: LIVERPOOL: GLASGOW:
352 to 364, EUSTON ROAD. 6 and 8, HATTON GARDEN. 335, ARGYLE STREET.

The Builder.

VOL. LI. No. 227.

SATURDAY, DECEMBER 4, 1886.

ILLUSTRATIONS.

Plan for the Paris Exhibition of 1889.—MM. Bonvard, Dutert, and Formigé, Architects; M. Alphand, General Director	804-809
The Ca d'Oro, Venice.—From a Drawing by Mr. F. T. Baggallay, A.R.I.B.A.	813-813
Newark Castle, Renfrewshire: Views, Details, &c.—Drawn by Mr. A. N. Prentice	816-817
Interior of Ellingham Church, Hampshire.—As Restored by Mr. T. G. Jackson, M.A.	820
House at Coombe, near Shaftesbury: Garden Front.—Mr. E. Towry Whyte, M.A., Architect	821

CONTENTS.

The History of the Guildhall of London.....	785	The Ca d'Oro, Venice.....	802	Embattled Gables.....	823
Restoration at St. Mark's, Venice.....	790	Newark Castle, Renfrewshire.....	802	Elham Union Workhouse.....	823
Notes.....	797	House at Combe, near Shaftesbury.....	823	Madame Lucca's New Mansion.....	825
Letters from Paris.....	800	Ellingham Church.....	823	Church-Building News.....	825
Sculpture, Royal Museum, Leipzig.....	801	An Air Process for the Purification of Sewage.....	824	The Student's Column: Stone Quarries.—XXIII.....	826
M. Alphand.....	801	Ancient Lights.....	824	Recent Patents.....	826
Results of Exhibitions.....	802	Cork Cathedral.....	826	Recent Sales of Property.....	827
Architectural Societies.....	802	"Non-Acceptance of Lowest Tender".....	826	Meetings.....	827
Heating Drawings by Gas.....	802	"Fruite Cost, and Painting in Plaster".....	825	Miscellaneous.....	827
Plan for the Paris Exhibition of 1889.....	802	Corsehill Stone.....	825	Prices Current of Building Materials.....	829

The History of the Guildhall of London.



THE ancient Corporation of the City of London deserves the thanks of all lovers of English history and antiquities for the publication of this great work.* The excellence of its

production, and the costly facsimiles, woodcuts, and chromo-lithographic plates with which it is embellished (to the number of fifty) indicate that neither money nor pains have been stinted in turning out a book that should be worthy of the capital city of the land, and of the associations, older or newer as may be, which cluster round the edifice to the description of which it is devoted. Mr. Price, to whom the task of writing or compiling the text was entrusted, has endeavoured to the best of his ability to fulfil that task, and in pursuance of it he conducted lengthy investigations at the Library and Museum of the Corporation, the British Museum, the Public Record Office, and several of the libraries at Oxford and Cambridge. Mr. Henry Hodge made plans and drawings of such buildings as were about to be removed for the erection of the new Council Chamber under the order of the library committee in 1882, and he was also directed to take drawings and dimensions of any ancient remains which might be revealed during the course of the excavations for the foundations of the new building. This resulted in the bringing to light of many details hitherto unknown or forgotten, which are chronicled herein in their proper places with the more publicly known history of the Guildhall. The demolition of the "Court of Aldermen's Room" and of the "Old Council Chamber" having been determined upon, Mr. J. P. Emslie was desired to make detailed water-colour drawings before the rooms were dismantled, and the coloured reproductions of this artist's work are among the most prominent in the book before us.

Mr. Price begins with a rapid sketch of Roman London, gradually advancing in importance to become at length the focus of the trade and commerce of the kingdom. He conjectures that there is little doubt that Aulus Plautius, the Roman Governor of Britain, Ambassador, or Vice-

General who first ruled in the newly-constituted colony, resided in London, from the circumstance of so many tiles having being discovered in City excavations with the inscription of PRB·LON., P·BRI·LON., P·PR·LON., and so forth, which are interpreted as referring to the Proprietor of Britain at London. The discovery on the site of Leadenhall of Roman buildings of a vast extent, and covering a considerable area, strengthens this conjecture. To the era of these institutions and these remains may be attributed also the offices of *Præfectus Urbis*, and other civic dignities, in which Mr. Price recognises the classic germ of the Mediæval development of the mayoralty, the aldermen, and the sheriffs. This localised rule surviving the disruption of the Roman Empire, we next meet with the Saxon head of the municipality, the *Portgerefa*, or *Portgrave*, an officer who developed into the mayor of Norman and post-Norman times. The portgrave at first, that is, in the reign of William the Conqueror, appears to have been one member (the lay or civil) of the three who formed the governing body of the City; the bishop representing the ecclesiastical functions, and the *burh-wara*, i.e., burgesses or corporation, the commonalty. During this Norman period London was governed like a shire. It was, in fact, a collection of small communities, manors, parishes,—some dedicated to foreign and obscure saints,—churches and guilds, in which the lords of such manors, the prelates of the churches, and even the elective aldermen of the guilds, might bear the title of Baron. It is this, perhaps, which explains the legend on the ancient seal of the Corporation, "*Sigillum Baronum Londoniarum*," whereon St. Paul stands with sword and book over Ludgate, with the towers, spires, and domestic gables of the city in the background. In the estates presided over by the aldermen and barons are the wards or burghal shires, into which some at least of the old cities had been divided. York, for example, the Domesday Book declares to have been composed of six shires, besides the Liberty of the Archbishop; Cambridge, perhaps, had corresponding subdivisions.

In the earliest list of London wards, as preserved in the City archives, and which until very recently was thought to be the earliest in existence (A.D. 1285), not fewer than twenty-four wards are enumerated, the names of which, for the most part, resemble those still in being. The "Ninth Report of the Historical Manuscripts Commissions,"—a work which, with all its faults and shortcomings, has done a vast amount of good in bringing to light unknown and unsuspected evidences which bear upon English history,—

drew the attention of London antiquaries to a manuscript belonging to the library of the Dean and Chapter of St. Paul's. This comprises a survey of the lands, with their respective measurements, for the most part rectangular or trapezoidal plots with the sides expressed in feet, which appertained to the cathedral church of St. Paul in the twelfth century, and it contains more information relating to the wards and the aldermen who exercised jurisdiction with them there than any document hitherto recorded. To Mr. Price belongs the credit of publishing this MS. in *fac-simile*, and of giving a tolerably correct translation of the contents. With the civic or political division into wards, and the ecclesiastical segregation into parishes, the mercantile associations, or guilds, are probably not far from contemporary. Guilds are, as we know, of great antiquity; they are also of diverse and comprehensive character; quite likely, as Mr. Price suggests, a survival of the *Collegia Opificum* of the Roman empire, in respect of their mercantile and artisan aspects; probably older still in those cases where they represent religious fellowships of persons associated for purposes of charitable assistance, decent burial, anniversary commemoration, and prayerful intercession. It has been suggested that the Anglo-Saxons found the Roman *Collegia* still in activity, even if greatly modified from their original style, and neither interfered in their practice nor controlled their principles. The British gild, or Mediæval guild, for both forms of the word are met with, has been derived from *gildan*,—Anglo-Sax., to pay; and *geld*,—seen in the well-known Danegeld, is a cognate form which two words still run current under the form of *yield* in our modern tongue. This society has three stages of development, voluntary membership, regulation by the general authority of the City, and self-government under royal charters of incorporation.

Of the history of the Guildhall of London in the time before the Conquest very little is known. Nothing has been handed down by tradition to associate the Guildhall with the site on which it now stands earlier than the reign of Edward the Confessor, and this is of the slenderest kind of evidence,—that the shield of arms fancifully ascribed by later heralds to King Edward are carved on bosses in the porch and crypt; but the appearance of this shield among general symbolical ornamentation merely illustrates a common practice in England in the thirteenth, fourteenth, and fifteenth centuries. According to Stow, to whom Mr. Price admits his general indebtedness, the first Guildhall was situated on the east side of Aldermanbury, and traces of early masonry found during some recent operation of

* A Descriptive Account of the Guildhall of the City of London, its History and Associations; with Charters, Maps, and other Illustrations. By John Edw. Price, F.R.S.A. Prepared by authority of the Corporation of the City of London, under the superintendence of the Library Committee. London: Large folio. 1886.

rebuilding premises seem to bear out the statement. There is, however, abundant evidence to illustrate the existence of a Guildhall in the thirteenth century, and, though alterations and enlargements have from time to time taken place, no evidence is forthcoming to show that the Guildhall of ancient times was ever situated in any other part of the city of London than where it now stands. In 1326 an enlargement took place; again, in the early years of the fifteenth century, 1411, necessities of the times demanded another enlargement of the Hall, the old hall being found to be inadequate to the accommodation required in consequence of the development and multiplication of the Livery Companies. As Fabyan, the chronicler, writes:—"In this year was ye Guyde halle of London begon to be newedyf and of an olde and lytell cotage made into a fayre and goodly house as it now appereth." Of this hall Mr. Price gives several views from engravings and panoramic illustrations, as well as some excellent woodcuts of the louvre, and some of the windows and other details. The entrance archway, a bold Gothic erection of pleasing appearance, was built in the year 1425. Above were effigies of Biblical personages and the Virtues. Of Mr. Price's lengthy notices of the details of architecture in the various halls and chambers we cannot here make even the most cursory account. He appears to have searched every spot and left no item unrecorded that could yield up any details worth notice. Fortunately there were ready to his hand numerous engravings and illustrations of almost every object, whether monument, window, doorway, facade, plan, or elevation. All these, with few exceptions, have been specially reproduced for the work in a way which reflects credit on the artist, the draughtsman, and the printer; and the general appearance of the book, which strikes us favourably at first sight, is borne out by the thoroughly genuine manner in which Mr. Price has striven to elucidate the points which arose from time to time as his work grew under his hand.

One of the most interesting portions of the Guildhall is the Crypt, which forms the eastern portion of the substructure of the Hall. It measures 76 ft. by 45 ft. 3 in., and averages 13 ft. 7 in. in height. It consists of three avenues of equal width, and is one of the few examples still remaining in London of Medieval crypts. The next on record is that of St. Stephen's, Westminster, which is of different aspect, as it measures 90 ft. by 28 ft., with a height of 20 ft. The restoration of this Guildhall crypt in 1851, by the City Architect of that day, Mr. J. B. Bunning, F.S.A., afforded the opportunity of adding an entrance on the north side, by which means increased facilities of access were given, and it became in consequence more generally visited and examined. The woodcuts representing the windows, pillars, bosses, and shields of arms, give an excellent idea of the sculpture in this part of the Guildhall. The chapel is another noble portion of the Guildhall. This also dates from the fifteenth century, but there had been a chapel at a far earlier period on the site. Abutting on the south side of the chapel stood Blackwell Hall, which had an extended front of brickwork about 105 ft. long, with a bold overhanging cornice and pediment supported by carved "modillions"; a moulded plinth and two string-courses relieved the face, dividing the stories of window openings with their solid frames, and dormers projected from the roof. The doorway was elegantly designed. The coloured drawing of this hall by Mr. G. Shepherd, in 1811, is one of the best reproductions of old buildings in the whole of the book. This curious specimen of ancient brickwork was removed in 1820. The Aldermen's Court-room, and its ceiling, a fine work painted by Sir James Thornhill,—also reproduced in colour, are two instances of the many invaluable specimens of the handiwork of the upholsterer, the decorator, and panel-painter which the Corporation possesses. The Council Chamber, which furnishes another excellent plate in colours, also deserves notice for its harmonious and pleasing proportions. The new Council Chamber, by Mr. Horace Jones,

first used in 1884, and of which an illustration appeared in the *Builder* for Dec. 1, 1883, is, of course, far more elaborate, but is somewhat overdone with carved details, with which the clustered columns and wide-spaced arches of the arcade barely accord. They appear to belong to an earlier style than the elaboration of tabernacle work with which they are surrounded.

Want of space forbids our entering upon any account of the latest phases in the history of the Guildhall. Its library, its museum, its banquets, its monuments, its charitable organisations, are all chronicled in Mr. Price's pages, and the reader who sits down determined to master the contents will indeed find a goodly feast for the mind stored up therein. The ancient Roman relics, though of considerable interest, seem scarcely so numerous, nor of such a fine class as we should have expected to see in the local museum of the greatest city in England. A few sculptured stones, a fragmentary mosaic pavement, an inscription or two, a dozen red ware bowls, some ancient lamps and bronze figurines, and a few leathern shoes appear to make up the tale of the Roman antiquities which Mr. Price has selected for reproduction; and Mediæval relics are represented by a so-called Norman jug and some leathern jerkins of the sixteenth century. Still with such a wealth of illustration as this book exhibits there is no need to find fault with this part of it. Perhaps the Corporation may see fit to entrust Mr. Price with the duty of preparing a companion volume, devoted to the elucidation of the numerous and attractive treasures of literature and art stored up in the museum of the Guildhall. If he expends as much time and care upon it as he has done in this present work, and they on their part are willing to be as liberal with such a subject as they have been with this, it will not be a fruitless undertaking.

RESTORATION AT ST. MARK'S, VENICE.

R. PIETRO SACCARDO, the architect, has recently reprinted from the *Archivio Veneto* (Series 2, t. xxxii., pl. 2, 1886) an account of the principal works executed at the basilica of St. Mark at Venice during the year 1885, together with a sketch of those proposed to be carried out during the year 1886.

It is perhaps rather late in the day to protest effectually against any works proposed to be done during the current year, but the document is instructive from the simplicity of its narrative, and exhibits a curious view of what an educated Italian thinks is the proper treatment of an ancient monument.

The author commences by observing that in the account of the work done during the year 1884 it was stated that the restoration of the last arcade of the principal front had not been completed, as the work was connected with the rectification (*riforma*) of the south side, the execution of which had been delayed by the reinstatement of the retro-altar of the chapel of St. Zeno, which was then approaching completion. Further obstacles also presented themselves in the shape of urgent works which constrained the employment of the limited number of workmen at the disposal of the authorities in other parts of the church. The work itself presented unusual difficulties, it being requisite to modify a portion of the fabric built a few years ago, and with the idea that it would serve as a buttress and would stop the movement which for ages past has been going on from the centre towards the southward. This work Dr. Saccardo claims to have effectually accomplished; to have restored the columns which were out of the upright to their original position; and to have enlarged the arch and reduced the size of the two archivolts,—all this having been done with the approval of the Government.

A peculiarity presented itself in carrying out this part of the work. In the last restoration, which was completed in 1875, the principal front was reduced in height (*accorciata*) in this part to the extent of thirteen centi-

mètres (5 in. English) between the bases and the impost of the arches, the pavement being also raised to the same extent with the intention of modifying the whole of the front in a similar manner. This reduction in the height was obtained to the extent of 7 centimètres by shortening the columns of the lower order, and to the extent of 5 centimètres by shortening those composing the upper order. The remainder was made by slight modifications in the intermediate architrave. At the present time everything, according to the author, has been replaced as it was formerly, and every member has recovered its original height without any addition being perceptible. And how was this done? asks the author, triumphantly. By an artifice, he replies, which the authorities leave the public to guess, if ever the public shall perceive what has been done when it sees this part of the front made old (*ornata antica*) as it once was. This, then, is how restoration is carried on in Venice: a portion of the west front of the basilica is restored in 1875 to what was then asserted to be its original condition, and in 1885 the work is pulled down and the church again restored to what it was before 1875. It is evident that both these restorations cannot have been right.

These are the author's principles of restoration. "To restore well," he says, "consists in doing it in such a way that nobody perceives the restoration. This is a duty and also a pleasure, but it brings but little satisfaction to the person superintending the work if, when the work is done, he hears said, 'What is the good of covering up a part of the building for a long time when there is nothing to see?'" This remark, Dr. Saccardo assures us, was frequently made when the first arcade beyond the grand entrance was uncovered, and he expects to hear it repeated when the last two arcades are finished. This, however, will not be added, be for some time, there being a great deal yet to do to the bench at the foot, the marble revetment, and various decorative portions of the building. It appears from this innocent confession that the whole of the western front is being entirely renewed.

The retro-altar of the Chapel of St. Zeno was completed in the course of last year, and was reopened towards the end of July. The polishing of the columns and other marble on the south front has been continued, and attention is called to the columns of red Oriental (Egyptian) granite on the left of the altar, which has been polished to such a degree that it sparkles, according to the architect, like a precious stone. The extreme hardness of this granite had almost induced the relinquishment of any idea of completely polishing it, but Signor Giacomo Boni having made an experiment upon a small scale, persuaded the authorities to persevere, and the operation resulted in what the architect considers was a splendid success, but which many artists will be inclined to believe was a deplorable mistake. The polishing of certain portions of an old building must inevitably destroy the harmony of colour which constitutes its chief charm. The introduction of polished granite into an architectural composition is always attended with some degree of risk, and a comparison of the design of the Carlton Club, Pall Mall, in which the columns on the upper story are of polished granite, with the palace at Venice, from which the Carlton Club is copied, where the columns on the upper floor are of stone, and are unpolished, will certainly result in a judgment in favour of the superiority of the older design.

"Returning to the principal front," continues the author, "we find ready prepared the new base of magnificent coralline breccia, which is to replace the base of one of the large porphyry columns which flank the principal doorway. We find also the large bronze gata of the last door towards the clock, which had remained closed for the last two years on account of the damage to the architrave, which has been repaired, as approved by the Minister of Public Education, in his despatch of the 4th of April, 1884 (No. 5,868), has been re-opened.

"On entering the atrium and turning to the

right, we perceive the tomb of the Doge Vitale Falier, with its marbles consolidated and restored in the upper part of the walling, which has been entirely renewed, together with the niche formerly crowned with his dentilled roundel, of Grecian marble (*sua ghiera di marmo greco a dentilli*), which is now approaching completion, with the gold mosaics of the background, the whole being ready to be placed in position.

"On the opposite side on raising one's eyes one no longer perceives the serious eyesore of the crooked and disconnected cornices of the last two little cupolas on the left and those ugly cracks and blackish stains which spoiled the mosaics of the cupolas, and of the vaults and lunettes surrounding them, the whole of the mosaics having been taken down and properly replaced (*levato e ricollocato a posto regolarmente*) as well as repaired and cleaned; the most important is the celebrated mosaic of the 'Judgment of Solomon,' by Bianchini, which had been only too much damaged by numerous restorations, and from neglect had become almost unrecognisable.

"Casting our eyes around the interior, the wall screens and pilasters, the cores of which, in my report for the year 1884, I noticed as having been rebuilt, have now been re-invested with their ancient marble lining, and present the same appearance as formerly, with the exception of being ruinous and falling; they now defy the action of time by the firm and solid manner in which they have been strengthened and connected with the main walls. Looking down upon the pavement we shall see that large portions have been relaid (*rifatti*) in the ancient manner (*all'uso antico*), and with those superb ancient Oriental marbles with which the basilica has been copiously enriched within the last few years from the ruins of Aquilera and Concordia. The restoration of the pavement, which in this part has been damaged beyond measure, is still going on, the work being done by a sympathetic and intelligent old artist, one of the most able men in Venice at this kind of work, who, notwithstanding, is satisfied to accept the modest wages of a workman."

Mention is made of the restoration of the Reliquary which is now going on, and for which the sculptor, Soranza, has modelled twenty-seven statuettes for the smaller niches, and replaced a considerable portion of the decoration where missing or decayed. The altar of St. Peter in the Chapel of St. Peter has also been renewed, in a manner which appears to be quite satisfactory to the architect and the cathedral authorities. The mosaics over the altar of the Blessed Virgin Nicopela having become, as is alleged, detached and ruinous through the percolation of water through the external wall of the church, have been thoroughly restored. The Chapel of St. Isidoro (commenced by the Doge Andrea Dandolo about 1125, and completed by the Doge Giovanni Gradenigo, the successor of Marino Faliero, in 1355), which until recently was used as a sacristy, has been completely restored and re-adapted to its original purpose as an oratory. In the words of the author, "without having lost any of its antiquity, majesty, and its intensely picturesque appearance, it makes a rare show, and displays the splendour of its treasures to the best advantage." This declaration we feel we have every reason to regard with the greatest suspicion.

This restoration, we are informed, involved long and patient care for its accomplishment. The ceiling was full of cracks, and in one place the head of a figure was separated as much as 3 in. from the body. Large portions of the mosaics of the ceiling were removed and refixed, the deficiencies being supplied, the displaced parts re-arranged, and an enormous quantity of cubes of glass and marble used where necessary.

The mosaics in the ceiling of the Chapel of St. Zeno have been refixed, and have, it seems, been universally admired. Other works are the removal of a wooden balustrade to the gallery over the Chapel of St. Clemente, which was decayed and dangerous, the rearrangement (*la riforma*) of the door behind the altar in the same chapel, the conversion of some rooms

in the rear into a laboratory, the restoring and polishing of the columns of verde antique at the back of the Pala d'Oro, and the re-arrangement of their capitals.

Some ideas may be gathered of the extent of the work going on at the basilica from the amount of marble which it is stated in the report has been warehoused for use in the work of restoration, about 130 feet cube of marble having been obtained for the south and west sides of the cathedral. This marble is very valuable, costing 5*l.* 17*s.* 6*d.* per foot cube, and is sawn into extremely thin slabs.

The total sum spent on the works during the year 1885 amounted to 64,946 lire, or about 2,597*l.*, which is considerably in excess of the annual sum allocated for the purpose. This amount is swelled by some extraordinary expenses, among which figure 110*l.* for new banners (1); 182*l.* for the cartoon of a mosaic of Paradise by Girolamo Pilotti, purchased at the request of the Minister of Public Instruction; the restoration of the right-hand organ, which cost 58*l.*; some trifling repairs (*alcune puntate*) to Orgagna's work, which amounted to 18*l.*; and law expenses, which cost 112*l.*: the total amount being 480*l.* These extraordinary expenses are taken out of the reserve fund, which, notwithstanding this debit, amounts, it appears, to 1,725*l.*

With regard to the works to be undertaken during the current year, the most important, in the opinion of the architect, is the completion of the restoration (*ristoramento*) of the principal front as approved; in the interior it will be necessary to complete the Chapel of St. Zeno, restoring the semicircular portion where perished and refixing the defective facings of the rest of the walls. Some portions of the ancient mosaics of the roof which have been removed require to be refixed, and it will be necessary to take down and refix the mosaics in the semi-apse (*semi-catino*), preserving the two angels, and making new (*refacendo*) the figure of the Virgin with the Child, which has been badly restored. With regard to this figure it is intended to use a figure of similar character in the apse of the cathedral at Torcello, of which it is proposed to make a tracing as a model for the new work.

The monument of the Doge Dandolo, already referred to, will be completed, the decoration carried through, and the missing portions replaced. A portion of the external covering of the roof and of the cupola is said to be in want of repair. As regards the cupola, it is proposed to repair it, where in sight, with sheets of old lead, in order that it may retain its picturesque appearance. It is also proposed to restore the stonework of the three circular windows in the principal front.

With respect to the pavements, these are Dr. Saccardo's own words, which are important, as in a recently-published letter he asserted that the report that he proposed restoring the pavement was entirely without foundation (p. 26):—

"In the interior of the church one of the most urgent works is the regulation (*ristoramento*) of the large piece of pavement, composed of slabs of marble, which is under the central dome, on account of its partial sinking, which appears to increase, and occasions frequent and dangerous falls. It will be also necessary to continue the restoration of the pavement in the body of the church, as well as in the vestibule (*st nell' interno, come nell' atrio*), adapting and making use, possibly, of the mechanical saw, with regard to which experiments are being made, as already explained."

The marble altar for the Chapel of St. Peter is in hand. It will also be necessary to complete the restoration of the Reliquary and the Chapel of St. Clemente. Another urgent work is the draining of the crypt, which is filled in parts with water, which renders it not only useless, but unhealthy.

Finally, as regards the mosaics. The work remaining to be done is the restoration of the large screen over the altar of the Madonna, which has already been approved by the Government, and possibly a general examination of the whole of the mosaics.

Dr. Saccardo concludes his report by

regretting that the Government will not allow him to clean the marble facing of the screens in the interior, and winds up with the following remark, which we give in his own words:—
"E cost, mentre sui muri esterni delle chiese si suole comunemente, 'E proibito di lordare,' sui marmi di S. Marco sta scritto invece, 'E proibito di lavare.'"^{*}

The Government are probably aware that in some instances the cathedral authorities did not confine themselves to the use of water for cleansing purposes, but made use occasionally of hydrochloric acid; and they are therefore wise in declining to give the permission desired, although why they should allow the mosaics to be not merely cleaned, but absolutely made new, and should not allow the marble screens to be cleaned from dirt, will be a puzzle to most of the uninitiated.

NOTES.

THIS is not a very satisfactory feature in our administrative organisation that the Metropolitan Asylums Board and the Local Government Board cannot make up their minds as to the character of the buildings to be erected for small-pox patients, whether they shall be the old wooden huts, or a new and permanent brick hospital at a cost of 84,000*l.* There is much to be said on both sides, the principal argument which the Local Government Board advances in favour of wood huts being that of economy. It is better, says the Board, to spend 20,000*l.* instead of 84,000*l.* The Asylums Committee answer that the saving is more seeming than real. The wooden huts, if they are to be really useful in summer and winter, will cost only from 20 to 30 per cent. less than brick, while the cost of the repairs will be double and the duration not more than one third. The huts, moreover, would get saturated with infection (a strong argument), and be far more liable to fire and total destruction. The Committee point out that the huts and plant now in the camp cost 48,000*l.*; that, after eighteen months, their value has shrunk to 12,000*l.*; and that the establishment expenses (quite apart from the maintenance of patients) were 32,000*l.* Both Boards are agreed that so much has to be spent on new buildings, and the point at issue is, shall they be of wood, which costs less at the time, but will not last, or brick, which will cost more, but be permanent? The dispute, in which the Local Government Board naturally has the upper hand, seems to have assumed a somewhat personal aspect, the Asylums Board being very united in backing up its opinion. The only dissident is Sir Edmund Currie, who believes that the wood structures will last at least twenty years, by which time the arrangements of any new hospital would possibly become obsolete.

THIS is very little doubt that cremation is making rapid progress on the Continent, and especially in Germany, where cremation societies are starting up in several towns. The body of a Cabinet Minister for Brunswick has lately undergone the operation, as also has that of the Superintendent of the Evangelical Church, and these two examples in such high quarters have given a decided fillip to the system throughout the country. Italy is about to adopt a new form of electric crematorium, in which the body will, it is stated, be instantaneously disposed of, though this is scarcely likely, nor, indeed, would it be entirely desirable. According to the latest report of the Gotha crematorium, the actual cost of cremation is 430 marks (21*l.* 10*s.*), though this sum does not include any accessories of the service, which are provided according to taste. The ashes of the deceased, which weigh only about 4 ounces, are given house-room for a certain time at the establishment without expense, but are, at the end of that time, handed over to the owners to dispose of them as they think proper. In this country

^{*} Thus while on the external walls of churches you commonly see "Commit no nuisance," on the marbles of St. Mark's it is written, "It is forbidden to wash."

cremation moves but slowly, Woking having recently had its eleventh operation, though it is worthy of notice that it attracts no attention now, and that the ridiculous clamour which characterised its first introduction has quite died away.

THE opening of the Severn Tunnel, on December 1st, for passenger traffic, is an event of considerable importance in the railway world; and although the full benefit of the union of the Gloucestershire and Monmouthshire sides will not be all at once felt as far as the through traffic to London, the local ports, such as Cardiff, Newport, and Bristol, will be benefited immediately. The intercommunication between these busy industrial towns is always on a very large scale, and the fact that some ten trains will daily bring them within an hour of each other, cannot fail to benefit the South Wales coal trade enormously. From the North of England we hear that the branch Windermere line is to be extended to Ambleside, whence before long it will probably go on to Grasmere and Keswick, where it would meet the Penrith and Cockermouth line. The residential population in this part of the country has so greatly increased that a railway has become a necessity, and the landowners have shown their conviction of this by giving land and assisting the new scheme in every way. In Derbyshire, the London and North-Western are going to make a branch from Buxton to Leek, through Hindlow. This will open up a bit of hill and moorland district which is very little known, and to the exploration of which it is quite worth devoting a few days.

THE re-opening services on the completion of the first section of the restoration at St. Bartholomew's Church, Smithfield, took place on Tuesday last, November 30th. The Bishop of Colchester, in the course of his sermon at the morning service, reviewed the history of the church. At the close of the service opportunity was taken by many of those present to inspect the large quantities of worked stones which have been found from time to time during the progress of repair. These consist for the most part of carved portions of arches, capitals, bases, and shafts of twelfth-century arcades, as well as other portions of the decorative sculpture, from a building which is conjectured to have stood on the site of the Lady-chapel itself; there are also nearly the whole of the traceries of the large eastern window, and numerous moulded voussoirs of fourteenth-century work. Among the miscellaneous relics are an iron sword, an iridescent glass vessel of the sixteenth century, a Bellarmine or greybeard jug of bluish-grey pottery, of the same period, and several carved and winged cherubic heads with lusty cheeks, of a later date. The new part of the apse does credit to Mr. Aston Webb, the architect. It harmonises thoroughly with the rest of the building, for all its details are derived from corresponding measurements in the extant portions of the ancient work. We fear, however, that the position of the clergy and choir in stalls under the organ at the west end of the church will be found inconvenient. It is interesting to note that not a single stone of the work which was carried out by Professor Lewis in 1866 has required to be removed, so thoroughly compatible was his work with the true spirit of the required repairs. The dangerous condition of the great arches of the crossing, on account of the absence of transepts, is apparent, the nave walls being, in some cases, out of line and out of plumb; hence the re-erection of at least shallow transepts is a pressing need; they would give great support to the walls and roof. Another imperative work is the removal of the forge, which was in full swing during the service on Tuesday last. The unseemly clanging and the frequent vibrations caused by heavy sledges pervaded the whole building; and apart from this, the chimney of the forge, which is actually within the church, jeopardises the very existence of the building, as a fire might break out at an unexpected moment.

IT appears that the Executive Committee re the Wellington Statue have decided to place the statue on the ground immediately in front of Apsley House, the statue to face Apsley House, on a line axial (we presume) with the centre line of that building, and so as to be seen in profile eastward and westward from Piccadilly. This is unquestionably the best place for the statue, and this was the position proposed by the present editor of this journal in a letter and plan under his signature, addressed to and published in the *Builder* more than four years ago,* before the regrettable removal of the arch, which numbers of persons (including those in official places) are now beginning to see was a blunder. The statue will probably have a kind of square stepped terrace formed around it, as far as the limits of the plot of ground allow, the inevitable corner pieces being made the best of in some way. What can be done, however, with the shoulder-of-mutton pieces of ground which the present surveying-clerk's method of "laying-out" (?) the site has left?

WE see by the agenda for this week's meeting of the Metropolitan Board of Works that the Works and General Purposes Committee will present a further report on the whole question of the appointment of a Superintending Architect, recommending—

- (a) That advertisements for the office of Superintending Architect be inserted in the leading professional papers; that the age of the candidates be unlimited, and that the salary be £5,000 per annum.
- (b) That the candidates who have already applied for the office and sent in their testimonials be informed that their applications will be considered, together with those which may be received in answer to the further advertisement, unless they express their wish to withdraw.

Some gentlemen who were exceedingly irate with us for venturing to say that the list of candidates was inadequate to the occasion, will therefore be able to gather that the Committee, at all events, is apparently of the same opinion with ourselves.

AT the same meeting of the Board, the Committee will also present a report stating that, having fully considered the reference by the Board as to the death of the Superintending Architect in connexion with the pension recently voted to him by the Board, the Committee regret that they are unable to advise the Board to take any action in the matter. On this point we observe that Mr. Richardson has given notice of his intention to move:—

"That it be referred to the Works and General Purposes Committee to consider and report as to the remuneration to be given to the representatives of the late Superintending Architect in consideration of his services given at the special request of the Board from and after the date of his resignation to the day of his decease."

NOT before it was much needed Messrs. Bohn have issued, in their "Classical Library," a translation of the ten books of Pausanias, the "Description of Greece." The fact that up to the present time no translation into English has been made since 1794, testifies in the most conclusive way to the utter neglect of archaeological study by the ordinary classical scholar. The translator of 1794 remarks in his preface, most truly, "As to the ensuing work, it ever has been, and doubtless ever will be, considered as an invaluable treasure of Grecian history and antiquities; for Pausanias, with the most consummate accuracy and diligence, has given an account of the temples and remarkable buildings, the statues and festivals, and games and sacred offerings, the mutations of empires, and the illustrious transactions of kings in every part of Greece." Yet this invaluable treasure "has been, save for the specialist, practically hidden in a field." No less remarkable is it now that Pausanias is obtaining an ever-increasing popularity; the new translation by Mr. A. R. Shilleto, of Trinity College, Cambridge, has an eager public waiting for it. We have reason also to believe

* See *Builder*, April 22, 1882, "Six vos non volis me licetis apes."

that very shortly two other translations will be offered to the public; one of the complete work, with archaeological "notes," another of a portion only, profusely illustrated from ancient art. There is room for both. Mr. Shilleto's translation has no notes of any description, either literary or archaeological. To discuss the text would here be manifestly out of place; we must note, however, that the book has an excellent index.

THE October number of the excellent series of "Professional Papers on Indian Engineering" contains notes and illustrations on several constructional matters of special interest. One of these is a paper by Mr. J. C. Larmine on the utilisation of disused railway rails, accompanied by a plate showing a proposal for such rails as substitutes for the timber beams usually employed to support the screw gearing of weirs and sluices in India; the drawings having been prepared for a tank weir in the Tinnevely district. The rails are easily put together, and form less obstruction to the passage of the water than timber piers. The idea of turning disused railway iron to account in this kind of way is certainly worth attention from an economic point of view. Mr. Milne, of Madras, contributes a paper and illustrations on the construction of terraced roofs so as to provide for the movement of the roofs from various causes and separate them from rigid attachment to the walls, a matter of much importance in India, where flat roofs are so largely used, and which is of some interest also to English constructors. These are among the shorter papers of the number; other longer and more elaborate papers include that by Captain Harrison, R.E., on "The Stresses developed in the Girders of Mr. Whiting's Stiffened Suspension Bridge," and another paper by the same author "On the Stability of Structures employed in Spanning an Interval."

WE have received the second edition of Mr. Herbert Griffiths's "Guide to the Iron and Steel Trade,"* giving names of manufacturers and list of brands. The trades tabulated include iron smelters, iron manufacturers, steel converters, steel-rolling mills, plate manufacturers, galvanised iron and wrought iron tube manufacturers, the brands of each class of trades being appended as a separate list. The book is very fully and clearly indexed.

THE fogs with which London was last week plagued point to the obvious need of proper preparations being made to mitigate their inconvenience as much as possible. The word "inconvenience" in relation to these visitations is perhaps scarcely strong enough, for they cause loss of money and time which in the aggregate amounts to a very large sum. It is obvious that what is needed to mitigate the consequences of these fogs in the thoroughfares of the metropolis is stronger light. Where the Argand and Sugg burners with strong reflectors are used the inconvenience to the traffic is considerably lessened. But where there is no other light than the ordinary single gas street-lamp, the latter has little more power over the fog than a farthing candle. It is questionable, however, whether the ordinary street-lamps might not be lowered with advantage, but certainly at some places in the chief thoroughfares powerful lamps should be erected, to be lighted when London is enveloped in a fog. Near such lamps the traffic would be reorganised.

THE days when to travel through the Peloponnese was an adventure are now, indeed, at an end. The *Berliner Philologische Wochenschrift* (of what other country but Greece would the railways be reported in a philological journal?) gives the following particulars of railways actually open. First is that from Athens to Nauplia, with stations at Megara, Corinth, and Argos. We wonder if any one now will face the horrors of the local steamer, or will the

* Published at the Iron Trade Exchange Office.

steamer cleanse itself from its past iniquities to compete with the railway? We conjecture that the tourist will go at least one way by rail to visit the robber Skiron; the cliffs are still steep, though the tortoise at the foot no longer batters on the bones of the travellers. "Poor tortoise, no traveller!" as the child said of the lion who got "no Christian." Next from Corinth to Pallas, all along the gulf. From Argos to Myli, nearly opposite Nauplia; Pyrgos to Katakolo; Athens to Thorikos, between Pentelicos and Hymettus. The iron bridge which is to cross the cutting through the isthmus is finished, and the isthmus itself will shortly be cut through,—a great boon, not only for trade, but for the pleasure-seeking and, let us hope, inscription-collecting yachtsman.

THE *Proteus* for 1885 of the Athenian Archaeological Society (which appears a year late) is specially valuable this year on account of the excellent plans of excavations from the hand of Dr. Dörpfeld. We imagine that the readers of the modern Greek text which accompanies the plans will in England be few, but happily the plans speak for themselves, and we hope many will inspect them. The first report relates to Epidaurus, and is from Dr. Kabbadias, the new Director of Antiquities. From time to time we have given particulars of the various discoveries in the course of the excavations, but till the issue of the present report anything like a complete view was impossible. As yet the whole of the sacred enclosure described by Pausanias has not been laid bare, but quite enough has been done to confirm and illustrate his account. Not only have the foundations of the actual Asklepios temple been dug out, but also the temple of Artemis, with its dog-headed waterspouts, characteristic of the hunter-goddess. Three plans are devoted to the illustration of the Epidaurus excavations, a fourth to Eleusis. The excavations here have yielded very complex results. Dr. Philios, who writes the report, thinks he can distinguish as many as six strata or periods.—1. The most ancient temple of all. 2. That destroyed by the Persians. 3. The temple as immediately rebuilt. 4. That of the time of Perikles. 5. The portico of Philon. 6. The internal changes made by the Romans. The third report, with its accompanying plan, deals with the Amphitheatre at Oropos.

IF the Prudential Assurance Company have really, as stated, purchased Staple Inn with no intention of pulling down, rebuilding, or by any means treating it as a mere commercial speculation to return as much money as possible at all costs to architecture and archaeology, they certainly merit a special paragraph of appreciation from those who are interested in the picturesque of architecture, and in the historical associations of Old London. The proceeding is so unlike that which is habitual in the present day (especially with "companies"), that it is somewhat difficult even to give full credit to it. We wish there were more companies in London with the same spirit pervading them.

THE Chairman of the Chelsea Vestry reported to the Vestry in December last that the Surveyor had informed him that the agent of a disinfectant manufacturer had offered him a bribe to recommend his goods to the Board. Mr. G. R. Strachan, the Surveyor, also made the allegation to the Vestry; and the discussion which followed, as to whether any proceedings should be taken in the matter, was reported in the local papers. Actions for compensation for libel were instituted by the manufacturer and his agent against Mr. Strachan and one of the local newspapers. It is now reported that these actions have been abandoned, which may be taken as a practical admission that the actions would not hold water; but we should have been glad to see a test case of this kind fairly tried.

THE Exhibition of the Society of Painters in Water Colours, though containing few large or elaborately-finished works (and these

are mostly not the best of the collection), is a most admirable one in regard to the number and quality of sketches and studies, many of which represent artistic styles of very marked originality. Mr. Naftel's works seem to gain year by year in artistic feeling and in atmospheric effect; "Near Pont-y-Cafyn" (33) recalls Corot a little, and perhaps inclines rather too much to the misty manner of that artist. Among other studies of special effects may be named Mr. North's, "The Bat begins with giddy wing" (15), to which title he considerably adds, "barley-field over the hedge." We could not gather that from the picture, though the tone of the scene is beautiful. Mr. North would perhaps reply that neither could we in nature differentiate a barley-field, viewed en masse, except by colour. Mr. Eyre Walker is very strong in special atmospheric effects (see 21 and 40),—another artist who is always doing better than last year. Mr. Tom Lloyd's small "Home" (99) is more interesting to us than his larger drawing, "The Favoured One" (101), though, of course, there is less work in it. Mr. Herbert Marshall exhibits a fine view over "Winchester" (108), and it may be noted that there is rather a full proportion of architectural subjects, including various drawings of the triumphal arches of Rome by Mr. H. P. Rivière, also Mr. Wallis's "Courtyard of a Jew's House at Cairo" (56), Mr. Marshall's "Dordrecht Cathedral" (62), Mr. Glennie's "Gateway of Massa Carrara" (212), and two lovely and quite magical little sketches of Lucerne, by Mr. Albert Goodwin (229, 280). Mrs. Allingham has several works as delicate and beautiful as ever in landscape effect, and in the character and truth of her often minute figures, of which the features and expression seem quite complete on however small a scale, yet without a touch of hardness. It is impossible to name a tithe of the works that invite mention; we may cite, among others which struck us especially, Mr. Gregory's powerful landscape, "Gorse" (201), with figures somewhat à la Mrs. Allingham; and Mr. T. J. Watson's "Farm-yard, Surrey" (138), a broad De Wintish kind of thing; Mr. Phillips's "The Glyders, North Wales" (104); Mr. Thorne Waite's "Shoreham" (96), and Mr. H. Marshall's "Last Breath of Day" (72). Mr. Robertson's "Alnaschar's Dream" is a brilliantly-executed work, perhaps rather failing in dramatic power in telling the story.

THE Institute of Painters in Water Colours is an unsatisfactory exhibition to go to, containing a great many works up to a certain level, and very few that rise to the highest kind of interest. We are glad to find that some old members who used to persist in exhibiting the decay of their powers and perceptions in disproportionately large drawings have subsided a little, which is one thing gained for the character of the Exhibition. Mr. Edwin Hayes, in certain large and, in their way, successful sea pieces, rather curiously recalls the manner and style of Stanfield. Miss Pickering's "Sea Maidens" (46), a row of mermaids waist-deep in chilly water, just misses its aim; the figures are destitute of any possibility of life, even of a mermaid order. There is a good deal of beauty both of drawing and colour in her ideal figure "Luna" (262). Mr. Arthur Severn's "Waves breaking against a Sea-wall" (192) is fine in action and movement, questionable and unreal in colour. We presume the figures of sportsmen and gamekeepers in Mr. Heywood Hardy's large work "Arranging the Next Beat" (198) are portraits. In the light of a portrait picture it is very good and with much delineation of character; regarded apart from this portraiture object it would have little interest. Mr. F. D. Millet's "The Interlude" (154), an interior where a violin player is waiting while his fair companion gets through the interlude portion on an old-fashioned piano, is more highly finished, and has more power of colour and effect, than some previous works of this painter; it is one of his best achievements. Mr. Keeley Halswelle has got an effect, unquestionably, if a rather forced one, in his large "Ely" (129); and Mr. Ivystan Hetherington's "Slumbering Village" should be looked

at as a landscape with an unusual and poetic effect. Mr. Fitzgerald's "Sympathy" (407) contains a good bit of flesh painting. Mr. Stock's large ideal work, "Love driven out by the World" (563), fails in the delineation of the "World," who is far too respectable an old patriarch to take such a step, but the figure of Love is good. Mr. Hemy's "Land's End Crabbers" (699) is a capital work; Mr. Carrick's "Boy at a Pool" (733), a small painting, with genuine character in it. Among the humorous works, of which there are always some in this Gallery, may be named, Mr. Forbes's "Adam and Eve" (348), a repetition of the temptation to eat an apple; Mr. Dadd's "Good Old Days" (184); Mr. Burton Barber's "Two's Company, Three isn't" (538), Mr. Gore's "The Dog it was that Died" (43), &c. For sheer vulgarity, the big and elaborately-painted work called "An Egyptian Study," a portrait of Arabi's former "Counsel" in his study, may certainly carry off the palm.

IT is a truly exquisite exhibition which Mr. Sutton Palmer has made at Messrs. Dowdeswell's, of his water-colour drawings from the English Lake Country. Mr. Palmer is a pure water-colourist, bringing into play the essential beauties of this form of art,—aerial tones, delicate distances, a beautiful atmospheric transparency and light. The drawing of the landscape is as true and fine as the colouring and aerial perspective, and the scale and distance in some of these small drawings is remarkable. There are seventy-six in all, among which we may mention as especially good, "Helvellyn, Thirlmere" (2); "Waterhead, Windermere" (15); "Rydal Vale" (20), a broadly-treated sombre wooded landscape; "Departing Day, Rydal Water" (27); "Silver Morn, Thirlmere" (32); "Sunny Haze, Langdale" (50). There is scarcely, however, a weak drawing in the collection; it forms a worthy series of illustrations of one of the most beautiful of regions, and distinctly advances Mr. Palmer's place among contemporary artists. The only thing we object to in connexion with the exhibition is the bad taste and folly of sending round a printed opinion from Mr. Ruskin with the invitation tickets, and tacking it on to the programmes. This is a kind of impertinence that ought to be protested against. People of any artistic knowledge wish to form their judgment, and not to have that of Mr. Ruskin pitched at them, as if they were children, to believe whatever they are told.

THE Society of British Artists used to be chiefly dull; it is now chiefly eccentric. It has entered into the stage of Whistlerdom, and part of its old makers of commonplace have been shut out from bliss, and most of the others have been seduced more or less in the direction of Whistlerdom. Mr. A. Ludovici, jun., seems to have aimed at out-doing his model, in his painting of the ghost of a ballet-dancer spinning round on her toe (170); he has caught some of the capacity of his chief for representing action also; it is very clever, but "don't do it again." Mr. Whistler labels as "unfinished" what is to the eyes of the Philistine the most finished of his works exhibited here, the full-length portrait (259) of a lady whose name is at present before the public in a very painful manner. His "Harmony in Red—Lamp-light" (227) is a fine thing. Near to this Mr. G. Clausen, one of the "dauntless three," has a half-length called "A Girl's Head" (229), which is admirably painted, and serves as a good practical comment on his claims for better treatment at the Academy. Mr. Jacomb-Hood's "A Portrait" (250) is a delicate and characteristic painting of a young woman seated, entirely in black, her face and hands showing a very delicate flesh colour against the dark raiment, though there is little of the texture of flesh to be made out in it; but then we have changed all that. "A Summer Day" (245), by Mr. William Stott, "of Oldham," makes one wish that he and his works had remained at Oldham; this picture, representing three odious little naked

boys with parchment skin, in the middle of an expanse of brown which means seashore, is a veritable degradation of the art of painting. A small work, called "Rehearsal: the End of the Act" (260), by Mr. Walter Sickert, should be looked at; there is an idea in it. Mr. Whistler's drapery of the room is very successful and effective, and his remark in a letter to the *Times* (which that journal seemed to regard as a joke and relegated to a "par." corner), that there was no need to remove the battens above the picture-line, as they added to the decorative scheme, is quite correct: they furnish a couple of horizontal lines to contrast with the festoons; their removal would be a loss. Altogether, both instruction and amusement are to be obtained from the Society of British Artists' Exhibition; and that is more than could be said of it for some time back.

LETTER FROM PARIS.

LAST week the competition for the painted decorations for the new Mairie at Pantin was decided. As this is one of the more important buildings of the suburban district, the departmental assembly was generous, and a total of 55,000 francs was voted for the work. It must be admitted that as this sum is to provide for the decoration of the Salle des Fêtes, the Salle des Mariages, and the chamber where the local authorities hold their sittings, as well as for the staircase decoration, the cost of each painting is after all but modest.

Owing to the not very flourishing condition of art in general and of painters in particular, this new competition has been responded to with avidity, and among the seventy competitors are many of the best known painters, who, in general, would hardly care to enter the lists in a matter of this kind.

The competition, as usual in these cases, is a double one; the three competitors selected by the jury as the best will compete anew between themselves, and present a portion of their composition full size for the final decision in February. The three painters selected are M.M. François Lafon (pupil of Cabanel), Henri Lévy (pupil of Picot, Fromentin, & Cabanel), and François Schommer (pupil of Pils & Lehmann).

The first has confined himself to pure allegory, and his composition, a little mannered but agreeable and harmonious in colour, will, at all events, suit very well for the Salle des Mariages. M. Lévy has already shown very fine qualities in his Pantheon decoration, but he has here gone into the world of dreams entirely, and one can hardly see, in a commune essentially prosaic and industrial, the suitability of his Neo-Greek composition of "jeunes beautés, troupe agile et dansante," posing in an idyllic landscape. The large staircase ceiling symbolising "Work and Plenty" is much finer, and shows true artistic feeling. As to M. Schommer, he has more happily gone to actual French history for the inspiration of his principal painting, showing the defence of Pantin in 1815 against the Russian army. Although Paris and its environs offer to painters a store of subjects of this kind, this is the first of such occasions in which we have known a painter quit for these subjects the well-worn paths of mythology; M. Schommer's attempt in this direction shows the hand of a master; and if he obtains the commission, his success will be a good example for the future decoration of new civic buildings.

This same Commune of Pantin had been chosen by the administration as the site for one of the two new Parisian cemeteries intended to replace the great necropolis which had been projected at Méry-sur-Oise; the other will be at Bagneux. They will not equal the area of the immense plan proposed for Méry by the Imperial Government, and subsequently taken up by the Republic, and which would have been realised now but for the unfortunate obstinacy of the Municipal Council. The cemetery at Pantin, nevertheless, includes 103 hectares and that at Bagneux 67.* Thanks to M. Formigé, the architect, something really fine has been done with the entrance gates, and the interior has been very well arranged. It is probable that the mortuaries, for which M. Formigé has presented designs to the Municipal Council, will be annexed to these two cemeteries. These mortuaries are partly based on suggestions gathered from an inspection of buildings for the same object in England, Belgium, and

* A hectare is nearly 2½ English acres in extent.



M. Alphonse, Director of Public Works, and of the 1889 Exhibition Works, Paris.

Germany. The Municipal Council has also taken up the idea of a monument commemorative of the French Revolution. So far nothing better, since it is a monument of the event of 1789, not of the saturnalia of '93, and besides, it should furnish commissions for sculptors, who are suffering like others from the present depression. But when the Council wished for a site in the Tuileries, which does not belong to the municipality, the Minister of Fine Arts turned a deaf ear, the "Conseil des Bâtiments Civils" kicked against the idea, and finally consented only to a very small site at the end of the parterres of the Tuileries garden. Hence much wrath among the City Council, who are not to be appeased, and refuse to contribute financially,—or otherwise,—to the actual project of the Government. The matter is to be submitted again to M. Goblet, Minister of Fine Arts, in order that it may be formally brought before Parliament.

While awaiting the separation of the Church and the State,—which is the Utopia of all advanced Republicans,—the Council is occupying itself with a general inspection of the works of art placed in all the civil and religious edifices of Paris. This is, there can be little doubt, an ill-disguised menace, and the Council thinks evidently of resuming possession, sooner or later, of all the artistic riches distributed among the churches of Paris, and uniting them in one collection. Fortunately for Christian art, which would certainly not gain by being thus changed in its "environment," most of these works are in the form of frescoes or other methods of painting which are indissolubly associated with the walls. As to the windows, it is fortunately impossible to touch those of St. Étienne du Mont, St. Eustache, or of any other edifice classed among the Historic Monuments under the control of the State; the project will therefore not be so easy to put in operation.

Six years ago the Administration proposed that the bust of the eminent architect of the Palais de Justice should be placed in the Salle des pas Perdus of that edifice. Unfortunately Duc had scored up against him the fact of his restoration of the celebrated grille of the Cour d'Horloge, which is ornamented with the arms of France, and crowned with fleurs-de-l'ys in wrought iron. For this sole reason the proposed homage to his memory was rejected! Fortunately, the Council now numbers a few artists and men of enlightened minds who are above such pettiness, and Duc will at last have his monumental bust, which is to be executed by M. Chapu.

The competition for a new girls' school in the Rue des Martyrs, for which nearly 200 designs have been sent in, will probably be decided by the time these lines appear. At Meaux, which is near enough to Paris to come into our

scope, a competition has just been decided for the construction there of a Communal College, the first premium being awarded to M. Delaire, the second to MM. Calinaud and Blavette, as equal in merit, the third, on the same footing, to MM. Fauconnier and Laporte. The competition for a statue to the famous chemist, Dumas, at Allais, has also just been decided; M. Pech, pupil of MM. Joffroy, Falguère, and Mercier, has obtained the prize, honourable mention being given to MM. Gaudet and Gilbert. The architect whose design has been selected for the pedestal is M. Delmas.

Another statue to Voltaire is imminent, but not for Paris; this is to be erected at the town of Saint-Claude, and is to commemorate the freeing of the ancient serfs of Mount Jura, due in great part to the efforts of Voltaire. It is connected with Paris though the fact that the execution of it has been entrusted to M. E. Monnier, Secretary of the Société Centrale des Architectes, an unassuming but very talented architect, whose services to the Société Centrale have been most valuable.

The subject of the gift of Chantilly has been submitted to the Conseil d'Etat, though it is not yet officially accepted. The bequest is really a fortune to the Institut of France, for after the annual charges are paid, which will amount to about 475,000 francs, there will still remain to the Institut a net revenue of 180,000 francs to be disposed of at its pleasure. By the terms of the Act submitted to the Minister of Public Instruction by the executors of the Duc d'Angoulême, the galleries and collections of Chantilly, under the title of the Musée Condé, as well as the park and gardens, will be open to the public twice a week during six months of the year. The general management of the estate will be entrusted to three curators named by the Institut, and chosen one from among the members of the Académie Française, one from the Académie des Beaux-Arts, and one from among the other sections of the Institut. After the sanction of the Conseil d'Etat, a decree of the President of the Republic will be requested to authorise the acceptance of the bequest.

There is much talk in official circles about the probable suppression of the offices of the Under-Secretaries of State, which would include the departure of M. Turquet, Under-Secretary of State for Fine Arts. Most of the artists would view with little regret the departure of this fanciful official, who has much contributed to put out of gear the Services des Beaux-Arts and of the Musées Nationaux, and whose competence in artistic matters is more than contestable: an instance of the serious inconvenience of entrusting to a purely political personage a special function of this kind, which pretends to give an official direction to art, the



SCULPTURE, ROYAL MUSEUM,
LEIPSIK.

THE accompanying illustrations are reproduced (slightly reduced in size) from the *Wiener Bauindustrie Zeitung*, a recently-started and very well illustrated Viennese architectural paper. They represent a portion of the sculptural decoration of the Royal Museum at Leipsic, designed and executed by Herr Ungerer, of Munich. The left-hand figure represents the Goldenmith's art (*Goldschmiedekunst*), and the right-hand one the Bransfounders' art (*Erzgießerei*), or it may perhaps stand for the art of working in wrought metal (other than the precious metals) generally.

very existence of which depends on its absolute independence.*

The work on the Champ de Mars for the first preparations for the Exhibition is in full activity, commencing with the preparation for railways over the whole surface of the site. A main line with sidings will connect the Champ de Mars with the railway de l'Ouest, and the wagons loaded with goods will be diverted by turntables on to the numerous interior lines which will run parallel with nearly all the galleries. These works will necessitate, of course, the suppression of the park of the Champ de Mars, the trees and shrubs of which will be preserved for the ornamentation of future gardens. The work for the iron supports to the galleries is in process of being assigned to various firms, and that for the 300-metre tower will be commenced almost immediately. At a recent interview with the Minister of Commerce, the delegates of the Ministers of Arts, War, and Agriculture have made known the views and intentions of their various departments. The programme of the Minister of Arts is very extensive, and includes literary conferences, and theatrical representations intended to illustrate the history of the French theatre from 1789 to 1889. A retrospective exhibition of painting, sculpture, and architecture will illustrate the progress during the same period in each of these arts. The project of the Minister of War includes a historical exhibition of French arms and uniforms from the origin of "La Gaule" (!), and to this exhibition, which will be located on the Promenade des Invalides, General Boulanger proposes to add a complete study of armament and fortifications at different periods of French history. The agricultural exhibition will be installed in the same quarter and upon the quays, and also that of food products, for which the Minister of Agriculture requires considerable space. The Exhibition scheme may, therefore, be said to be fairly started.

We have unfortunately to record this month

* We in England can certainly sympathise with our French critics on this head, considering the nature of some of our appointments to the post of First Commissioner of Works.

the death of several artists of talent. In painting we have lost M. Eugene Petit, whose flower-pieces at the last *Salon* were much appreciated. M. Petit was only forty-seven years of age. He was a pupil of MM. Diéterle and Muller, and several times received a medal at the *Salon*. The Imperial Administration entrusted him with the decoration of the Palace at Compiègne.

Among sculptors, we have lost MM. Bourgeois, Schiff, and Mouly. M. le Baron Arthur Bourgeois died after a long illness. He obtained the Prix de Rome in 1863, and several silver medals subsequently. He was the author of a statue of George Sand which adorns the Hôtel de Ville. M. Mathias Schiff, pupil of MM. Petre, Falguère, and Thomas, was a young and rising artist to whom we owe the equestrian statue of René II., erected at Nancy. He died at the early age of twenty-four.

In regard to the sculptor Mouly, his end was, like that of Schopenhauer, that of a despairing man, for whom artistic disappointment was aggravated by the miseries of poverty. He had exhibited at the last *Salon* an enormous statue of Verginctorix, which he had vainly endeavoured to dispose of to the Municipality or the State. Repulsed on all sides, and not having obtained even an "honourable mention" at the *Salon*, whereas he had counted on a medal, at the end of his resources and harassed with debts, the unhappy artist committed suicide, leaving his young wife and five children only what could be raised by a public sale. We ought to mention also in this obituary catalogue the death of M. Alexandre de Sacy, who for more than forty years has directed the castings for the École Nationale des Beaux Arts. It is to his labours that we owe the fine collection of casts and models in the École des Beaux Arts, and the greater portion of his reproductions are works of art in their kind.

The New Infirmary at Workington was opened on Monday last by Mrs. Wilson, wife of Mr. Alexander Wilson. The buildings have been erected at a cost of about 3,000l. from designs by Mr. George D. Oliver, architect, of Carlisle.

M. ALPHAND.

As we are publishing this week the plan of the Paris Exhibition of 1889, as adopted by the Commission, we give at the same time the portrait of the eminent engineer who has elaborated this vast project, and to whom the Government has entrusted the general direction of the whole work.

Jean Charles Adolph Alphand was born in 1817 at Grenoble, and is accordingly now nearly seventy years of age, but he is still full of vigour and of an apparently insatiable activity which finds pleasure in arduous undertakings. He was admitted to the École Polytechnique in 1839, and entered two years later the École des Ponts et Chaussées, and was appointed, in 1843, engineer at Bordeaux, where he was charged with the direction of public works. It was there that he made the acquaintance of M. Haussmann, who, when he became, in 1853, Prefect of the Seine, recollected the young engineer, and summoned him to Paris as Engineer-in-chief for the embellishment of the capital. Since that time M. Alphand has become Director of the Services of Plantations, Promenades, Roads, and Lighting, and concentrated his efforts in these offices towards beautifying and sanitating (if we may coin a word) the city of Paris. His talent has been most especially shown in the transformation of waste and empty spaces into umbrageous squares. We may note particularly in this respect his treatment of the Champs Élysées, of the Bois de Boulogne, and that of Vincennes, the parks of Buttes Chaumont and Montsouris, the park of the Exhibition of 1867, and the new Paris cemeteries.

When the "Année terrible" interrupted all this, M. Alphand found new food for his incessant energy. Appointed colonel of the Legion of Auxiliary Engineers, he had under his orders no less a man than Viollet-le-Duc, and in conjunction with him he organised the fortified enceinte of Paris, and rendered great service to the national defence during the siege. After the Commune, M. Thiers created the post of "Directeur des Travaux de Paris" especially for M. Alphand, who is also at present Inspector

Général des Ponts et Chaussées, and Grand Officer of the Legion of Honour. This has certainly been a tolerably full life for any one man. We may add that this indefatigable worker, who finds time to direct both the public works of Paris and those of the forthcoming Exhibition, is also an able writer and an orator of the first rank. Among the productions of his pen may be mentioned "L'Arboretum" and the "Promenades des Paris." As a speaker, he has a remarkable influence over the most irreconcilable of municipal councils, and has always contrived to obtain from them the supplies he has required for his great works in the course of the transformation of Paris.

RESULTS OF EXHIBITIONS.

EXHIBITIONS are now so far a matter of history, that a retrospect becomes a study of some interest, and especially in answer to the oft-repeated question, "Do they pay?" That is, as a speculative undertaking, and not in any indirect way. That they can be made to pay is clear from the statistics of the Exhibition of 1861 (the first of the series), which had a surplus of 186,000*l*. This was a fine profit, indeed; but then the thing was a novelty, and managers and officials came to their work in a healthy, honest manner, very different to the style of the present day. The next Exhibition (1862) was a failure, financially speaking, and the deficiency, something like 76,000*l*, was helped out by the contractors. The "Fisheries" showed a favourable balance of 14,752*l*; the "Healtheries" left 3,557*l*. to the good; the "Inventories" had a deficiency of 5,437*l*; the "Colinderies" accounts are not yet made up, though we can scarcely expect much balance, when we remember the immense amount of coloured water and electricity to be paid for. All the Paris Exhibitions were failures (*absolutely*), and especially the one of 1878. The Welt-Ausstellung of Vienna (1873) was also a breakdown, while Philadelphia is believed to have been a commercial success, though the accounts have not been disentangled from certain city speculations in connexion with it. A tabulated statement will show all these results at a glance:—

Year.	Place.	No. of Visitors.	Total Receipts.	Surplus.	Deficiency.
1861	London	6,030,196	503,243	186,000	—
1865	Paris	3,162,19	138,099	—	considerable
1862	London	6,211,003	434,631	—	276,000
1867	Paris	—	494,530	—	heavy
1873	Vienna	6,740,600	206,377	—	very heavy
1878	Paris	—	—	—	very large
1875	Philadelphia	3,140,193	789,676	Probable	—
1883	Fisheries	2,703,661	162,903	214,752	—
1884	Healtheries	4,183,49	2,7,118	3,557	—
1886	Inventories	—	218,490	—	£5,437
1888	Colinderies	—	—	—	12,000 or more.
1888	Liverpool	2,087,374	131,000	—	—

* Accounts not yet published.

On the whole, the results seem to have been unsatisfactory, and when we have to add those of the three undoubted South Kensington collapses in 1870-71-72, as also several of the provincial Exhibitions, they cannot be said to be successful speculations, the chief consolation being that we have done better than our Continental neighbours. Of course, the good that these undertakings do can scarcely be measured by statistics. A certain amount of money is circulated in the city in which the Exhibition is held, and a certain amount of knowledge is disseminated (but a small asset, we fear). On the other hand, much ill-feeling is often engendered amongst the unwearied exhibitors, there is generally a good deal of jobbery, and a good many inventors' ideas are appropriated by foreign visitors. It may be safely said that, if an Exhibition cannot pay its way without fire-water - works or Eiffel towers, the game is scarcely worth the candle.

A Jubilee Medal.—In continuation of their medallion series, the Council of the Art-Union of London, we understand, are about to offer three premiums of 50*l*., 30*l*., and 20*l*., for a pair of dies for a medal to celebrate the Jubilee of Her Majesty. The medals will be 3 in. diameter, and, in bronze and silver, will form a portion of the prizes to be given in their next distribution. The competition is confined to British artists.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The second ordinary meeting of this Association for the current session was held in the library at Queen's College on Tuesday evening last. The Vice-President (Mr. John Cotton) was in the chair. The following gentlemen were elected members of the Association:—Messrs. S. J. Holliday, H. R. Lloyd, B. V. Hirsch, H. Buckland, L. Stone, J. Jephcott, G. T. Bassett, and J. R. Shaw. The secretary read memorials from the Liverpool and Manchester Architectural Societies in favour of the proposed new Charter for the Royal Institute of British Architects. Mr. T. Timmins was nominated for membership. A paper was then read by Mr. J. W. Bradley, B.A., on "Illuminated Books, what they are and how they were produced." The lecture was illustrated with many fine specimens of original MS., and copies of some of the best examples in England and on the continent. A hearty vote of thanks, proposed by Mr. W. Doubleday, seconded by Mr. W. Henman and supported by Messrs. J. Cotton, H. Lloyd, V. Scruton (hon. sec.), and H. James, was accorded to the author for his interesting paper. After a response from Mr. Bradley the meeting terminated.

Manchester Architectural Association.—At the meeting of this Association on Tuesday evening last, eight new members were elected, and after some discussion on the proposed new Charter of the Royal Institute of British Architects. Mr. A. H. Davis-Coley read a paper entitled "Architecture at the coming Manchester Jubilee Exhibition."

HEATING DWELLINGS BY GAS.

In a recent lecture before the Saxon Society of Engineers, Herr Friedrich Siemens, the well-known German engineer, dwelt on the means at disposal for preventing smoke, and the best method for heating dwellings. To prevent smoke entirely, said the speaker, was utterly impossible as long as solid fuels were used for heating, &c.; at most, it might be minimised by certain means. The only way by which there would be no smoke in the heating of dwellings was by introducing electricity, gas, or mineral oil for that purpose. The first-named had at present little prospect of becoming of general use, but the two latter had already been adapted for furnaces and boilers, as well as for cooking, and would, he believed, soon become extensively used in the heating of dwellings. In order, however, that this should be the case, it would be necessary to introduce fireplaces in which the gas could burn completely free and in pure state. It could be used either in the form of radiation,—as, for instance, in open fireplaces,—or by direct contact with iron, as in cooking-stoves, &c. One great advantage in the former was that the rays thrown backwards could, by means of a reflector, also be utilised, which was impossible with coal. By gas grates, too, heat was more evenly distributed, whilst they would, at the same time, ventilate the room. The most pernicious manner of heating rooms was, the lecturer considered, that of hot air, it being most unhealthy to heat the air we breathe. The air ought to be cold, artificially-heated air being too dry to be wholesome,—a proof of which was furnished by Nature herself, the sun warming the earth solely by radiation. Herr Siemens had, he announced, constructed such a gas fireplace, in which heat was only distributed by radiation from the uncovered flame. No chimney was necessary, as no smoke was created, all that was required being simply a little pipe for the escape of any impurities. A room warmed in this manner he had found most comfortable. There was, however, the great drawback to the general adoption of this mode of heating, that it was at present more expensive than coal-firing, the grate in question consuming 500 litres of gas per hour, but this was counterbalanced by the saving of labour in tending, cleaning, &c. He considered it doubtful whether gas in such grates could be brought to the cheapness of coal and coke. Further, he expressed the belief that it would take a long time before people would adopt gas for heating their dwellings, though it was largely used for cooking, as the prejudice against it was great. He thought, however, that future generations would smile at the primitive and laborious manner in which their ancestors heated their dwellings.

Illustrations.

PLAN FOR THE PARIS EXHIBITION OF 1889.

E give this week the officially-adopted plan for the proposed Great Exhibition to be held in Paris in 1889, ostensibly in celebration of the centenary of the Republic. That there is no scale to the plan is no fault of ours; this is one of the things which they do not "manage better in France," and the official plan appears to have been published with no scale, though the scale will be apparent enough within certain limits, sufficiently so to enable the reader to appreciate the preposterous dimensions of M. Eiffel's proposed tower, the four piers or legs of which are seen on the centre line of the plan, with a couple of *cafés* interposed in the space between them. The symmetrical disposition of the ground will no doubt realise some fine effects, or would if they were not all likely to be interrupted or dwarfed by this precious tower.

As stated at the foot of the plan, the general scheme of the whole is due to M. Alphand, while special portions are put under the charge of three architects respectively:—M. Bonvard taking the construction of the palaces for the French and Foreign Sections, and also the Special Pavilion of the City of Paris; M. Dutert being charged with the machinery galleries; and M. Formigé with the Fine Arts Palace. The machinery galleries, it may be mentioned, will be 380 metres in length, and are to be covered with a roof of 115 metres span, on iron columns.

If this great undertaking really takes form and substance, and is brought to a fortunate completion, it will no doubt be an event of interest for the whole civilised world, a considerable portion of which will probably visit it.

THE CA D'ORO, VENICE.

We give an illustration of this remarkable and picturesque building, which will form the subject of the paper by Signor Boni at the Institute of Architects on Monday evening. The illustration is reproduced from a water-colour drawing by Mr. F. T. Baggallay.

Signor Boni will, perhaps, have some new light to throw upon the history of the building, about which doctors are divided a good deal. It dates from the fourteenth century, and is affirmed by some to have received its name from the amount of gilding originally on it; by others to be called after the d'Oro family, M. Chas. Yriarte, in his great work on Venice, suggests that the building was the design of a certain Filippo Calendario, a man who seems to have been originally a sailor, and afterwards a mixture of architect and politician, and was eventually hung in the piazzetta of the Ducal Palace for a conspiracy against the famous oligarchy of Ten.

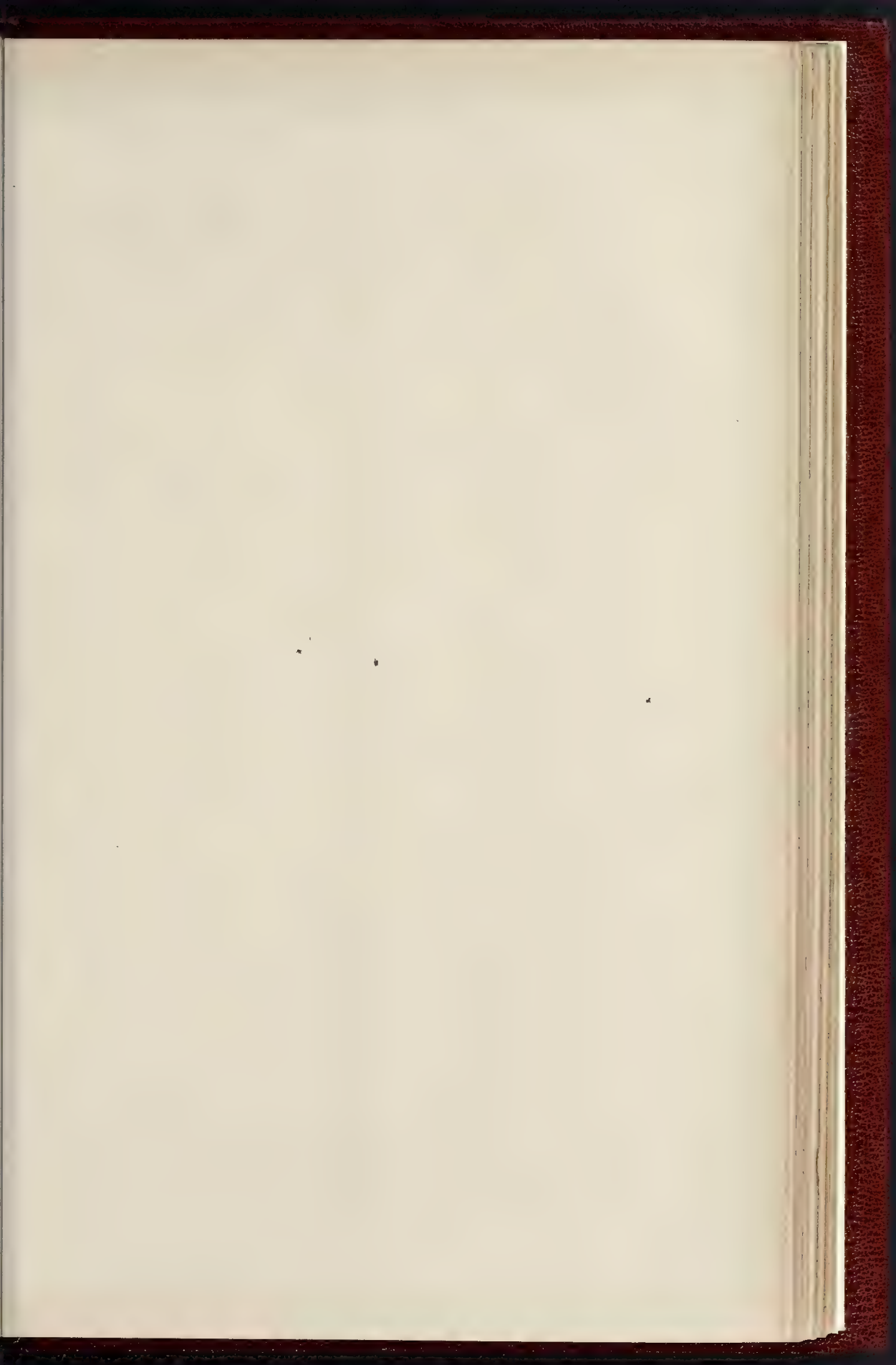
The design is a most characteristic example of Venetian architecture in its piquant contrasts of solid masses and open arcades, and the curiously Oriental aspect of some of the details.

It has been suggested that the Ca d'Oro shows evidence of manipulation of its lines with a view to correct optical illusion, as in the Parthenon. Considering the date of the building, the architectural influences under which it arose, and the great chance of settlement and torsion of line from the probable nature of its foundations, we should require very unmistakable evidence to induce us to believe this.

NEWARK CASTLE, RENFREWSHIRE.

On a low-lying piece of ground, close to the banks of the Clyde, stands the picturesque old castle of Newark, at one time beautifully situated, but now surrounded by the ship-building yards and workshops of the neighbouring town of Port Glasgow.

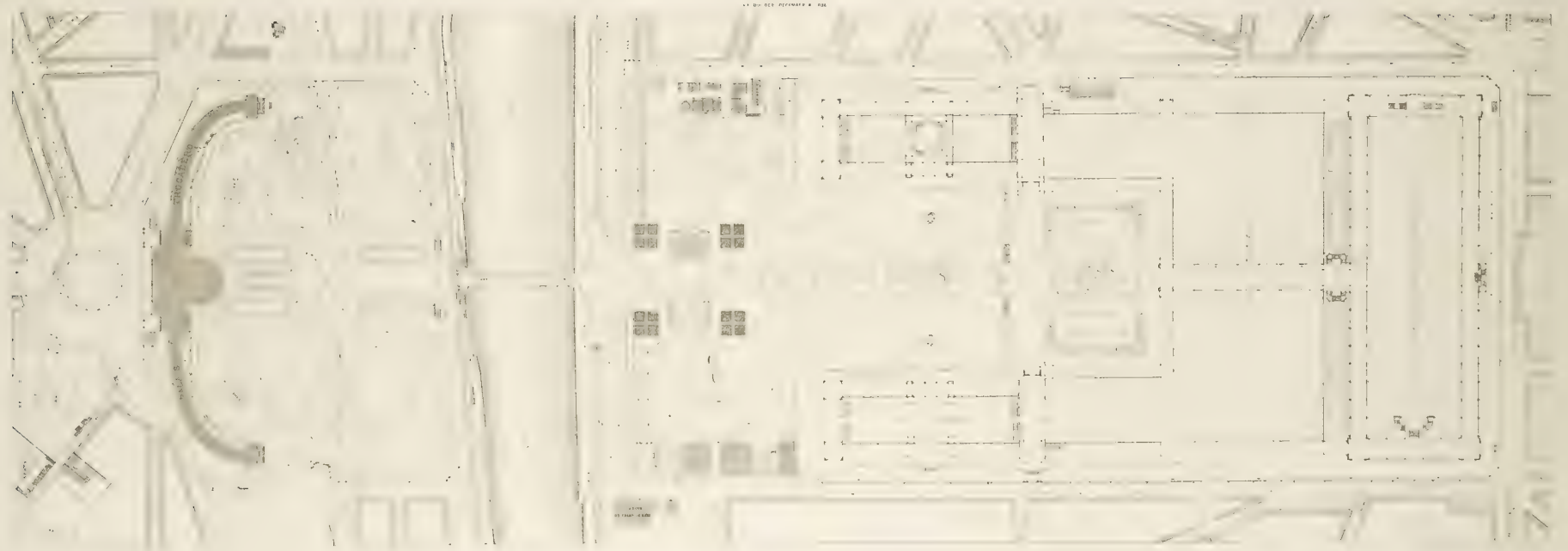
The edifice bears traces of having been built at two different periods; and is formed with a courtyard to the south, in the corner of which is the principal entrance, with moulded jamb and broken pediment, bearing the inscription, "The blessings of God be heirin," anno 1597. Above is the group of panels and openings shown in the sketch, giving light to the main staircase. At the southern angle of the court rises the oldest portion of the building, dating probably from the fifteenth century, in the form of a lofty square tower, so characteristic of



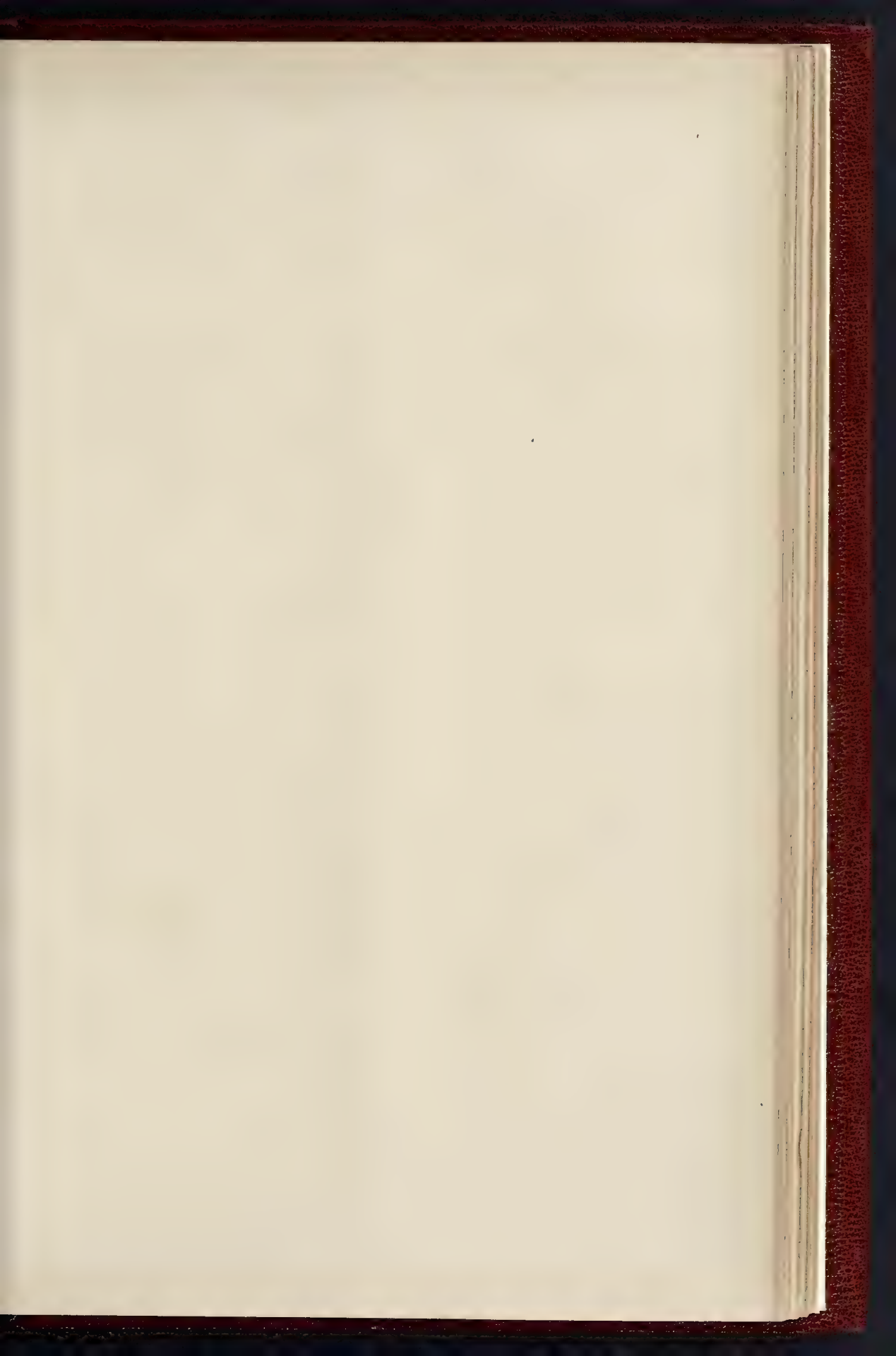


THE CA D'ORO, VENICE,—FROM

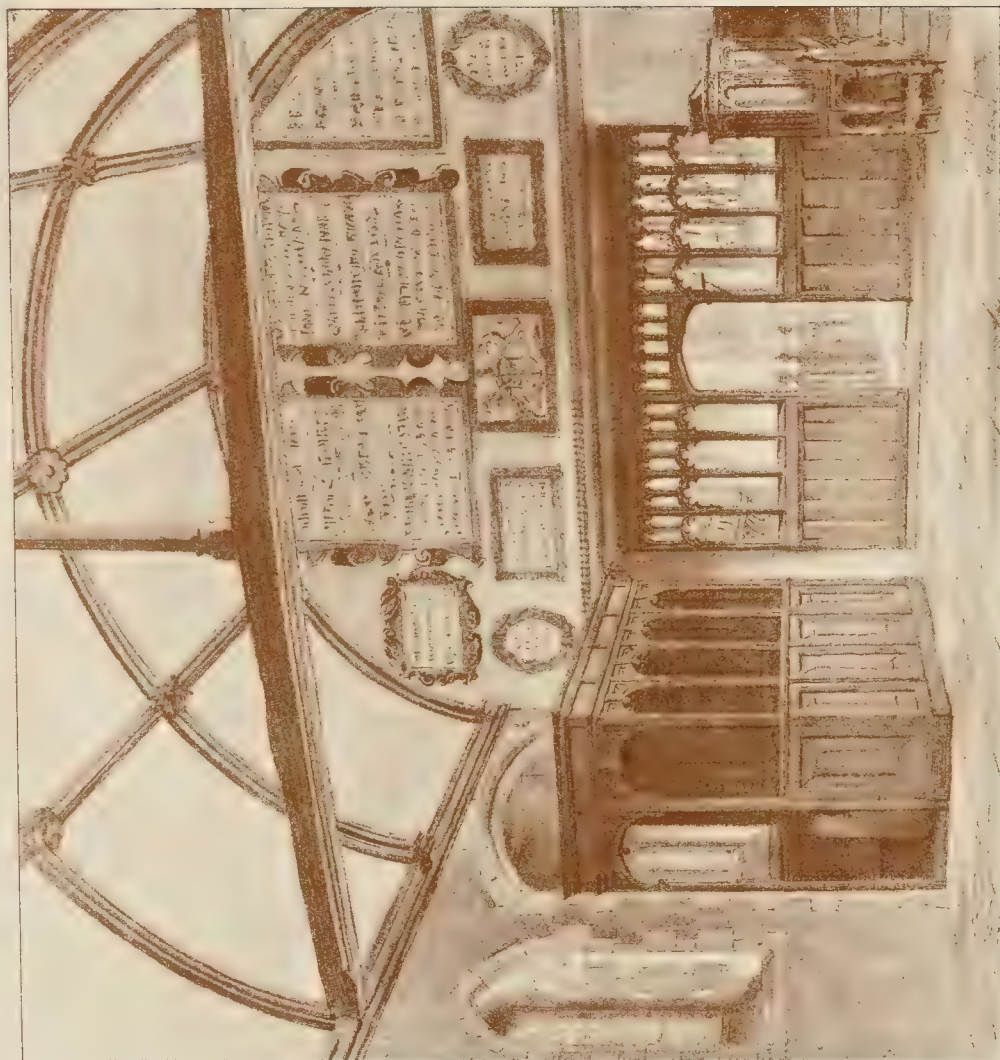




AN DER GLEICHZEITIGEN 1882

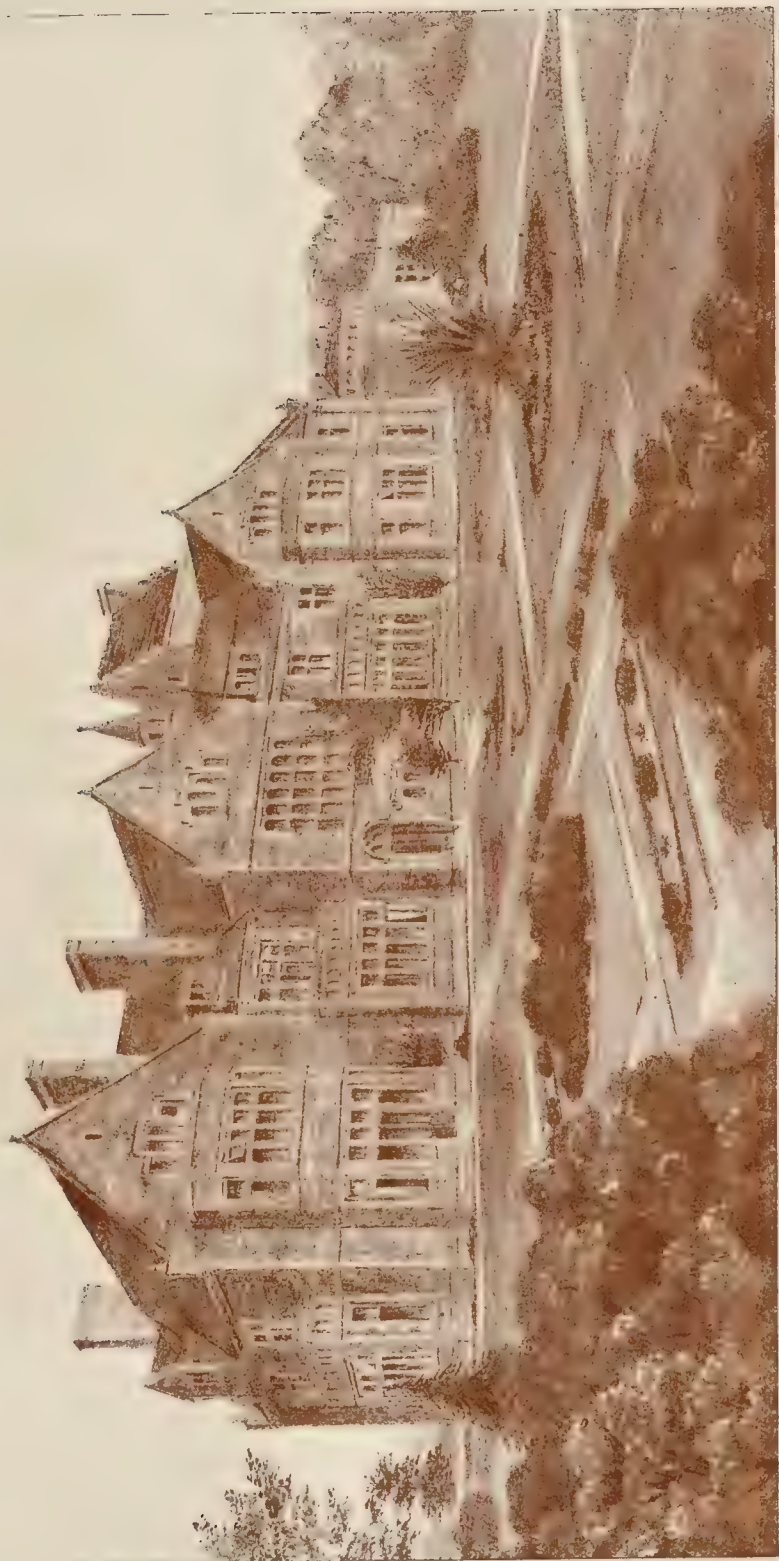


THE BUILDER, DECEMBER 4, 1886

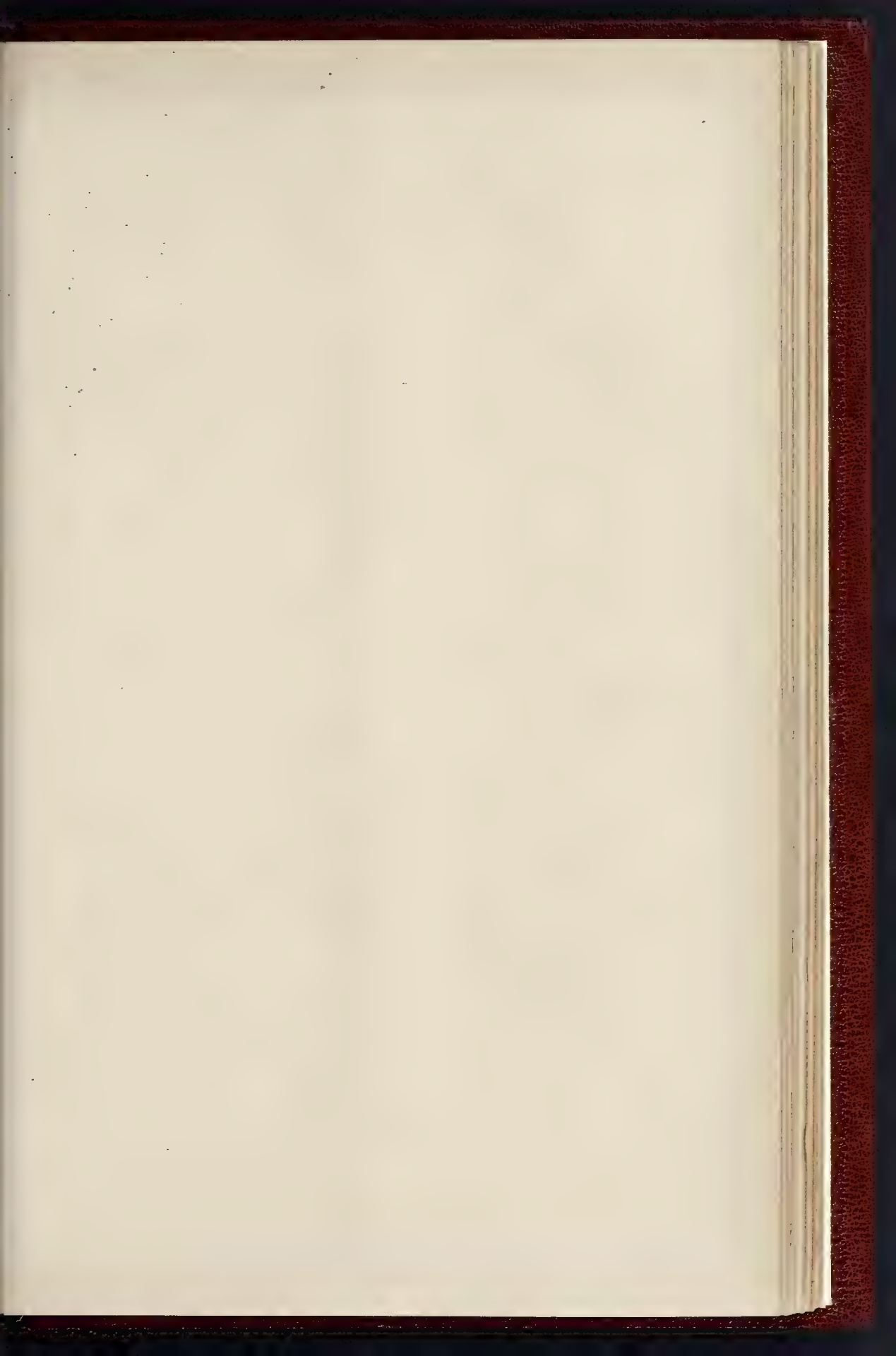


IN A PHOTO SPRAGUE & CO LONDON

INTERIOR OF ELLINGHAM CHURCH, HAMPSHIRE, AS RESTORED BY MR. T. G. JACKSON, M.A.



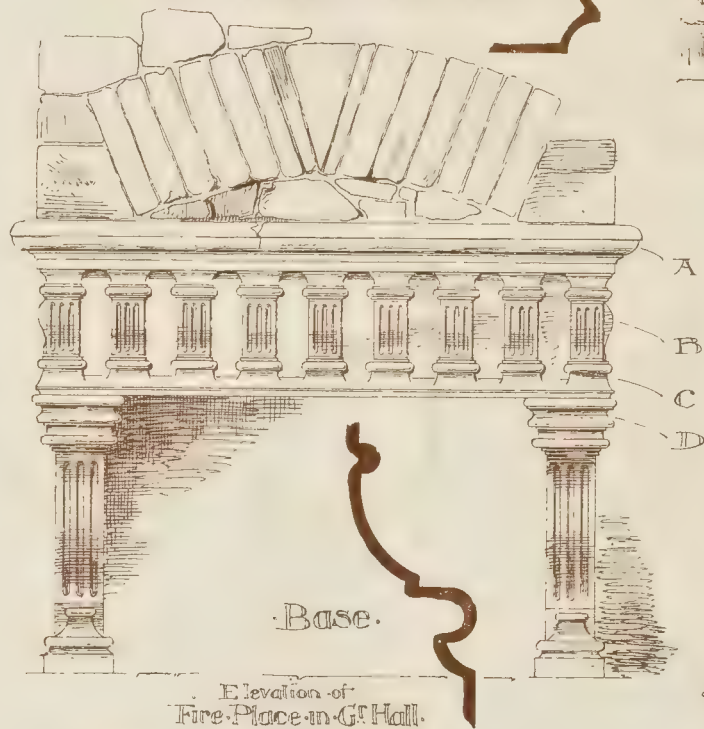
HOUSE AT COOMBE, NEAR SHAFTESBURY - MR. E. LOWE WYLLIE, M.A., ARCHITECT.
GARDEN FRONT



NEWARK CASTLE SOUTH-YORKSHIRE



Details of Fire Place.



Elevation of
Fire Place in G^t Hall.

Scale of feet.
Scale for Elevations.



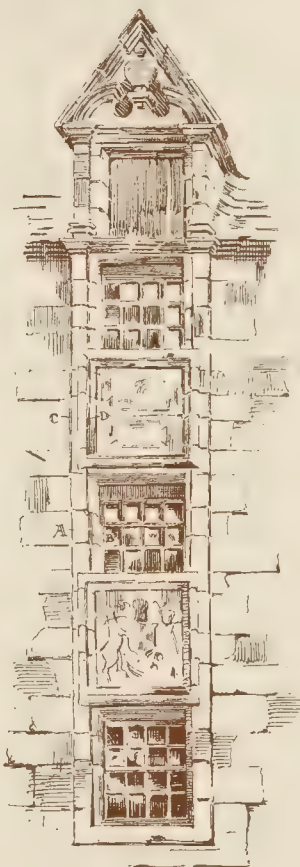
Sketch



View from the River.



East Corner.



Window in Court-Yard.

Jamb at A.B.

Moulding at
C.D.

Scale 0 3 6 9 12 15 18 Inches.

Scale for Details.



Monogram in Pediment

A. N. PRENTICE.
GLASGOW. Oct. 1886.



House at Coombe, near Shaftesbury: Courtyard.—Mr. E. Towsy White, M.A., Architect.

ish buildings of this period. Its windows near to have been altered and enlarged when rest of the castle was built. The north elevation presents a most striking view from the river, being similar in its style to Heriot's Hospital, Edinburgh, and the later portion of Althgow Palace. The windows on the ground-floor are formed with plain unadorned arches, and give light to the vaulted kitchen and offices. A little stair in the thickness of the wall, to the right, communicates with the hall above, which is a finely-proportioned apartment, with stone floor and oak roof, and is so arranged that it is lighted by windows on all its walls. The large stone fire-place shown in the illustration is placed on its north side. Inspection of its details will show that even in this late period its mouldings were not altogether wanting in Gothic feeling.

A circular stair turret, the chief feature on the elevation, gives access to the rooms above. On either side of it there are large moulded and canopied windows, which show that the porch were not so far behind at this time in matters of light as some Southern critics would have us think. Circular turrets rise from the angles of the building, crowned with conical roofs, which, together with the tall chimneys, give the building quite a French chateau appearance; indeed, this front is considered to be one of the finest of its kind in Scotland.

The ancient barony of Newark originally belonged to the Dennistons, at one time an influential family in Renfrewshire. About the beginning of the fifteenth century it was transferred by marriage to a family of Maxwells, who retained it up to the beginning of the eighteenth century, since then it has changed hands several times, and is now the property of Lady Maria Shaw Stewart. In one of the panels over the main entrance the armorial bearings of the Maxwell family are introduced.

A. N. PRENTICE.

HOUSE AT COMBE, NEAR SHAFTESBURY.

This house, now building for Mr. M. H. Sanford, is situated on high ground not far from Shaftesbury. One of the conditions was at all sitting-rooms should face the south-

east or garden front. It is built of local green sandstone from a quarry on the property, with red Farleigh stone for windows, strings, &c. The roof is covered with red tiles; in the tower is a large water-tank in case of fire, as all the water for the house has to be pumped up by means of a turbine from a spring 170 ft. below the site, and distant about a quarter of a mile. The hall, which is two floors high, will be finished with oak panelling and oak staircase; the dining-room, smoking-room, and billiard-room will also be panelled in oak to a height of 4 ft. 6 in.; the billiard-room has an open timber roof with a lantern light. Mr. Dart, of Crediton, is the builder.

ELLINGHAM CHURCH.

The Church of Ellingham, near Ringwood, was lately restored from Mr. T. G. Jackson's designs. It had for some years been in a ruinous state, the tiebeams of the roof having been cut away and the walls undermined by graves and vaults, and the greater part of the structure was actually in danger of falling. The dangerous walls have been rebuilt and the others underpinned; the church has been re-seated with oak pews, new roofed throughout, and warmed and drained, and a vestry and organ-chamber have been added on the north side of the chancel.

The church contains many points of interest. The rectory and chapel were attached to the Abbey of St. Sauveur le Vicomte in Normandy in the year 1163, and the actual building was apparently constructed at the end of the twelfth century or early in the thirteenth, to which date the east window, of three simple pointed lights under an arch, and some of the lancets in the north wall, may be referred. It was restored extensively in the fifteenth century, to which period the old roofs belonged, as well as the rood-screen and several of the windows.

The west front and the south porch, with its picturesque sun-dial, were rebuilt in the eighteenth century of red brick with stone quoins, and the west end bears the date 1747. These parts have not been disturbed, but retained as representing a chapter in the history of the building.

The chancel, which is large in proportion to

the nave, was, no doubt, appropriated to the regular clergy, while the nave was occupied by the parishioners, and this may explain the absence of an open arch between the two, the space above the screen being filled with a solid partition of timber and plaster, on which still exist towards the nave some traces of the fifteenth-century painting. The rood occupied the centre, and on each side are figures of angels traced in red line among diapers and within a flowing border.

In 1671 this was concealed by a second partition 2 ft. further west, the space between the two being occupied by the rood-loft, and on this western partition are painted the royal arms and several Biblical texts in black letter, quoted from the Geneva version. These have considerable interest of their own, and are well preserved, and it was therefore thought desirable to retain them rather than remove them to expose the barely decipherable ruins of the fifteenth-century painting behind.

One picturesque feature in the church is the Moyle's Court pew, with panelling and tester of Italian walnut, which has been carefully preserved and may be seen in the accompanying illustration to the left of the chancel-screen.

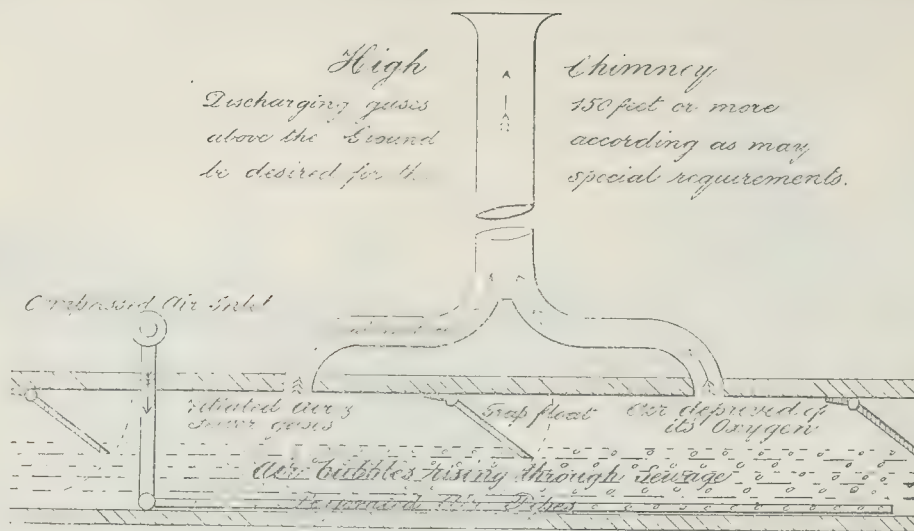
Moyle's Court is an ancient house in the parish, which descended from the De Molis family to the Whites.

In the church is the handsome monument of Alice, heiress of the Whites, and wife of William Beconsawe, who died in 1622. Their son, Sir White Beconsawe, had a daughter Alice, who married John Lisle, M.P. for Winchester in 1640,—a zealous Parliament man, who took part in the condemnation of the king, and fled the country at the Restoration.

John Lisle was assassinated at Lausanne by a Royalist, and the fate which his widow, Dame Alice Lisle, met with at the hands of the butcher Jeffreys will be familiar to every one. She lies buried in Ellingham churchyard, close to the south porch, below an altar-tomb, with this epitaph:—

"HERE LIES DAME ALICIA LISLE
& HER DAUGHTER ANN HANSELL
WHO DYED THE 17 OF FEB: 1704."

"ALICIA LISLE DYED THE
SECOND OF SEPT. 1655."



Section showing Proposed Application of Innes's Air-Process for Purifying Sewage.

The Moyle's Court property passed in later times to the Barings, and now belongs to the Earl of Normanton, at whose expense the church has been repaired and restored.

In the chancel floor have been reset some stone coffin lids, with crosses, which were discovered during the restoration. They may have belonged to some of the priors or monks of the cell at Ellingham.

AN AIR PROCESS FOR THE PURIFICATION OF SEWAGE.

This is rightly called a "purifying process." It purifies or does nothing. Most other processes do not aim so high as to purify sewage, its clarification being nearly all that is pretended to be done. The process, however, now under notice would, with a sufficient supply of air, deprive the sewage of all its noxious properties, and send them up a tall chimney as smoke is carried off.

When sewage is spread over land by way of irrigation, for the double purpose of utilising it and purifying it, it is introduced to the presence of air in the soil, in minute subdivisions as numerous as the pores of the soil itself, and by contact with the air in this minute state of subdivision the germination of the organisms of the sewage is promoted, so that, whether the purification of the sewage be regarded as due to living organisms, or, as formerly, to the mere presence of atmospheric air, the process may be regarded as the same, reversely applied, as the irrigation of land. The air is brought into contact with the sewage, instead of the sewage being taken to the air of the soil. There is this difference, however, that there may be in the soil pre-existing nitrifying organisms which may not be contained in the air blown through the sewage in the manner contemplated by the process. The description we give of the process and its application is that of the patentee, Mr. S. H. James, and is not the way in which the process could well be practically applied. The practical application, however, in no way concerns the principle. It is easy to blow air through water or sewage, and if that will effect its purification it is worth a trial. The points to be decided are, what degree of purification will a given quantity of air effect upon a certain bulk of sewage, and will any further supply of air effect further purification? The engineer knows what it will cost to supply a given quantity of air. Without trial of the effects of the new process, however, he has not sufficient data upon which to found an opinion of its practicability in a financial sense. It has before been proposed to oxidise sewage by bringing it into minute contact with air, but not in the way now proposed. The proposition we mean was to let the sewage fall through air, but it

could not be applied on the larger scale of practical works.

In proposing to perform the operation of purification by forcing air through the sewage in the sewer itself, as shown by the diagram, the inventor probably overlooks the fact that there would not be time while the sewage is running to bring the air into sufficient contact with it. It must be performed in a reservoir, and one of the difficulties will be to find space enough for a shallow reservoir such as is desired. However, the difficulty is one which can be overcome if it is worth while, and the first thing to be done is to make a trial with the object of deciding the points we have named.

We subjoin the author's own description of his method:—

"It is well known that in all cases of lime precipitation a secondary action takes place after the discharge of the effluent into rivers. Fish cannot thrive even where they can exist, owing to the free oxygen in the river water being absorbed. It is also well known that the direct exposure to the oxidising influence of air will alone decompose sewage, but previous attempts required vast tracts of land, or the discharge of effluents in long, thin, and broad streams.

By my process, air is forced through the sewage matter, either in its passage along the sewer or in covered tanks, by means of perforated pipes or air distributors, placed at the bottom of the sewer or tanks near the outfall works, the part where this process is carried on consisting of one or more sections divided by suitable traps, floats, or syphons, designed to prevent gases escaping beyond the limits of the section operated upon, except by the openings at the top, which lead to tall escape shafts or chimneys (as per sketch annexed).

Air being forced through the perforated pipes, agitates and intimately mixes with the liquid, oxidising and purifying it, thus rendering the sewage harmless before its discharge. The de-oxidised air and foul gas is ultimately carried away and discharged by the chimney into the upper region of the atmosphere. The present shafts or chimneys at most pumping stations are high enough to prevent smoke affecting the population, and probably would be found efficient for the dissipation of the vitiated gases evolved.

Where a clarified effluent is required, I prefer to use (after purification) a settling reservoir rather than employing any of the chemical precipitating processes. Without the aid of a settling reservoir, the effluent would be little altered in its dark appearance, but having been thoroughly oxidised and purified, it might be safely discharged into tidal rivers without prime existence in a plentiful supply of fresh air; they ferment, live fast, and die, being practically burned out like impurities in iron when converted into steel by the Bessemer process.

By the time the sewage reaches the outfall all solids are broken up, and a few minutes' 'blow' drives off the foul gases, and very rapid decomposition sets in immediately, and resulting gases follow their predecessors. The chief work is done in the first section, and the second will complete it in less than a quarter of an hour, either in the sewer itself, or, better still, in covered shallow tanks. The solids and liquid, being purified, can be discharged into tidal rivers and carried by the tide to sea, thus avoiding subsequent dealing with the sludge; but where a clarified effluent is necessary, it is preferable to employ a settling reservoir to deposit the solids, avoiding all chemical pre-

cipitation, which, besides the expense, doubles the amount of solids and sets up subsequent decomposition in the rivers. The cost of the air-process is therefore the expense of maintaining blowing-engines."

ANCIENT LIGHTS.

SIR,—In your review [p. 759, ante] of Prof. Kerr's work, "The Consulting Architect," you take exception to the latter part of the statement made by him that "the mere obstruction of the light for one year is not enough to extinguish the easement unless notice of that intention has been first delivered." The words of the statute are, "No act or other matter shall be deemed to be an interruption within the meaning of the statute, unless the same shall have been or shall be submitted to or acquiesced in for one year after the party interrupted shall have had or shall have notice thereof, and of the person making or authorising the same to be made." Conflicting opinions are given as to the meaning of this, e.g., the *Law Times*, February 4th, 1882, vol. 72, p. 236, says:—"The burden of specially proving the twofold notice will be held to lie upon one person erecting the obstruction." "Twofold," that is, (1) Notice of the obstruction; (2) Notice of the person making, &c., the same. This burden of proof is a most important matter. Roscoe in his Digest of the Law of Light observes that "in Seddon v. The Bank of Bolton (L.R., 19 Ch. D., 462), Lord Justice Fry (then Mr. Justice Fry), seems to suggest that there must be some kind of direct notice from the person authorising the interruption in order to satisfy the fourth section of the Prescription Act. But the learned judge gives no definition of the word 'notice,' and the case is but little guide. Upon consideration, the Act would seem to be satisfied so long as the owner of the dominant tenement becomes aware that some particular person, or some person authorised by him, is obstructing his light. Thus, if he is aware that A. is the owner in fee of the servient tenement in which an obstruction has been erected, this would seem to be sufficient 'notice of the person' making the same."

Whether the notice is to be actual or implied, a very important point arises, viz., that an interruption during the nineteenth year of the enjoyment of the easement cannot mature to be a sufficient interruption, and so the statutory period of enjoyment "for the full period of twenty years" before "the right thereto shall be deemed absolute" becomes practically reduced to nineteen years, because after nineteen years' enjoyment it is impossible to interrupt for a full year before the twenty years expires. The actual interruption for less than a year at the end of the twenty years is to be considered, in law, as no interruption at all: consequently at the end of the twenty years the

owner of the dominant tenement is deemed to have had twenty years' uninterrupted enjoyment of the easement.
A. & C. HARSTON.
15, Leadenhall-street, Nov. 23.

CORK CATHEDRAL.

SIR,—A letter, over the initials "H. C. S.," which appeared in one of your recent issues [p. 753], has been copied into the *Cork Constitution* newspaper, where I have seen it.

I can assure "H. C. S." that the Dean and Chapter of Cork have at least as great an admiration for the genius of the late W. Burges, A.R.A., as he has, and are fully sensible of the sacred trust imposed upon them as guardians of the greatest ecclesiastical work of that gifted man. The present Bishop of Cork has, under the constitution of our Church, an absolute veto with regard to all changes in the structure or ornaments of the cathedral, and was chaplain to his father, the late Bishop, John Gregg, during whose episcopate the cathedral was built. The Bishop was a friend and fervent admirer of Mr. Burges, and would be the last to sanction any deviation from the late architect's plans, or the introduction of any addition that might disfigure the cathedral.

I beg to say that a western gallery was no part of Mr. Burges's original design. The existing gallery, with the huge organ upon it, was an after-thought, and hides from view more than three-fourths of the most beautiful window in the building, the western rose.

The organ is placed about 80 ft. from the choir, and the congregation in the intervening space, with the result that Divine service can only be performed with difficulty and with confusion,—a matter that even "H. C. S." will admit to be of some importance.

I may add that nothing has been decided upon; that we are all alive to the difficulties of obtaining a better and more satisfactory arrangement than the present one,—condemned as it is on all sides; and I beg to assure you and all admirers of Mr. Burges that his work is safe in our keeping, and shall only be touched, if touched at all, with reverent hands.
S. O. MADDEN, D.D.,
Dean of Cork.

"NON-ACCEPTANCE OF LOWEST TENDER."

SIR,—Please allow one more ill-used contractor to bring his grievance before the public notice through the medium of your paper.

In your issue of the 6th inst. the Directors of the Metropolitan Railway Company advertised inviting tenders for connecting the drains of the Willesden Park Estate, Willesden Green, specifications to be seen, and quantities to be obtained at the office of Claude Robson, Esq., C.E., in Edgware-road.

I sent a price for the above and with it a letter stating that I had been engaged with drainage works for many years, and at the same time gave the names of three engineers,—and could have given thirty if necessary,—for whom I have done works of a similar kind. I also furnished substantial sureties.

Now, sir, my estimate, although the lowest by 5%, has not been accepted, which I think you, and most of your readers, will agree with me in anything but fair treatment, no question being raised, so far as I am aware, as to my competency to carry out and complete the contract in a satisfactory manner.
Nov. 30. JAMES YOUNG.

"PRIME COST, AND PAINTING IN TINTS."

SIR,—Allow me to answer the questions of your correspondent, "B. H." [p. 790], in your last week's issue.

Clause 1.—"All prices of articles mentioned are to be P.C. prices in London; add, therefore, profit, carriage, and fixing, and include same in contract."

"P.C." in this case means first cost after deducting trade discount, but not the discount for cash.

Clause 2.—"All work to be done in four oils or tints."

The proper interpretation of the above clause is that the architect shall have the right to select the colours of the paint. If those colours which are usually charged at a special rate were desired they should have been described.

If several tints are required on a piece of framing, as, for instance, a door, the clause of the specification should run thus:—"Knot, prime, stop, and paint three oils, the framings finished parti-colours, the whole of the woodwork in,"—(describing the rooms). This would mean one colour for panels and another for the remainder, as stile and rails.

If mouldings or members of mouldings are to be "picked out," i.e., painted in a different colour or colours, it should be stated.

The "P.C." question raises a different issue. The system of trade discount beyond the ordinary discount for cash is, I believe, almost exclusively confined to the building trades, and is a corrupt practice which architects and surveyors (through whom only the reform can come) should discourage wherever possible. But is it quite certain that firms

who should advertise their intention to give no discount beyond that for cash, would receive such countenance and patronage from the profession as would secure them from loss?

It is well known that some of the houses which have altered their practice in that respect have been martyrs to their principles. Their customers, with one accord, transferred their patronage to the adherents of the old system.

If this were a new phase of business, surely some conscientious scruples would be awakened. How shall we describe a system under which trade books with prices fifty per cent. and more beyond cost are produced for the express purpose of deluding the employers of the builder? A book of patterns of paperhangings is a familiar instance.

It might, perhaps, be expedient to retain a large discount on such things as gas-barrel and fittings, and wood screws, in which cases very small fluctuations of value are best represented by a percentage, but these should not be concealed, and if perfectly well known could do no harm.

The result of the abolition of these discounts and a better knowledge of cost would be a more intelligent practice in both the preferring and adjusting of building claims, and ultimately a healthier system of profits.

At present ignorance often accords much larger profits than the builder should have, and as often errs in the other direction, and allows him none at all.
JOHN LEANING.

CORSEHILL STONE.

SIR,—Kindly allow us to correct the statement in a letter published in your last week's issue [p. 790], respecting the stone we have used at the new dispensary at Battersea. The stone used is *red Corsehill*, and certainly not of an inferior quality, as stated in the letter referred to.

We may add that part of the stone used was actually supplied (indirectly) by Messrs. Trickett.
W. G. WYATT & CO.

EMBATTLED GABLES.

SIR,—Your remarks at p. 768, on the "St. Jans Gasthuis," pass the pyramidal fronts without mention. Of course it is very common in the Low Countries, but what is its origin?

I find that guide books indicate the theory of an introduction under Spanish influences; it may be so, but I rather incline to connect it with the crenellated walls and towers of the many Roman stations known thereabouts.

As a stranger I was much impressed with the effect as seen in Antwerp and Cologne, while in Rotterdam and Amsterdam it seems to have spread out into a broader form, that seems rather a development than the original style. The annexed cut* is very widely spread by advertisement, and I do associate it with the demolished walls and surviving *thurns* or towered gateways that still survive in the "town of monks and bones," that Coleridge would hardly recognise if he now revisited it.

November 27th, 1886.

A. H.

ELHAM UNION WORKHOUSE.

SIR,—Some time ago advertisements appeared in the *Builder* for designs for rebuilding Elham Union Workhouse. The designs were to be in by the 9th of October. I have been looking through the *Builder* since to see if any decision had been arrived at concerning the competition.

Can you give me any information?

A COMPETITOR.

Madame Lucca's New Mansion.—During the last few weeks Madame Pauline Lucca has been engaged in superintending the finishing touches to her new mansion at Vienna, which has been furnished in the most sumptuous style. The ground floor is occupied by the dining saloon, ornamented and furnished in old German style, and a magnificent conservatory, illuminated by incandescent lamps of various colours. On the first floor are Madame Lucca's private rooms, and on the second floor the reception-rooms. In the principal of these, which is hung with real Gobeline tapestry, are two splendid paintings of the artist as *Carmen* and in reception dress. The staircase, however, is the most magnificent part of the house. The handrails of the marble steps, covered with carpets, are of bronze, exquisitely moulded and ornamented with nude female figures bearing lamps. The large landings are partly occupied by bronze basins filled with choice exotics, the two walls at the bottom being hung with large paintings representing Music and Drama, in the style of Makart. What lends particular interest to the decoration of the interior is that they have all been executed from drawings by Madame Lucca.

* The cut, which is rather too rough to reproduce, represents a street front in Cologne, with a low three-stepped gable, having a very "battlemented" appearance.
—Ed.

CHURCH-BUILDING NEWS.

Battersea.—We are asked to mention that the oak pulpit in St. Stephen's Church, Battersea, which was consecrated a fortnight ago, as mentioned by us at the time, was supplied by Mr. Wm. Dart, Credition, Devon. It is entirely constructed of English oak, from designs by Mr. Wm. White, the architect.

Hempstead (Essex).—In January, 1882, the tower of the parish church, dedicated to St. Andrew, erected in the later Decorated period, fell, demolishing the western portion of the nave and aisles. These are now to be rebuilt from the drawings of Mr. Samuel Knight. Concurrently with these works, the church is to be otherwise restored, upon the basis of the ancient design and structure, with the assistance of photographs taken before the disaster to the tower. Much of the original masonry (executed in Barnack stone) will be available in the restoration. The church has some interesting brasses and monumental slabs, and has historical interest as the burial-place, A.D. 1657, of the famous physician, William Harvey, discoverer of the circulation of the blood. The Harvey family have a chapel and vault here, though their residence has long ceased, and of the house only the moat can now be traced. Admiral Sir Eliab Harvey, G.C.B., who, as one of Nelson's captains, commanded the old *Téméraire* at Trafalgar, also lies in the vault, his being the last interment, in 1830. A first contract has been entered into for the restoration with Mr. William Saint, of Cambridge.

London.—After having been closed for some time past, the Church of St. Mary Woolnoth, Lombard-street, was re-opened on the 21st ult. Owing to the effluvia arising from the vaults beneath the church, and penetrating into the building itself, it was found to be imperatively necessary that some effectual steps should be taken to remedy the evil, and accordingly the assistance and experience of Mr. F. C. Penrose were called into requisition. Under his direction, the entire surface under the vault arching has been covered with a system of iron joists and concrete to receive a layer of asphalt, which has been laid in two thicknesses, viz., $\frac{1}{2}$ in. Poloncean, and $\frac{1}{2}$ in. Seyssel. Mr. Gathercole acted as clerk of works, Messrs. Holland & Hannen being the general contractors. Messrs. Pilkington & Co., of Fish-street-hill, were the contractors for the asphalt. St. James's Church, Ratcliffe, and Christ Church, Watney-street, in the Commercial-road, have been lately decorated in colour, by Messrs. Campbell, Smith, & Campbell, from the designs of Mr. Frank T. Baggs, architect. St. James's Church is a brick edifice of the period of the Early Gothic revival, and its bare interior was until lately distempered throughout with a light blue wash. For this has been substituted, on the walls beneath the galleries, a warm red with a dark painted dado, and a few lines of a darker colour to form a cornice. The upper part of the side and west walls has been distempered in a buff tone, and a few lines in light red, between which it is intended eventually to stencil a running ornament, have been drawn at the plate level and at the level of the springing of the window arches, which are very sharply pointed, and without detail of any sort. An attempt has been made to reduce the form of these arches to apparently better proportions by surrounding them with lines and conventional crockets and finials. The decoration has, however, been chiefly confined to the east end, where the arch opening to the shallow sanctuary has been treated like the window-arches, and with the same object. The forms of the arch and of the rose-window beyond it have also been repeated in a conventional manner in the decorations on the end wall on either side of them, the object being to get rid of the unpleasant effect of the arch standing alone in the middle of a bare wall space. The rose-window referred to has been filled with stained glass, and the wall beneath it and above the reredos painted with a conventional representation of the mustard-tree and the birds of the air lodging in its branches. The gallery fronts have been decorated with running ornament on a light ground, broken over each column by a panel containing a Christian emblem, and with a frieze of lettering in plain Lombardic characters. The total cost of the work, including distempering the ceiling and outlining it in panels, amounted to 260l. Christ Church,

Watney-street, is externally of somewhat similar character to the last, but with slightly greater architectural pretensions. The interior, however, with its round arches, double arcades, and raised apsidal sanctuary, has an impressive effect, and lends itself well to a scheme of coloured decoration, which seems, indeed, to have been commenced some time ago by painting the arches and columns in dark red and neutral green, which colours have been adhered to chiefly in the new work. The spandrels of the lower arcades have been decorated with ornament of Byzantine character, consisting of circles of colour containing Christian emblems and conventional scrollwork on a deep red ground. The walls under the galleries have been panelled out between the windows in red for the reception of figure subjects illustrative of the miracles and parables of the New Testament, and over and in the spandrels of the windows a frieze of bold scrollwork has been introduced. The arch opening to the sanctuary, and the wall above, and at the sides of it, have been decorated with ornament similar in character to that in the arcades. The cost of these works has been under 130*l*. The aisle windows have been filled with glass of simple character from Messrs. Campbell & Smith's own designs, and other decorative work is in contemplation when money can be obtained.

Weston-super-Mare.—The chancel of St. John's Church, Weston-super-Mare, has just been embellished by the erection of a new reredos, carried out by Mr. James Forsyth, from the drawings and under the superintendence of the architect, Mr. Edmund Buckle, of Bedford-row.

The Student's Column.

STONE QUARRIES.—XXIII.

(SAND-STONES (continued).)

SCOTGATE ASH QUARRIES.—These quarries are three-quarters of a mile from the North-Eastern Railway Station at Pateley Bridge (fourteen miles from Harrogate), with which they are connected by a line of railway. They are on the eastern side of the valley of the Nidd, at a height of 600 ft. above the level of the river of that name. The stone is worked on a very extensive scale, and we will describe the quarries in detail, as being good types of sandstone workings.

The stone may be represented as a bed of flagstone, lying between the Millstone Grit of the Brimham bed and the mountain (carboniferous) limestone of Greenhow. It occurs in beds of from 2 in. to 6 ft. in thickness, and the vertical joints, being numerous and open, contribute greatly to the easy working of the quarries. We have before us an account of the loading of a large landing 17 ft. 6 in. long and 7 ft. wide, whilst there have been several larger ones found *in situ* from 10 ft. wide to 22 ft. in length, and upwards. This will give a small idea of the sizes of stone raised from quarries of this class. The workings have been made along the line of out-crop of the rock, the ground opened up being about 600 yards in length. Tramways are laid down to all parts of the workings, so that material of any kind can be easily and quickly moved about. The lifting is done by powerful steam cranes, which travel on railways of 10 ft. gauge. These not only hoist the stone from the depths where it is quarried, but carry it to the places where it is faced, dressed, and prepared for use, and then lift it into the railway trucks. Smiths' and carpenters' shops are on the premises, as in other equally large quarries. Every accommodation is rendered to shelter the workmen from inclement weather, and in providing cabins in which they can cook and warm their midday meal and tea, as well as dry their clothes, &c.

But the most remarkable fact about the Scotgate Ash quarries, perhaps, is the method in which the stone is delivered on to the rails of the Nidd Valley Railway, one having the closest analogy to that employed in the Cornenine, Tillyfourie, and other large granite quarries in Aberdeenshire. A tramway of regular railway gauge has been made from the workings to the Pateley Bridge railway station, a distance of more than 1,000 yards, in the valley below. The gradient for half the distance at the upper end is very steep, rising at the rate of 1 ft. in 5 ft., and in some places at the rate of 1 ft. in 3 ft.; the lower part towards the town is much easier, being 1 ft. in 11 ft.

The stone-carrying trucks belonging to the quarry-owners or the North-Eastern Railway Company ascend to the quarries empty and descend loaded, being drawn up and let down by means of two steel-wire ropes, each 1,000 yards in length and 3½ in. in circumference, so contrived that the descent of the loaded truck causes the empty one to ascend. In the middle of the incline is a double line of rails, enabling the trucks to pass each other. The steel wire-ropes are wound upon a large drum, 16 ft. in diameter, enclosed in a house at the top of the incline. Close by is the brake-room, where the apparatus for regulating the speed of the descending trucks (which is somewhat like the steering-wheel of a ship) is placed. By means of this machinery, the brakeman can stop the descending truck in any part of its course, and there is also a kind of indicator showing on what part of the incline the trucks are when the day is foggy, or in the dark,—a most useful contrivance. In the same room there are four levers connected by wires with switches on the line of rails, so that if the rope should break or any other alarming accident take place, the trucks can be thrown off the line in almost any desired part of their journey,—precautions very necessary to prevent loss of life and damage to property below. The time occupied in the descent of a loaded truck is two minutes.

The geological phenomena presented in the quarries are numerous and suggestive, and are not altogether devoid of practical utility in their consideration. Violent dislocation is visible all along the edge of the quarries. In one place, within a space of 30 yards, the base line of one heavy bed varies four times, step faults throwing the strata down from 1 ft. to 5 ft., the blocks, as usual, being separated by vertical jointing.

Some of the beds exhibit ripple-marking (undulations) showing that these fissile sandstones formed in rather shallow water. The student must have noticed on any sandy seashore that the action of a gentle wind frequently caused little undulations in the sand under a foot or two of water. The ripple-marks form in a very characteristic and unmistakable manner, and are clearly recognisable in these old carboniferous sandstones. They are preserved by a gentle return tide bringing much sediment and covering the markings up; but we need hardly remark that out of the thousands of times these undulations are made, only once, perhaps, is that sediment brought and the conditions rendered favourable for their preservation. The return tides, in the other cases, shift the material over and over again. It is wonderful, too, that in the Scotgate Ash sandstones, the pittings made by a passing shower of rain or of a hail storm are observable. Those of our readers who may not have studied the subject will scarcely credit that such things have been preserved, yet the little dents made by the hail, accompanied by a driving wind, have made slanting impressions on the sands of these early times, in exactly the same manner as similar atmospheric agents do at the present day at Sandown, Shanklin, or Bournemouth. Of course, such phenomena would not be so easily interpreted if all their surroundings did not point in the same direction. Geologists frequently find the ripple-marks, and rain or hail spottings in these stones, accompanied by the impressions of the feet of birds or dinosaurs, and the muddier sediments show cracks made by the sun in drying the silt between tides, and high and low water marks. Worm-tracks are also exceedingly common, and such tracks are sometimes ended by a perpendicular hole,—the temporary home of the crawler. In fact, almost all the ordinary phenomena that may be observed on sandy or muddy beach to-day find representatives in even the strata of the Cambrian age. Such, then, are the teachings of a sandstone quarry, telling us of a sun, rain, hail, winds, and tides in remote periods, and speaking of an order of things very similar to that now obtaining. Such evidence should be ever before the eyes of those geologists who would make these agents more energetic and active in those times than now.

The prevailing colour of the stone is light brown, but there are also tints of yellow. Some of it is distinctly micaceous, which greatly assists in rendering it fissile, more especially in the lower beds.

The Scotgate Ash quarries produce a great variety of stone, but the six following are the most important:—

1. "Green Crag," a laminated dark greenish brown stone with minute specks, used principally for window-heads, cills, coping, &c.
2. "White Crag," a compact light brown colour, looking almost white when tooled, with similar specks. Mr. David Kirkaldy has tested this stone, three 6-in. cube samples of which gave the following "crushing-weights," in tons, per square foot,—734.6, 742.6, and 725.8, the mean being 734.3. All the samples tested were bedded between pieces of pine ½ in. in thickness. It is used for landings, steps, paving, &c.
3. "Bottom bed," a very similar stone to No. 2, but rather more micaceous, used for the same purposes and for monuments.
4. "Block stone," a fine homogeneous brown sandstone, largely used for high-class masonry and monumental purposes.
5. "Rag," a laminated stone with dark thin lines of mica; it is suitable for bases and the like.
6. "Grit stone," as its name implies, is rather coarse, being made up of almost transparent grains of quartz; used mostly for dock-walls and cheap masonry.

Examples of the stone may be seen in the National Gallery, South Kensington Museum, and Gresham Buildings, in London; War Offices, barracks, station, and hotel at York; new barracks at Portsmouth, Newcastle, and Liverpool; and the principal buildings in Harrogate.

The great number of quarries in Yorkshire preclude the possibility of our mentioning them in detail. Many of the sandstones raised are very similar in character to those just described, and they are all found near the principal towns, the stone being generally called *Yorkshire Stone*. As a rule, the finer-grained kinds are used for ordinary building purposes, whilst the coarser varieties are more suitable for heavy engineering works. Good flags and landings are found near Bradford and Halifax, especially in the North and South Owram quarries, near the latter place.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

15,464, Lavatories. E. J. Preston and E. W. De Russett.

The object of this invention is to increase the slightness of fold-up lavatories. They are fitted with a movable flap or lid hinged across the back so as to fold up compactly when the basin is not in use. Openings for ventilation are left in the casing. On the top of the casing a shelf is provided, supported by brackets attached to the side of the casing, and in this shelf and brackets are carried the container for water supply, water-bottles, and glasses. A form suitable for use in railway carriages is also specified.

15,860, Joints and Stoneware Pipes. H. L. Doulton.

A collar is provided near one end of the pipe, and this is made to support a ring of gasket or other suitable material, against which, when the pipes are laid together, the socket of the next pipe abuts. In each socket there is a hole by which the cement to complete the joint is run into the cavity of the socket, and between the tipped end of the pipe within the socket and the gasket ring which closes the mouth of the socket. The joint is convenient for manufacture as well as for use, and there is sufficient flexibility in the joints to admit of the pipes being accurately placed in the positions required, whilst afterwards a complete and impermeable closing of the joint is effected.

304, Boilers. J. Stanley and J. Todd.

The front supporting the fire-bars is made tubular, with water inlet on each side. The fire-bars are supported at the front by the front feed-tube; the back ends of the fire-bars are joined to cross fire-bar box, above which is the boiler back. The front and back are connected by tubes of V-shaped section, which connect the front and the back. These tubes are covered by saddle or water jacket, which is in connection at top with front and back of boiler, so that a large and continuous water-heating surface is provided.

5,124, Ladders. W. A. Allen.

The rungs are of iron, and hinged to uprights which have an internal groove on each, into which the rungs fit when the ladder is closed up.

11,091, Bricks, Tiles, &c. J. C. Anderson.

The object is to produce articles of uniform density, and the material is filled into the moulds in a vacuum, and several other improvements are embodied in the production of bricks of different colours and of various styles of decoration.

11,294, Chimney Cows. J. Whitehead.

The specification of this invention (wherein the patentee describes himself as a "practical Doctor of

Chimneys") sets forth an arrangement of revolving vanes which, when started by the wind, extract or withdraw the air in the tube or orifice of the chimney or ventilator.

11,397, Boring and Well Sinking. O. Terp.

The object is to obviate the difficulty and delay caused by altering the boring-tools according to the different strata passed through. Instead of changing the whole apparatus, only the tool itself is changed, and this is conveniently effected by the gear employed in working it. Special means are also explained for the use of steam in connexion with the boring and the lifting and manipulation of the boring-tools.

NEW APPLICATIONS FOR PATENTS.

Nov. 19.—15,017, M. Syer, Siphon Water Waste-preventers.—15,024, W. Sudbury and W. Spreadbury, Chimney Tops and Ventilators.—15,038, J. Gregson, Rain-water, Soil-pipes, &c.—15,069, S. Fisher, Wall or Ceiling Coverings.

Nov. 20.—15,092, W. Baggshaw, Tubular Iron Roofs.—15,119, J. Tucker, Lock.

Nov. 22.—15,134, G. S. Sienk, Closing Fanlights, Windows, Ventilators, &c.—15,203, W. Kellogg, Sash Pulleys.—15,212, D. Grove, Water-closets.

Nov. 23.—15,227, E. Verity and Others, Sash and Casement Fastener.—15,233, C. Parrot, Tile Grates.—15,267, O. Lessing, Cut and Stained Glass for Decorative purposes.

Nov. 24.—15,312, G. Ewing, Flushing Apparatus for Water-closets, Urinals, &c.

Nov. 25.—15,347, L. Schlenker, Ornamental Granite Marble Mosaic.—15,374, W. Buchan, Ventilators.—15,383, G. Rainsford, Gas Chandeliers or Gasaliers.

PROVISIONAL SPECIFICATIONS ACCEPTED.

13,364, R. Pardoe, Scindless Revolving Chimney Cowl.—13,432, G. Shorland, Stoves and Fire Grates.—13,738, E. Pearson, Valve Arrangements and Container for Closets.—14,396, W. Blakeney, Combined Earth Closet and Urinal.—13,937, E. Taylor, Ventilating Door-knobs, &c., to Spindles.—13,944, W. Macdonald and Others, Adjusting Door-knobs, &c., to Spindles.—13,964, J. Watson, Slits Brick.—13,964, W. Lindsay, Moulding Bricks or Blocks.—14,582, N. Pitt, Stoves.—14,584, E. Kent, Heating and Ventilating Houses.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

923, H. Buchan, Water-closets.—979, W. Leggett, Regulating Casements, Fanlights, Ventilators.—981, W. Leggett, Regulating Skylights.—1,744, T. Hare, Floors and Supports of Floors in Bridges and Buildings.—2,371, E. Houghton, Chimneys or Ventilating Shafts.—4,435, W. Rowe, Plough and Sash and Sash Filler Plane.—6,163, R. Little, Sash Windows.—6,912, G. Butt, Wood Mouldings.—13,382, W. Browne and Others, Automatic Cut-off for Water-pipes.—14,619, S. and J. Fawcett, Pressing Bricks, Tiles, &c.—905, T. Young, Door Lock Spindle.—1,086, F. Wendling, Manufacture of Paint.—1,149, H. Hartung, Door Checks.—1,163, H. Vaughan, Drying-floor for Tiles, &c.—1,884, H. Conolly and Others, Man-hole for Drains, &c.—13,739, F. Hainsworth, Scroll Work.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

NOVEMBER 23.
By WALKER & CLYDE.
Barking-road—Ground-rents of 42l. a year, reversion in 94 years £920
By HAZARD & CO.
Fulham—Ground-rents of 161l. 10s., term 91 years 3,000
By BRAN, BURNETT, & ELDRIDGE.
Camden Town—15 to 19, Rochester-square, 60 years, ground-rent 29l. 2,630
20 to 24, Rochester-square, 60 years, ground-rent 27l. 2,670
25 to 29, Rochester-square, 60 years, ground-rent 24l. 2,110
61 to 64, Hildrop-crescent, 64 years, ground-rent 32l. 2,600
By HOLMCASTLE & SON.
Poplar—26, 28, and 30, High-street, freehold 546
Blackwall—124, Brunswick-street, copyhold 360
Old Ford-road—Nos. 609 and 611, term 17 years, ground-rent 12l. 120
Canning Town—35, 34, and 36, Clarkson-street, freehold 630
Haggerston—Ground-rents of 12l. 10s., reversion in 97 years 276
Plinton—Ground-rents of 13l., reversion in 97 years 276
1 to 7, Chad-street, freehold 790
Canning Town—7 to 19 odd Clarkson-street, freehold 1,235
By DUNN & TAYLOR & CO.
Brechley The residence, Dunbar House, and 31 acres, 63 years, ground-rent 25l. 2,500
Holloway—129, 126, and 127, Seven Sisters-road, and an improved ground-rent of 6l. 12s. 6d., long leasehold, ground-rent 15l. 2,750
Ground-rent of 7l. 10s., term 56 years 100
Barnes—Ground-rents of 13l. 7s. 8d., freehold, and a ground-rent of 7l., reversion in 19 years 2,190
By REYNOLDS & EASON.
Lambeth—An improved rental of 69l., term 31 years 8,500
Kenning—3 to 5, Kenning-road, ground-rent 5l. 5s. 308
Hackney—1 to 13 odd, North-street, 31 years, ground-rent 12l. 655
Walthamstow—1 and 2, Ashburn-villas, freehold 425
1 and 2, Brandon-villas, freehold 420
1 and 2, Richmond-villas, freehold 414

Lea Bridge-road—3, 4, and 5, Wheatsheaf-terrace, freehold £1,610
Hackney-road—13 and 14, Seabright-street, and 11, Hill-street, 30 years, ground-rent 14l. 365
9 and 10, Hill-street, 31 years, ground-rent 8l. 390
22 and 24, Maidstone-street, 21 years, ground-rent 4l. 5s. 170
1 to 4, Emma-street, 17 years, ground-rent 14l. 230
29, 46, and 47, Great Cambridge-street, 2 years, ground-rent 15l. 250

NOVEMBER 24.

Kingland—1, Upton-road, 33 years, ground-rent 4l. 4s. and 4s., lease-street, 33 years, ground-rent 6l. 323
By H. J. BLISS & SONS.
Finsbury—1 to 18, Royley-street 19 years, ground-rent 84l. 1,900
Hackney-road—46, 48, and 50, York-street, and a ground-rent of 2l., freehold 1,200
22 and 23, Finsbury-road, 70 years, ground-rent 8l. 270
Clapton, Lea Bridge—Crofton Cottage, 64 years, ground-rent 6l. 260

By A. WALTON.

Barking-road—1 to 7 odd, Victoria-place, 87 years, ground-rent 12l. 350
South Norwood—1, Clifton-villas, 86 years, ground-rent 3l. 200
Clapham—79, Faversham-road, 90 years, ground-rent 6l. 10s. 331

NOVEMBER 25.

Finsbury Park—59, Blackstock-road, 86 years, ground-rent 6l. 535
Peckham Rye—The residence called Sunnyside, leasehold 380
By J. G. & A. FAVOR.
Mile-end—8, Berners-road, 7 years, ground-rent 2l. 10s. 32
43 to 61 odd, Grafton-street, 63 years, ground-rent 22l. 10s. 2,005

By BOWEN, BOWEN, & E. MARSH.

Wapping—25 and 26, Wapping-wall, freehold 280
Peckham—15, Peckham grove, freehold 690
Barnes—5, Grafton-road, 650 years, no ground-rent 760

By C. H. & H. WHITE.

Harrow—9, Elm Park-villas, freehold 693
West Norwood—1, The Shrubbery, 39 years, ground-rent 36l. 455
Stockwell—27 and 27a, Stockwell Green, freehold 590
Kennington—14, 16, and 18, Cleaver-street, 28 years, ground-rent 13l. 680
3 to 13 odd, Harleyford-road, 19 years, ground-rent 13l. 690

Balham—The residences Sunnyside and Bedford Lodge, 35 years, ground-rent 18l. 1,080
Brighton—12, Marine-square, freehold 860
18, Bristol-road, freehold 700

By DATA & SON.

Stepney Green—9 to 17 odd, Pole-street, 40 years, ground-rent 17l. 10s. 625
St. George's-in-the-East—13, Langdale-street, 16 years, ground-rent 4l. 90
72, Christian-street, 13 years, ground-rent 3l. 110

By EASTMAN BROS.

Lee, Kirkdale-villas—ground-rents of 14l. 17s. 6d., reversion in 96 years 315
Lebanon-road, ground-rent of 87l. 10s., reversion in 96 years 1,460
Old-road, ground-rents of 22l. 2s., reversion in 96 years 620

Belgrave-square—18, Chapel-street, 21 years, ground-rent 21l. 1,400
Brompton—25, Ovington-gardens, 32 years, ground-rent 6l. 1,120

By R. RHID.

Hampstead-road—Nos. 63 to 63 odd, and 165 to 173 odd, Drummond-street, freehold, area 13,608 ft. 16,500
Holborn—Staple Inn, freehold, area 33,361 ft. 69,000
Bryanston-square—9, Upper Dorset-street, 18 years, ground-rent 6l. 320
Holloway—157 and 159, Seven Sisters-road, 75 years, ground-rent 7l. 400

MEETINGS.

SATURDAY, DECEMBER 4.

Association of Public Sanitary Inspectors.—Mr. W. Heame on "House Drainage in London." 6 p.m.

MONDAY, DECEMBER 6.

Royal Institute of British Architects.—Signor Giacomo Boni on "The Ca' d'Oro and its Polychromatic Decorations."—A Contribution to the Study of Gothic Architecture in Venice." 8 p.m.

Surveyors' Institution.—(1) Mr. E. Ryde, on "The Time Question, with Suggestions for the Reduction of the Rent-charges"; (2) Discussion on the foregoing subject. Mr. Willis Budd's paper, 8 p.m.

Society of Engineers.—Mr. G. B. Jerram on "River Pollution caused by Sewage Disposal." 7.30 p.m.

Society of Arts (Cantor Lectures).—Mr. Lewis F. Day on "The Principles and Practice of Ornamental Design." H. 8 p.m.

Leeds and Yorkshire Architectural Society.—Annual dinner.

Clerks of Works' Association.—Mr. R. Old, on "Brick-making Ancient and Modern." 8 p.m.

Victoria Institute.—Mr. S. D. Peel on "Worship and Traditions of the Aborigines of North America." 8 p.m.

TUESDAY, DECEMBER 7.

Institution of Civil Engineers.—Dr. John Hopkinson, F.R.S., on "The Electric Lighthouses of Macquarie and of Tino." 8 p.m.

Parkes Museum.—Annual General Meeting. 5 p.m.

Society of Biblical Archaeology.—Three papers. 8 p.m.

WEDNESDAY, DECEMBER 8.

Society of Arts.—Major-General C. E. Webster on "Glow Lamps, their Use and Manufacture." 8 p.m.

Institute of Auctioneers and Surveyors.—Adjourned General Meeting of Members. 4.30 p.m.

THURSDAY, DECEMBER 9.

Society of Telegraph Engineers and Electricians.—Annual General Meeting. 8 p.m.

Miscellaneous.

"The Principles and Practice of Ornamental Design."—This is the subject of the first course of Cantor Lectures given this session in the Hall of the Society of Arts, the lecturer being Mr. Lewis F. Day, who, on Monday evening last, delivered his first discourse, which was devoted to a consideration of what he called "the anatomy of pattern." He showed how various patterns had obviously grown out of the mechanical necessities of primitive industrial processes, such as basket-making, weaving, &c., and how, in many manufactures of the present day, carried on with all the resources and complexity of machinery, the basis or groundwork of a pattern, structurally speaking, was essentially the same as in the kindred products of antiquity. The dissection of pattern design was spoken of at some length by the lecturer, and his remarks on this and other heads of his subject were very clearly illustrated by a series of wall-papers printed in black and white by Messrs. Jeffrey & Co. for the special purpose of showing the form of the ornament. Mr. Day concluded a long and interesting lecture by entering into special technical details as to the limitations and conditions under which the pattern-designer was compelled to work owing to the exigencies of manufacture, especially in regard to such processes as the printing of paper-hangings, calico-printing, &c., where the unit of pattern had almost to be invariably self-contained within a limited area and arranged so as to repeat. The philosophy of "drop-patterns" was also touched upon, it being clearly shown how disagreeable horizontal, diagonal, or stepped lines of patterns on papered walls could be prevented by the judicious use of a "drop-pattern" paper. The remaining lectures of the course will be delivered on Monday evenings, December 6, 13, and 20.

Swanage.—Mr. W. Harvey's report to the Local Government Board on the prevalence of enteric fever in the urban sanitary district of Swanage, in Dorset, contains the following particulars as to the sanitary arrangements of this "picturesque resort."—"Of the 500 houses in Swanage, 342 have privies, mostly situated in the Purbeck beds. These privies consist of pits of various dimensions, but averaging about 5 ft. in each of the three diameters. About 150 houses have what are designated earth-closets. These are, in reality, large tubs or buckets, so large, mostly, that they must of necessity be emptied long before they are filled, lest they become too heavy to be moved. Their contents, invariably very liquid from deficiency or absence of earth and ashes, are commonly thrown into the domestic ash-midden, or are disposed of in the ground of the garden. The ash-midden itself consists of three slabs of the local stone, placed against a convenient wall so as to enclose a rectangular space. Everything thrown thereon is, as a matter of fact, simply cast on the ground. The ash-middens and privy-pits are not emptied or cleaned except at long intervals, and then only by the enterprise of occupiers; of scavenging by the sanitary authority there is none, except in so far that the main streets are duly swept and watered. As the privy-pits themselves are lined with small flat stones, simply placed in apposition, and (I have good authority for saying) generally without cement or mortar, the ground in their vicinity cannot fail to become polluted by matters exuding from them. In the town the soil covering the rocks is a hard, friable clay, that fissures easily in dry weather, and which is not, therefore, by any means impervious. Moreover, it is not (at any rate about the High-street) many feet in thickness; and not a few pits are in direct relation with the rocky substratum."

The Plumbers' Company entertained a large company of gentlemen interested in the progress of sanitary science at dinner at the Albion, on Monday evening, the Master, Mr. Alderman Knill, in the chair. Mr. E. P. Anson (President of the Royal Institute of British Architects), Mr. T. Cartwright (President of the United Operative Plumbers' Association), and Mr. Ernest Hart responded to the toast of "Sanitary Science and its Allies." The progress of the movement for the registration of all competent plumbers was referred to by the Master and by other speakers, and as to this we may direct our readers to a list of registered plumbers, masters and men, which occupies one of our advertisement pages this week.

New Workhouse at Fordingbridge.—On the 22nd ult. the Guardians of the Fordingbridge Union attended under special notice to receive the keys of the new workhouse buildings, which during the past fifteen months have been erected on a very suitable and central site known as The Bartons, Fordingbridge. The buildings comprise the entrance block (on right hand), containing porter's rooms, receiving wards, bath-room and lavatory, cells for male and female vagrants, with day-room, labour-shed, fumigating-room, and conveniences. The entrance block (on left-hand), containing Board-room, with strong-room, lavatory, &c., waiting-room, shoemakers' room, rooms for aged married couples, and store for inmates' clothes. Beyond is the main block, providing accommodation for able-bodied, infirm, and very infirm inmates of both sexes, with bath-rooms, lavatories, stores, &c.; master's office, sitting-room, and bedrooms, large and well-proportioned dining-hall, with convenient kitchen and offices adjoining. In the able-bodied women's yard is the wash-house, laundry, and other offices, with large storage-tank for supply of rainwater; whilst in the able-bodied men's yard is a large and convenient labour-shed, with well and pumping apparatus. The infirm men and women's yards have covered seats. The children's block comprises boys' and girls' day-rooms, school and class rooms, with mistress's room and large airy dormitories, with convenient bath-rooms and lavatories. The drainage is so arranged that almost any length of drain may be inspected at a moment's notice by means of lamp and manholes placed in suitable positions, with lidded pipes (to allow for removal of a stoppage without breaking the pipes). Messrs. Bowes Scott & Read's patent automatic flushing-tanks are used for flushing purposes. Externally, the buildings are faced with the local red bricks, relieved only by moulded cornices, strings, labels, aprons, &c., of the same colour. The design is "Queen Anne" in character, plainly treated. The whole of the works have been carried out by Mr. John Greenwood, of Mansfield, Notts, from the designs and under the superintendence of the architect, Mr. Fred Bath, of Salisbury. Mr. Edwin Radford acted as clerk of works, and Mr. Robert Orchardson was the contractor's resident agent.

Sir John Soane's Museum.—According to the daily papers, the "secret chamber," or rather cupboard, in Sir John Soane's house in Lincoln's Inn-fields, was opened on Monday afternoon. The trustees present were Mr. Waterhouse, R.A., Mr. G. Godwin, F.R.S., Mr. C. S. Percival, F.R.S.A., Professor T. Hayter Lewis, F.S.A.; Professor Flower, F.R.S.; Dr. Freshfield, V.P.S.A.; Dr. Richardson, F.R.S.; and Alderman Sir R. W. Carden, together with the curator (Mr. Wild) and the solicitor to the trustees (Mr. Upton). On being opened, the cupboard was found to enclose a nest of sixteen drawers, to the outside of which was affixed a memorandum, of which the following is a copy, signed by the executrix of Sir John Soane's will, Sir Francis Chantrey, and two other trustees of the Museum, and the then curator:—

"December 9, 1837.
Pursuant to Dr. Lushington's opinion, this repository was opened by the executrix, in the presence of three trustees, to ascertain if there were money, notes, or valuables to require further probate duty, and after merely looking at the papers, &c., for that purpose they were all returned without further examination, retaining for use some articles of stationery."

It is stated that a careful examination is now being made of the contents of the drawers, which appear, however, at first sight, to contain nothing of public interest, but only documents relating to various buildings with which Sir John Soane was professionally connected, and to a well-known family dispute. The worthy Sir John seems to have been addicted to mystification.

St. Pancras Workhouse.—At the meeting of the St. Pancras Board of Guardians, held at the Vestry-hall last week, the Special Building Committee brought up a report recommending that instructions be given to Mr. H. H. Bridgman, architect, to prepare and submit, by the 1st of February next, plans and specification for additional and improved accommodation at the Workhouse, at an expenditure of 50,000*l.* or such other sum as the Guardians may ultimately decide upon. The recommendation was carried, and a contract embracing the terms of the architect's appointment was subsequently sealed by the Board.

The Cement and Brick Industries of Sweden.—Hitherto the cement and bricks used in the building trade of Sweden have mostly been imported from abroad, the former article principally from England, but there appears now every prospect of this being altered, two large works having recently been started in that country for the manufacture of cement and bricks. The former of these is the Visby Cement Company, having works on the Island of Gotthland, in the Baltic, the formation of which consists entirely of chalk. It has been found that the raw material here is excellently adapted for the purpose in view, being entirely free from all foreign and injurious substances, a circumstance which permits of the adaptation of a method of manufacture cheaper than any other in use. Thus Portland cement is produced at Visby from slacked lime and dried marl, whereas at other works raw chalk and dried marl are used. In order to pulverise chalk extensive and powerful machinery is required, whilst the dust obtained has to be subjected to a slow and costly process of slacking before foreign substances are removed. Subsequently the mass has to be treated to an equally slow process of drying, which, as it has to be done in a natural way in the air, is greatly dependent on the weather. At Visby both the latter processes are avoided, whilst in the slacking process itself, in which two-thirds of already slacked lime are used, a saving of 25 per cent. of fuel is effected. On the other hand, the works are most favourably situated at the foot of a rich chalk cliff, and close to extensive layers of marl, whereby great saving in transport is also caused. As the island is in direct communication with Sweden, Russia, and Germany, the owners are confident of being able to compete with English cements in these countries. In Stockholm alone the yearly consumption of cement is estimated at nearly 20,000*l.* The brick works referred to have been established at Stockholm by Herr A. F. Nilsson, and the manufacture is, for the first time in Sweden, effected by steam. The bricks produced are stated to be superior to those made by hand, and to find a great demand.

The Loading of Chimneys and Walls. In the *Zeitschrift des Vereines deutscher Ingenieure*, Herr A. Hollenberg communicates some interesting information respecting the effect of loading chimneys in preventing, or at least diminishing, oscillations. A chimney only 56 ft. high, set in ordinary lime mortar without cement, when tested after completion for the degree of oscillation, displayed this property to such an extent that it was thought advisable to make its upper end more secure by placing a load on it. This was done by putting on the top an iron plate weighing 145 kilogrammes. This plate is stated to have proved a complete success. The chimney, which is rather exposed, has withstood since its erection (1870) many a storm, and shows neither horizontal nor vertical cracks. According to the *Praktische Maschinen-Constructeur*, similar results have been obtained by a millowner at Müllfort, near Rheylt, by placing rails on walls. He found it necessary to erect two additional stories over the first floor, without, however, interrupting work in the factory. But the constant vibration destroyed the brickwork as soon as it was erected. An attempt to hold the walls together by loading them with rails was so far successful that the two additional stories could be completed. The vibration of the walls was completely stopped by the load placed upon them.

Handicrafts in Russia.—According to the *Novoje Vremja*, handicrafts among the peasantry in the southern provinces of Russia have fallen to a very low depth. Several kinds of crafts have already died out, and fresh ones are not originated. It is stated that the causes are low economical conditions and the starting of manufactories, which latter attract the peasants. Besides this, the peasantry of the south display an increasing tendency to wander from place to place in search of work rather than to settle down.

Workmen's Dinner at Weybridge.—Last week the workmen engaged in building a residence, "Roselyn Lodge," at St. George's Hills, for Miss Milligan, of Ryde, Isle of Wight, were, by that lady's kindness, entertained at dinner at the "Stag and Hounds." Among those present during the evening were Mr. T. Coulston, representing Miss Milligan; the architect, Mr. George A. Wright, of Wimbledon; Mr. Samuel Woods, contractor; Mr. Lake, clerk of works; and Mr. Smith, foreman.

Bombay Railway Terminus Buildings. The directors of the G. I. P. Railway Company have accorded their sanction to the execution of the statues which are to be the crowning features of the new terminal buildings at Boree Bander. This splendid block of buildings has been constructed on such liberal principles in every respect that it would have been a pity to leave out of the design the beautiful figures which Mr. F. W. Stevens, the architect, considered would appropriately give completeness to his work. The principal of the statues, which are now being executed in London, is a colossal figure of her Majesty the Queen-Emress, and, as we suggest elsewhere, a fitting way of celebrating the Queen's Jubilee in Bombay, on the 20th of June next, would be for H.R.H. the Duke of Connaught to unveil this statue. The building will by that time be almost if not quite completed in every detail, and the unveiling of the statue would mark the importance of the occasion. Bombay has every reason to be proud of the ornate pile which Mr. Stevens's genius has called into being, and the city could not offer a more appropriate compliment to her Majesty, on the fiftieth anniversary of her reign, than associating it with the completion of this great work.—*Times of India*.

New Canals in France.—Since Germany decided upon the canal from Brunsbüttel to the Kieler Fjord, several projects for new canals in France have been submitted to the Government of that country. Of these, two are of particular importance. One is for a canal connecting the Bay of Biscay with the Mediterranean, a plan formerly proposed from Bordeaux to Cette or Narbonne, via Toulouse, which a Government Commission has now under consideration. The length of this canal is estimated at 900 kilometres. The second project, is, however, of a far more extensive nature, being for a canal from Marseilles through the Rhone Valley to Lyons, and thence, by the use of the waterways of the Upper Loire and the Seine, to Paris, and further north to Calais or Dunkerque. The length of this canal would be about 2,500 kilometres. The engineers who advocate this scheme point out the excellent defence which it would offer against an eastern invasion, and the advantage it would give to France in opposition to England, besides which it would traverse the most fertile and important parts of the country.

New Buildings in Scandinavia.—A company has been formed in Christiania for the building of a grand new theatre on modern principles. At present there is only a very old one in existence. The cost of the building is estimated at about 25,000*l.*, but as yet no site has been chosen, and no invitations for designs issued. A Bill has just been presented to the Danish Parliament asking for funds for the rebuilding of the celebrated Palace of Christiansborg, which was burned to the ground a few years ago. The sum required is estimated at 275,000*l.* A Bill has also been presented for the erection of new Houses of Parliament, the cost of which is estimated at 110,000*l.*, including exterior decoration. The Gothenburg Private Bank has decided upon erecting a new building of very handsome appearance, the design accepted being those of Herr George Krügers. Three prizes were offered. The city of Bergen having decided upon the building of a new Bourse, designs for the same were invited, but the committee appointed to report upon them have come to the conclusion that none should be accepted. The two prizes offered were, however, awarded to the best drawings submitted. It is proposed to invite further designs.

The Hygiene of Warm Climates.—The following suggestions, made in a paper read before the Congress at Nancy, with regard to the salubrity of houses and clothing in hot countries, are of interest. In houses, whether constructed of stone, brick, straw, or wood, great attention ought to be paid to the way in which they are protected. They ought to be two stories high, as a more even temperature could be kept on the first floor, and malarial diseases are less to be feared on an upper story. Windows should be glazed, as a protection against malarial and intestinal complaints, and as a means of maintaining a lower temperature. All domestic offices should be at some distance from the house. This is a wise precaution against fire and bad smells. It is desirable to wear flannel in hot climates.—*Sanitary Record*.

The Parkes Museum.—The annual general meeting of the members of the Parkes Museum will be held in the Museum, 74, Margaret-street, Regent-street, on Tuesday next, December 7th, at five o'clock p.m., for the transaction of the following business, viz.—1. To receive report from Council; (2) to elect vice presidents; (3) to elect members of Council.

The Public Health Act, 1875.—Mr. William Spinks, Surveyor to the Dukinfield Local Board, read a paper on this Act at the Warrington meeting of the Association of Municipal Engineers on Saturday last, with special reference to the 150th Section and its proposed amendment. Mr. Spinks writes:—"It is very desirable indeed now to get all the information we can as to the working of the 150th Section, and I am collecting, with a view to proper compilation, the results of the practice of several Borough Surveyors, who have not been able either to attend the meetings of the Association nor had time to take part in the discussion." We will return to the subject next week. In the meantime, Mr. Spinks will be glad to hear from gentlemen who have any experience on the matter.

Lightning Conductors of Nickel.—Some experiments are now in progress at Dresden, by using nickel instead of iron for the points of lightning conductors. As this metal does not corrode in wet weather, it is believed to be more suitable than iron, corroded or oxidised conductors being less effective when struck by lightning.

Building in Philadelphia.—It is estimated that about 9,100 buildings, of which 6,835 are stated to be private dwellings, have been erected in Philadelphia in the present year. This is 1,140 more than were built in 1885, which latter year had beaten the record of any previous year by over 1,500 buildings. During the past six years 24,206 private dwellings have been constructed in Philadelphia, or an average of 6,000 a year. It is calculated that the additions and alterations during those years, and the many shops or stores with dwellings attached, which must be considered in this connection, bring the aggregate of new houses added to the community up to fully 30,000. The number of unoccupied houses in Philadelphia is stated to be inconsiderable.

"The Architect and Contractor's Compendium, Specialist's Directory and Diary," for 1887, edited by Mr. John E. Sears, A.R.I.B.A., is in preparation, and will shortly be issued. In the words of the prospectus, "its design is to combine in a convenient form an office diary, copies of Building Acts, By-laws, legal and general information, tables, and memoranda of every kind relating to the theory and practice of architecture, together with carefully classified advertisements of specialties, manufactures, and requirements in the several branches of the building trades." It is to be illustrated, and from specimen-pages which have been forwarded to us it is likely to be found a very handy work of reference for office or workshop, provided pains are taken to ensure accuracy. It will be published by Messrs. James Sears & Sons, Crane-court, Fleet-street, E.C.

PRICES CURRENT OF MATERIALS.

TIMBER.			
	£. s. d.	£. s. d.	
Greenheart, B.G. ton	6 10 0	7 0 0	
Teak, E.I. do	9 0 0	14 0 0	
Sequoia, U.S. foot cube	2 4 0	2 7 0	
Ash, Canada load	3 0 0	4 10 0	
Birch " do	2 5 0	3 10 0	
Elm " do	3 10 0	4 10 0	
Fr. Dantico, &c. do	1 10 0	4 0 0	
Oak " do	2 10 0	4 10 0	
Canada " do	3 0 0	6 0 0	
Pine, Canada red " do	2 0 0	3 10 0	
" yellow " do	2 5 0	4 0 0	
Lath, Dantico fathom	3 0 0	5 0 0	
St. Petersburg " do	4 0 0	5 10 0	
Walnut, Rye " log	2 15 0	5 0 0	
" Odessa, crown " do	3 5 0	3 7 6	
Deals, Finland, 2nd and 1st. std. 100	7 0 0	8 0 0	
" 4th and 3rd " do	6 0 0	8 10 0	
Riga " do	5 10 0	7 0 0	
St. Petersburg, 1st yellow " do	8 10 0	14 0 0	
" 2nd " do	7 0 0	8 0 0	
" white " do	6 0 0	10 0 0	
Swedish " do	2 0 0	15 0 0	
White Sea " do	7 0 0	17 10 0	
Canada, Pine, 1st " do	17 0 0	29 0 0	
" 2nd " do	11 0 0	17 0 0	
" 3rd &c. " do	8 0 0	8 0 0	
" Spruce, 1st " do	8 0 0	11 0 0	
" 3rd and 2nd " do	5 0 0	7 10 0	
New Brunswick " do	5 0 0	7 0 0	
Battens, all kinds " do	4 0 0	12 0 0	
Flooring boards, sq. 1 in., Prepared, first " do	0 9 0	0 13 0	
Second " do	0 7 6	0 8 6	
Other qualities " do	0 5 0	0 7 0	

TIMBER (continued).

	£. s. d.	£. s. d.
Cedar, Cuba " foot	0 0 3	0 0 3
Honduras, &c. " do	0 0 2	0 0 3
Australian " do	0 0 2	0 0 3
Mahogany, Cuba " do	0 0 4	0 0 7
St. Domingo, cargo average " do	0 0 4	0 0 7
Mexican " do	0 0 3	0 0 4
Tobacco " do	0 0 4	0 0 6
Honduras " do	0 0 4	0 0 6
Maple, Bird's-eye " do	0 0 6	0 0 8
Rose, Rio " do	7 0 0	10 0 0
Bahia " do	6 0 0	10 0 0
Box, Turkey " do	5 0 0	17 0 0
Satin, St. Domingo " foot	0 10 0	0 10 0
Porto Rico " do	0 0 7	0 1 0
Walnut, Italian " do	0 0 4	0 0 5

METALS.

	£. s. d.	£. s. d.
Iron—Bar, Welsh, in London. ton	4 7 6	4 15 0
" " in Wales " do	4 2 6	4 7 6
" " St. Domingo, London " do	5 10 0	5 10 0
Sheets, single, in London " do	8 15 0	8 10 0
Hoops " do	6 0 0	7 0 0
Nail-roads " do	5 15 0	6 10 0
Copper " do	43 10 0	44 10 0
British, cake and ingot " ton	45 0 0	45 10 0
Best selected " do	51 10 0	52 0 0
Best, strong " do	49 10 0	50 0 0
India " do	39 14 0	40 0 0

METALS (continued).

	£. s. d.	£. s. d.
Yellow Metal " lb.	0 0 4	0 0 4
Lead " do	12 16 3	12 17 6
Pig, Spanish " ton	13 2 6	0 0 0
English, common brands " do	13 18 9	14 2 6
Sheet, English " do	14 0 0	14 12 6
Strains " do	14 7 6	14 10 0
Silesian, special " ton	102 0 0	0 0 0
Ordinary brands " do	102 10 0	0 0 0
Strait " ton	105 10 0	0 0 0
Australian " do	20 5 0	20 10 0
English ingots " do	37 10 0	38 0 0
Ceylon " do	25 0 0	0 0 0
Palm, Lagos " do	22 0 0	0 0 0
Rapeseed, English pale " do	20 12 6	0 0 0
" brown " do	18 10 0	20 0 0
Cottonseed, refined " do	25 0 0	45 0 0
Tallow and Oleine " do	6 0 0	10 0 0
Lubricating, U.S. " do	8 0 0	13 0 0
" refined " do	1 8 0	0 0 0
Turpentine " cwt.	0 15 0	0 15 6
American, in casks " barrel	0 10 6	0 11 0
Tar—Stockholm " do		
Archangel " do		

OILS.

	£. s. d.	£. s. d.
Linseed " ton	20 5 0	20 10 0
Cocoon, Cochiti " do	25 0 0	0 0 0
Palm, Lagos " do	22 0 0	0 0 0
Rapeseed, English pale " do	20 12 6	0 0 0
" brown " do	18 10 0	20 0 0
Cottonseed, refined " do	25 0 0	45 0 0
Tallow and Oleine " do	6 0 0	10 0 0
Lubricating, U.S. " do	8 0 0	13 0 0
" refined " do	1 8 0	0 0 0
Turpentine " cwt.	0 15 0	0 15 6
American, in casks " barrel	0 10 6	0 11 0
Tar—Stockholm " do		
Archangel " do		

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
New Public Offices	Willenden Local Board	50l. and 25l.	Jan. 31st	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Second-hand Broken Granite.	Southend Local Board.	Official	Dec. 7th	xiii.
Stores and Materials	Great Northern Ry. Co.	do.	Dec. 9th	ii.
Erection of Eight Cottages, &c.	Admiralty	do.	Dec. 10th	ii.
Works and Materials	St. George's, Hanover-square, Vestry	G. Livingstone	Dec. 11th	ii.
Making-up Roads	Tottenham Local Board	— De Pape	Dec. 14th	ii.
Works at Infirmary	St. Leonard, Shoreditch	F. J. Smith	Dec. 15th	ii.
Paving Footways	Dartford Local Board	Official	Dec. 16th	xiii.
Portland Cement	Folkstone Corporation	A. W. Conquest	Dec. 18th	ii.
Refreshment Room, Monmouth Station	Great Western Ry. Co.	Official	Dec. 21st	ii.
Brick and Pipe Sewers, Paving, &c.	Met. Board of Works	do.	Dec. 22nd	ii.
Nine-floor Garage	Bristol Corporation	J. W. Girdlestone	Dec. 28th	ii.
New Municipal Buildings	Sunderland Corporation	Brightwell Hayton	Dec. 29th	xiii.
Additions to Principal's House	Trustees, King William's College (Isle of Man)	Official	Jan. 15th	ii.
Completion of Block of Buildings	Ed. Clarke	do.	Not stated	xiii.
Erection of a Pair of Villas, New Barnet	J. White	do.	do.	i.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Building Inspector	Edmonton Local Board	123l.	Dec. 13th	xvii.
Draughtsman and Surveyor	Croydon Corporation	100l.	do.	xvii.

TENDERS.

BOURNEMOUTH.—For the erection of a lych-gate and boundary-wall to the churchyard of the Church of St. Michael. Mr. Reginald G. Pinder, architect—

McWilliam, Bournemouth	£290 0 0
Minty, Bournemouth	253 10 0
Marnell, Bournemouth	213 10 0
* Accepted, subject to slight alteration.	

BOURNEMOUTH.—For the erection of a mission hall, per the Rev. F. E. Toyns, for St. Michael's Parish. Mr. Reginald G. Pinder, architect—

S. Minty	£830 0 0
Davis & Lambert	748 0 0
F. Hoare & Son	675 0 0
McWilliam & Son	595 0 0
W. Jones & Son (accepted)	585 0 0
[All of Bournemouth.]	

CARSHALTON.—For the erection of a villa residence at Meadow-road, Carshalton, Surrey, for Mr. H. Woodcock. Plans and specification prepared by Mr. James Keal, Sutton, Surrey—

T. B. Potter, Sutton	£550 0 0
A. H. Harris, Sutton	465 0 0
Baobin & Shopland, Sutton	444 0 0
J. Brown, Sutton	429 0 0
Howe & White, Wallington	375 0 0
S. T. Evans, Carshalton (accepted)	370 0 0

CHICHESTER.—For rectory-house at New Fishbourne. Mr. Arthur Baker, architect, Warwick-gardens, Kensington. Quantities by Mr. J. S. Alder, Palmerston-buildings, Old Broad-street, E.C.—

Pocock, Wood Green	£3,250 0 0
D. C. Jones & Co., Gloucester	2,980 0 0
J. H. Lockyer, Brighton	2,880 0 0
Dove Bros., Islington	2,375 0 0
W. Johnson, Chichester	2,864 0 0
J. Longley, Crawley	2,780 0 0
Forster & Son, Westbourne	2,630 0 0
Howell & Sons, Bristol and London	2,597 0 0
Macey & Sons, London	2,559 0 0
Johnson & Son, Wandsworth	2,630 0 0
Peters, Hove	2,453 0 0
Irish, Lavant	2,439 0 0

DARENTH (Kent).—For repairing, repainting, repainting, and re-corded Venetian blinds of six patients' blocks, at the Asylum for Imbeciles, Darenth, Kent, for the Managers of the Metropolitan Asylums District. Messrs. A. & C. Harston, architects, Leadenhall-street.

Quantities supplied—	
C. Willmott	£258 6 0
T. A. Bone	250 0 0
Fuller Bros.	217 2 6
F. G. Wenborn	185 11 0
Collyer & Son	194 15 0
C. J. Batstone	186 6 10
Snelling & Sons	186 0 0
W. J. Sandford	180 0 0
A. J. Shingleton	179 10 0
Gibbs, Fiew, & Co.	170 0 0
F. S. Smith	163 5 0
Tidmarsh & Sons	155 0 0
C. J. Shaw	152 0 0
W. Hitchcock	140 10 0
J. Hitchcock	145 0 0
J. Williams	140 0 0
F. Clarke	139 13 6
F. D. James & Son	139 0 0
W. Meredith & Son	135 0 0
D. Westlake	130 0 0
R. Searby & Son	119 0 0
W. Furnie	119 0 0
Saxby Bros. Northcote-road, Clapham Junction (accepted)	108 10 0

EASTBOURNE.—For the erection of private school, Eastbourne, Sussex, for Mr. A. M. Wilkinson. Mr. F. G. Cooke, architect, Eastbourne. Quantities by Mr. C. Stanger, Finsbury-pavement—

J. Fearless	£4,945 0 0
Harding	4,638 0 0
Langley	4,660 0 0
Wood	4,445 0 0
Cornwell	4,371 0 0
M. Martin	4,350 0 0
J. Martin	4,290 0 0
H. Noakes	4,178 0 0
Backhurst	4,140 0 0
Dow & Son	3,945 0 0
[All of Eastbourne.]	

none the less is colour pure. The snow white mountain against the midday blue is as the white of an opal, and as the morning rises and the evening sets upon it, it turns to gold and ruby, and at night it is more silvery than the moon. These colours are but elements of its whiteness, and are as veils of beauty thrown over it in nature's varying moods."

All this is very true and very picturesquely put, and with the conclusions of the author as to the extent to which colour should be or may be used in sculpture we are not disposed to quarrel. Of course he does not for one moment wish for realistic colour. "The nude of a statue is not flesh, the drapery of it is not stuff of woven flax or wool, and colour that would be used in either case with the purpose of deception would be a falsity and offence." But Mr. Parry is certainly not happy in his quotation from Gibson, who wrote to a friend that "form is spiritualised by the tinting; it makes us forget the material; the Greeks were right" (1). Let any one look at the tinted statues in the Gibson collection, with their coloured doll eyes and the coloured borders to their robes, and say if this is a way of idealising or de-materialising sculpture! It is highly improbable that the Greeks did anything at all like this; if it could be proved that they did, the only conclusion we could come to would be that they were not quite such great artists as we have been accustomed to think. Mr. Parry is more in the way of artistic righteousness when, a page or two further on, he argues against pure white marble on the ground of its over-lustrous quality, reflecting too much light into the shadows and failing to show all the delicacy of the modelling clearly. "Terra-cotta has been a favourite and successful material from the soft richness of its tint." Marble, however, Mr. Parry goes on to say, is the queen of all materials for sculpture; materials of dark colour, like porphyry and bronze and black marble, "need highly-polished surfaces to make their modelling visible,"—so Mr. Parry states it; we rather question his conclusion as to the necessity of this high polish in such substances, but he is quite right, of course, in saying that this polishing of dark marbles and bronze, which habit at all events has sanctioned, leads to a disagreeable effect of high lights in violent contrast to the dark colour of the material. The sculptor, who modelled the surfaces and knows what they ought to show, of course complains of this; but the brilliant decorative effect of bronze and dark marble has always been liked by decorative artists and painters, who love these flashing lights in giving effect to a painting of an interior. We may say, then, that these dark substances with a high polish should be confined to what may be called, rather, decorative sculpture, than used in imaginative and expressive work of the highest class. But to return to our white marble; this, says Mr. Parry, is the finest sculptor's material, with the one defect of its too great lustre: let us therefore tone it with some rich and mellowing tint, which will impart to it, by an artifice, the subdued lustre which would in future be imparted by the lapse of time. Granted; and if this tint be of such a nature that it does not cover the surface like a pigment, but rather sinks into the marble, leaving its beautiful grain and crystalline surface unimpaired, we should opine that such a treatment was an almost unmixed gain to the artistic result. It should be applied, however, to the marble as a whole,—drapery and all; not to flesh tints to distinguish them from drapery, which is merely to reduce the thing to a toy, as Gibson, by his unhappy experiments, in fact, did for his "Hebe." The process of toning down marble by a stain, and of colouring various parts of a statue with different tints (even if highly conventionalised and kept away from nature), are two widely different proceedings, and an acceptance of the one does not in the least imply the acceptance of the other.

In regard to the question how far the Greeks really carried the principle of what may be termed parti-colouring of statuary, Mr. Parry is inclined to imagine some distinction between the practice in regard to sculpture treated separately and sculpture in combination with architecture. The evidence for the use of

decided colour in architecture with the Greeks is much stronger than any evidence in regard to sculpture separately, and it is natural to think that friezes which were grouped with and were actually in a sense part of the architecture were treated in a manner to harmonise and form one whole with it. We are glad to find, however, that Mr. Parry does not accept the extreme polychromatic theory which would present the Greek temples to our imagination as entirely covered with strong colour. He adopts the view which we have always supported, that special parts were selected to be heightened and emphasised by colour, and that this colour would in many places probably be applied in the form of open decorative design, leaving the marble (toned perhaps) as a ground. There is nothing in this to shock our associations with Greek taste as the standard of artistic purity. Mr. Parry sums up his view thus:—

"It appears, therefore, that the treatment of architecture and sculpture differed on plain and reasonable grounds. The former had made part of a complex effect, and in consistency with the demand of artistic breadth, it had yielded to the stern demands of artistic composition. Colour had formed a very important part in it. Independent statuary, on the contrary, was clear of all obligation, and its colouring had relation to itself alone. With the exception of a few touches of colour on drapery and accessories [but there, alas! is where the cloven hoof comes in] "to save the whole from insipidity," the treatment appears to have been very tender, the main purpose having been to clear the supports and parts of inferior importance from the figure itself, and thus by contrast to emphasise the beauty of the nude."

In relation to the evidence of the use of colour, Mr. Parry refers in a pathetic tone of regret to the rapid fading of colours which were in some cases plainly visible when statues were first dug up, and faded rapidly on exposure to the air, so that only the evidence of the original discoverers can be taken as to their chromatic condition. The author quotes a letter from Mr. Newton in regard to the colours on the architectural and sculptural remains of Halicarnassus. "I saw them fade away in the sunlight like a ghost," Mr. Parry also adverts to the hard experiences which coloured fragments have had to go through in cleansing,—"at first well cleaned on their discovery; then, on arrival at their destinations, well soaped for taking plaster casts; then chemically washed to get rid of the soap." We remember standing by the late eminent Keeper of the antique marbles at the British Museum, when a question was discussed as to the former colouring of a certain architectural fragment, and an attendant put in, "Well, sir, it was scoured with soap lees to get the dirt off"; a statement which seemed sufficient to account for disappearance of any possible trace of colour that might have existed. But what strikes us as odd is, that amid all these admissions and laments as to the fugitive nature of the colouring on the Greek sculpture and architecture, it never seems for a moment to occur to Mr. Parry that there is an element of weakness in a system which brings such a perishable method to bear upon the completion of arts which, like sculpture and architecture, are in their grand work monumental and comparatively imperishable in character, and owe to this quality part of their effect upon the imagination.

In regard to architectural wall painting, the author admits that "the nude beauty of uncoloured architecture is of the most pure and abstract kind," and we are glad to get this admission of a view of the matter which has been rather overlooked of late years. In regard to Gothic architecture, for instance, there is a far higher pleasure to be found from pure stone mouldings, with their lights and shadows, than from some of the ill-judged examples of violent colouring which have been flaunted before us by enthusiasts on behalf of Mediæval colour, much of which was certainly coarse and crude, though not so bad in this respect, probably, as some of its modern so-called imitations. We can only pause to note in regard to this chapter the decisive manner in which the author distinguishes between picture painting, properly so called, and architectural wall painting. "Let the former," he says, "be

as free as the air it imitates, but architectural wall painting is bound by the respect the one art owes to the other. In the former the effect should be annihilation of surface, in the latter its emphasis." This sums up admirably the radical distinction between the aims of easel painting and of wall painting.

We must refer the reader to Mr. Gambier Parry's pages for his views as to the history and practice of mosaic, and "Art and Artists on Glass Painting," which chapters occupy a considerable portion of the work. In speaking of the limitations of stained glass art, we may observe, Mr. Parry seems to give the right conclusion on the wrong reason; he objects to a too high-wrought realistic picture on glass, on account of "the prodigality of human labour on a material so fragile that the least injury would mar it": that is not the reason for conventionalism in stained-glass design; it is because the material will not admit of a realistic treatment, and any attempt at this involves inevitable failure. The chapter on the adornment of sacred buildings goes a good deal into this subject of conventionalism, summing up with the conclusion that modern art "has rested too exclusively on the study of naturalistic combination," and that the type of art which we call "monumental" or "sculpturesque" or "heroic," or by various names meaning really the same thing, must be awakened again if painting is to become "a power of abstract and ideal expression, in harmony with that greatest creation of man's genius,—architecture."

NOVEL APPLICATIONS OF PORTLAND CEMENT CONCRETE.

By B. H. THWAITE, C.E.

THE *prima-facie* advantages of Portland cement concrete may be enumerated as follows:—

Its strength increases with age.
Its immunity from the ravages of organic elements.

Its freedom from oxidation or corrosive influences.

It will be seen that as an external structural element *per se*, or where artistic effects are not required, it has decided advantages over iron or timber.

The former is rapidly affected by contact with moist surfaces; the latter is subject to organic decay and the ravaging effect of minute animal life. Subjected to the effect of high temperatures,—as in the case of fire,—the latter is quickly destroyed, adding a contributory element to combustion. The former expands or cracks, and is a very treacherous material unless preserved from immediate contact with the flame. The combination, then, of the iron as the element of tensional strength along with the preservative and compressional strength of concrete, would appear to be most rational and superior to the use of either material *per se*; for positions where the outbreak of fire is a possible occurrence, or where the action of oxidation may prove damaging to the stability of the iron, the composite principle of construction may be adopted as a perfect *ensemble*. For floors, if the iron is placed in the form of wire attached to the points of support, and so placed in the section of the beam or floor as to take all the tensional strains whilst utilising the compressional strength of the concrete, this is a correct development of the principle for actual practice.

The application of the principle of the use of wire netting along with Portland cement concrete has lately been largely developed by Mr. David Wilson, of Grays, Essex. Mr. Wilson has been experimenting for a very considerable time with many strikingly novel applications; and many engineers who visited the Liverpool Exhibition would be struck with the exhibit of Mr. Wilson, which comprised a telegraph-pole with arms, 33 ft. long (the material forming an admirable insulating agent), a section of a 9-ft. sewer, a chimney-pipe, and a railway sleeper. The *modus operandi* adopted by Mr. Wilson for the construction of his telegraph-poles is a most

interesting and ingenious one, and is as follows (see figs. 1, 2, 3, and 4):—

A sheet of iron wire netting of the length of the pole, and of a width equal to its required circumference, is formed into a taper tube the length of the pole.

The principle of construction of the pole will be clearly seen by the segment shown in fig. 1,—2 is the wire netting, 3 the hollow core. Special moulds, in segments and

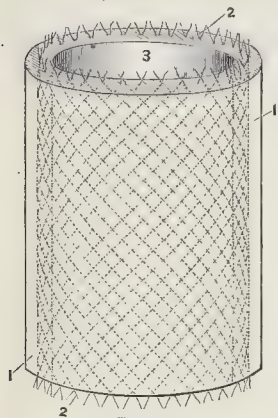


FIG. 1.

FIG. 2.

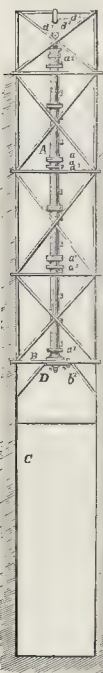


FIG. 3.

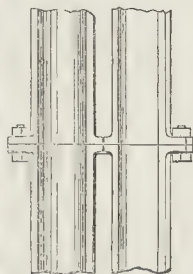


FIG. 4.

Wilson's Iron and Concrete Constructions.

arranged to open in half (see figs. 3 and 4), are bolted together to form the full length of the pole.

The moulds, A, Fig. 2, are placed vertically in a pit, c, on the side of a wall sufficiently deep to allow a mandril the length of the pole to be covered; they are first placed beneath and in the centre of the mould. As soon as the mandril, D, which forms the internal hollow of the mould, is in the position named, the mould is opened in half, and the wire netting, 2, is placed

therein. The mandril is now lifted up into position shown in fig. 2, and the two halves of the mould are brought together. The concrete is poured into the hopper, a, at the upper end, until the mould is filled.

During the time the concrete is setting the mandril is occasionally turned to prevent the concrete from binding on it while it is setting.

After a certain period of time has elapsed, sufficiently long to allow the concrete to thoroughly set, the mandril is lowered free from the mould by the pulley blocks, d. The clamps, a, a', which connect the two halves of the mould together are now removed, the mould is opened, and the pole is then ready for removal, and can be shipped off or erected without further labour. The arms are made of concrete, and are attached to plugs of wood let into the concrete shell.

The latest poles made on this ingenious principle are 30 ft. long, and are 7 in. to 3½ in. in diameter, weighing about 15 lb. per foot in length. The 20 ft. pole is 6 in. to 3½ in. in diameter, weighing only 12 lb. per foot in length.

The application of the same principle of construction for the manufacture of sewer, drain, water, and gas pipes, has considerable advantages over the use of iron or earthenware drain pipes,—the former is rapidly reduced by corrosion and the latter is liable to become broken by the weight of the superincumbent earth.

A sewer-pipe constructed on this combined principle, but with two or more layers of wire netting evenly distributed in the thickness of the shell, makes an ideal structure for strength, durability, economy, and facility of construction.

To test the strength of a drain-pipe on this system of construction a pressure of water was established in a pipe of 12 in. bore (only six weeks old), and at 60 lb. pressure per square inch the pipe remained intact. A ball 7 lb. in weight was allowed to fall from an initial height of 1 ft., increasing finally to a height of 11 ft. The ball at this height caused a surface-fracture of an insignificant nature.

Applied to the construction of cylindrical tanks, the system has distinct advantages over those of timber or iron; there is no oxidation, painting is not required, the water keeps cool in hot weather, the system costs less in first cost and practically nothing for maintenance, and, measured by capacity, is the same weight. A *sine qua non*, however, in this system of construction is clean and thoroughly reliable cement, and well-selected and clean aggregate.

NOTES.

IT is probable that no ordinary duty in time of peace is so disastrously fatal to those who discharge it as are the shunting operations on the railways of the United Kingdom. The devoted men who perform this function form the very forlorn hope of civilisation. No adequate reason exists for the dangerous manner in which the duty is discharged. It is a scandal to the railway manager, to the Board of Trade, to Parliament, and to the country. To this, late enough in the day, some of the companies are now awakening. The Midland Railway Company instituted a public trial of various systems on the 2nd inst., at Derby. The question whether it is better to have an automatic coupling, or one that can be worked by hand without getting between the vehicles, is one not easy to decide. But the practical difficulty lies, not in the invention of a good mechanical appliance, but in the great diversity of vehicles in use on our various lines. The adoption of such a system as that introduced on the Italian railways, where certain normal dimensions are compulsory, would go far to facilitate the introduction of a safety coupling. But it is late in the day to talk of such a matter in England. In the meantime it is stated that by the use of a pole armed with a hook, the shunters can couple and uncouple with rapidity and safety. Twenty wagons were uncoupled by two men in 70 seconds, and

coupled in 76 seconds; and the simple implement is said to have been used for twelve months without mishap. Pending the decision of the best and safest coupling, this coupling-hook ought to be immediately introduced at every station, and it is several chances to one that it will hold the field against any other method.

THE many visitors to Brighton, and especially those who prefer the scenery and the comparative quiet of the east cliff and Kemp Town to the garish bustle of West Brighton, will be sorry to hear that the days of the old chain pier are likely to be numbered, and that pleasant, though solitary, promenade,—“far from the madding crowd,”—may soon disappear. It is proposed to apply to Parliament for a Bill to incorporate the properties of the Aquarium and the Chain Pier, in which case the latter venerable object is to be pulled down, and its place supplied by a new pier, which, at its sea frontage, will be extended in the form of a T-head for 600 ft. A marine palace, with all the usual frivolities that characterise such places, will be erected on the pier on a scale which, it is expected, will quite overpower the attractions of the West Pier. Under the same undertaking is a proposal to run out another pier of 500 yards, opposite the end of West-street. This is apparently to be used as a ferry station for the conveyance of pleasure-seekers to and from the new structure, though its necessity does not seem quite clear. It is not by any means the first time that this end of Brighton has been professionally inspected by the speculative improver, for it was once proposed to annex a considerable portion of the cliff wall and the Madeira-road for a range of *al fresco* buildings, containing baths, hanging gardens, concert halls, and all kinds of attractions. Fortunately for the inhabitants of the Marine Parade this project was never carried into effect, and the Madeira-road still remains intact, with its combined advantages of sea air, shelter, and the electric railway.

FROM the extreme cold of last week, it would almost have seemed that the horrors of a London winter were again upon us, and that we might at any moment find the streets blocked with snow for an indefinite time, in proportion to the activity and power of coping with it on the part of the various vestries. It is a serious matter in any case, seeing that a 6-in. fall over one mile of road 60 ft. wide entails the clearing away of over 6,000 cubic yards of snow. We trust that in the event of a heavy fall no time will be lost in applying Mr. Lyons's snow-melter, by which, during last winter, 21 yards of consolidated snow, weighing 10½ tons, and equal to 198 yards of fresh snow, were melted in 10 hours, at a cost of 1s. 7d., or 1½d. per ton. The apparatus appears to be simplicity itself, consisting of a series of wrought-iron tubes with a slightly arched upper surface, cut into lengths of about 6 ft., and made to fit into each other. At one end is a furnace. The apparatus is laid along a gutter, the furnace is lighted, and the snow is shovelled on to the heated surface, whence it runs off to the nearest gully in a stream of water, at once relieving the contractor of half his difficulty, while the drains are advantageously flushed by the waste water. The whole thing is easy and cheap to work, though these are not always recommendations to vestries, who are not prone to experiment with novelties.

IT is to be sincerely hoped that the action just taken against the Great Western Company, with a view to prevent the destruction of the Thames and Severn Canal, will not only be successful, but that it will inaugurate a general and energetic crusade in favour of restoring the inland waterway system which in former days was of such importance to the country. The case of the canal in question is particularly lamentable. According to the Act of George III.'s reign, under which the canal was made, the committee of management should be thirteen persons; but these have dwindled down to eight, every one of whom is a nominee

of the railway company, and the canal is now virtually managed by a sub-committee of three railway officials. The result is easily imagined. The Great Western have assumed all the rights of proprietorship, and, not content with a tacit neglect of the canal interests, they have actually let the water out, so that the canal was for eleven miles a dry ditch, and for the rest of the way a stagnant pond. All the lock gates are useless from want of repair, the lock-keepers dismissed, and the feeders utterly neglected, and it is evident, according to the memorial, that there was a deliberate intention of destroying the canal, so that the railway should have no competitor in its goods traffic. This case (one out of many in England) is all the worse because the Great Western influence is paramount in the district through which the upper waters of the Thames and the canal flow, and for the last few years the whole trading community has been denouncing the grasping monopoly which has been gradually tightening its meshes around it. Unfortunately the neighbourhood is agricultural and bucolic, slow to realise facts and slow to act; but we trust that now that public attention is being roused, the railway powers will soon have to draw in their horns.

FROM a paper read the other day at Canterbury by the Vicar of Herne, it appears that the well-known and interesting church at Herne is in a rather precarious condition, owing to the state of the tower, which is said to be due to the curious fallacy of the original builders in hollowing one of the angle buttresses into a staircase, leaving it with the same external outline and appearance as the other angle buttresses, having the form of a buttress but without the power thereof. "The east and north sides," says the Vicar, "are rent and cracked from top to bottom, and are considerably out of the perpendicular. One of the stone steps of the turret staircase recently fell out of its place, and the newel of the stairs is much twisted and broken." It has been recommended that the peal should not be rung in the tower for the present, and that the staircase doorway should be built up with solid masonry, and other works of strengthening done. An even more pressing need was that of a new roof, the present one being no longer even weather-tight. About 700*l.* is required for the work of reparation, and a subscription-list has been opened.

AN interesting set of oak carvings has lately been lent to South Kensington Museum. They are figures, 2 ft. 6 in. high, of soldiers; being the newels of the grand staircase of Blickling Hall, county of Norfolk, the seat of the Marchioness of Lothian, which dates from 1620. One of them is generally accepted as a very early presentment of a private in the renowned 42nd Highlanders. We should think it is rather a private in the old "Royal Scots,"—who were formerly dressed *more Celtico*,—predecessors of the now 1st Royal Scots or Lothian Regiment; for the "G.R." upon his shot-pouch goes to show that the figure was carved before 1728. The "Independent Companies," originally six in number, were raised in 1729 as a constabulary force for service in the Highlands. They were locally styled *Am Freicad-han Dubh*, or Black Watch, from the sombre hues of their tartan, in distinction from the *Sighleatharhan Deargh* or Red Soldiers (regulars). The Black Watch, with four new additional companies, were established October 25, 1739, as the 43rd Regiment, under command of Alexander (Lindsay), fourth Earl of Crawford and Balcarres. In 1749 their regimental number was altered to "42nd," on the reduction of General Oglethorpe's battalion. This statuette has no target, whilst most of the Black Watch carried targets at Fontenoy (1745), and many of them as late, at least, as 1747. The disposition and pattern of his weapons and appointments,—pistol, dirk (*bedag*), broad sword (*glainigh-mohr*), socket-bayonet and fusil, belts, and gysaire or *dorlach* (precursor of the much more modern goat's hair or badger's skin sporran),—are fairly correct. The philabeg is puffed out in ample folds over the hips and back, and without any

"kilting," as the term is now mistakenly used. But the artist omits the plaid, which should have been carved as thrown over the man's left shoulder from the back. At the time we speak of most northern Scotsmen had one garment only. They first kilted this,—a "kilt" is Lowland Scotch for a shortened or tucked-up skirt,—around their loins, and then drew the rest of the cloth,—its pattern, and not the stuff, being the tartan,—for a plaid over their shoulders. We notice these particulars since we understand that this unique effigy is to be reproduced by Mr. Boehm as an authentic model of a Highlander.

FROM Olympia comes the very satisfactory news that all doubt as to the nature of the large building discovered at the south-west corner of the Altis is set at rest. Professor Treu has happily discovered an inscription on one of the stones of the building which states that it was erected by Leonidas, son of Leotos. The bare news only has come by telegram, so we are unable to give a facsimile of the inscription. The news is specially satisfactory for Dr. Bötticher, who reports the telegram in the *Philologische Wochenchrift*, Dec. 4. He had always maintained that the large south-west building could be none other than the Leonidaion, and he marks it as such in his plan. The Leonidaion, it will be remembered, was seen by Pausanias (v. 15, 2) as he came back to the Altis after visiting the "workshop of Phaidias." "You see it straight before you," he says, "as you come back. The Leonidaion is outside the sacred enclosure, and it is the only one of the approaches to the Altis which is used for processions. It was built and dedicated by a man who was a native of the country, Leonidas by name, and in my time the Roman governors made it their quarters. It is separated by an *ayvā* from the procession gate. The Eleans call ways that the Athenians would speak of as narrow passages (*στενωποῖς*) by the term *ayvā*, i.e., broad road." All this is made clear by the excavations; a very narrow passage does lie between the Leonidaion and the procession-door, and it was this passage that provincial pride called by the grand name of *ayvā*. The procession-door is itself very small,—large enough to admit six persons only abreast,—but then the sacred gate at Athens through which the processions went to Eleusis was little larger. We shall be eager to hear if the style of the letters of the inscription confirm the usual hypothesis that the Leonidaion was built just before the Macedonian re-arrangement of the Altis.

THIS Leonidaion inscription has an interest beyond that of fixing the site of the building itself. It determines without a doubt which was the procession-gate, and hence, to a certain extent, the course of the procession. It gives us also a fixed point in the wandering of Pausanias, who was no doubt led round by his guide to see the sights in an order long fixed by tradition. We further understand now how it is that in the portion of the Altis just north of the Bouleuterion there was such a number of monuments of exceptional interest. It would be just here that the procession, after passing from the Leonidaion to the south of the Zeus temple, would turn and probably halt before making north for the great altar of Zeus. At this all-important corner, among a crowd of other monuments, stood the Zeus who was erected by the Greeks who fought at Plataea, and the stele with the names of the States inscribed who took part in the battle; also the pillar, with the conditions of the thirty years' peace between the Athenians and the Lacedæmonians; further, the offerings of Micynthos; and last, but not least, the famous Nike of Paenios.

THE question as to the advantage of mixing saccharine matter with mortar is assuming great interest, and facts are daily being brought forward to show that it is not only feasible, but of extreme value, both to the builder and the engineer. All experiments go to prove that the admixture of a little sugar to lime has not only the singular property of making the

resulting mortar commence setting almost immediately, but also of giving it an extraordinary amount of strength, as compared with ordinary mortars. Nor need the saccharine matter be sugar, for treacle (say a $\frac{1}{4}$ d. worth added to a hod of mortar), malt, or even beer, will do just as well. It is stated that an Italian builder was sent for to Workshop in Nottinghamshire to erect a mansion, and that before he commenced he called out for malt to mix with the mortar. This was supplied him, and the result was that when that building was destroyed, a great many years afterwards, it could only be done by the agency of gunpowder. In the entries of many cathedral records is mentioned "For beer for the masons," a not uncommon event with the British artisans in this or any other age; but it is also varied with "beer for the mortar," which shows how well its value was known. In India, the native masons always use "jaghery," the coarsest sugar that there is, and everybody conversant with Indian buildings knows that they are notorious for their powers of duration.

IT is no very great surprise to us to find that a majority of the ratepayers of Hornsey voted against the purchase of the wood. Their view probably was that they were going to be taxed to provide an open space for London generally. The open space would be better for themselves also, of course; but all people are not aware of that. Statements have been made that the Ecclesiastical Commissioners' title was a doubtful one; but we do not suppose that influenced the decision; it was the dread of increased rates,—a disease which is epidemic. We do not applaud the ratepayers of Hornsey; we think they showed a want of sense and of public spirit; but taking human nature (among ratepayers) for what it is, we cannot share the surprise of some of our contemporaries at the decision.

FROM the Liverpool papers it appears that a Committee was to be held on Friday of this week to formally consider Mr. Christian's report on the Cathedral designs, but it appears to be implied that no decisive action will be taken in the matter as yet, and even that there is an idea of again exhibiting the drawings publicly, in order to give scope for further expression of public opinion.

THE Commission on the competing schemes for the railway crossing of the Simplon has made its report. It is adverse to the plans of Mr. Fell, Signor Agudio, and others for hauling the trains over the mountain pass, and has reported in favour of a tunnel, ten miles long, and 2,700 ft. above the sea-level, at Bondo. Various plans have been advocated for the passage of the Simplon by tunnels, varying from 14,400 metres to 20,000 metres, at heights of from 771 metres to 680 metres above the level of the sea. The cost of the line now selected is estimated by the Commission at about 3½ millions sterling, and that of the whole 58½ miles requisite to be made to complete the junction with the French and Italian lines of railway at 4,400,000*l.* The maximum gradients exceed 1 in 50. The geological formation of the Simplon consists of various schists, crystalline, calcareous, and micaceous; of hornblende, serpentine, and gneiss. The south end of the tunnel will pass through hard granitic gneiss. As mica schists will not stand on exposure to the air, a re-ventment of the tunnel will be necessary.

MUNKACSY'S picture of the "Last Moments of Mozart," which is on view at Messrs. Agnew's, has been described and commented upon in one of our Paris letters some time back, when the picture was exhibited at the artist's studio in Paris, in a somewhat sensational manner, and accompanied by music from unseen performers. The picture, which represents Mozart seated in a chair, propped by pillows, and feebly conducting the singing of part of his own Requiem by some of his friends, is quite untrue historically, as Mozart died in his bed, and the singing of a part of the Requiem, by Süssmayer and other friends, actually took

place around his bed, though not on the day of his death. Nor does it appear that Munkacsy has made any attempt to revivify the portraits and personalities of those who were around Mozart at his death. He gives us a group of characteristic figures in the dress of the period, that is all. The central figure of the composer is fine and pathetic, the face somewhat handsomer than authentic portraits warrant. There is a fine broad style in the work, which is admirably composed; but it is to be regretted that, for the sake of dramatic effect, the painter should have ignored the known facts, and given what, to all who are conversant with Mozart biographies, can only appear a theatrically made-up scene.

MESSRS. AGNEW have also on view in another room a most interesting collection of the studies of Edouard Frère. One or two of these, such as "The Crucifix in the Church at Ecomen" (49) and "The Suppliant" (50), a very touching figure of a peasant woman kneeling, bowed over a rush chair, show the painter in a more serious light than we are accustomed to regard him in England. Some of the studies were for now well-known pictures. Among designs with which we are not familiar, Frère's sympathy with the humour or the seriousness of children is admirably shown in "The Young Cook" (37) and "The Young Student" (44), the latter perched on the top of a step ladder absorbed in a book.

THE monumental statue of the "Restoration," the plaster model of which was on view at Mr. Maclean's studio in Bruton-street on Saturday last, is a fine and unusual work of its class. It is intended as a monument to a deceased lady, to be executed in marble and erected in a cemetery at Wiesbaden; it represents the portrait figure of the lady, life-size, and swathed in long drapery clinging closely to the figure, rising on tiptoe from a semi-globe, which forms a kind of base to the work, and as if just about to take flight; the upturned face has an expression as if of hope mingled with the remembrance of pain: it is a very fine and pathetic head. We should, however, have preferred the figure without the wings; they help the composition, perhaps, by giving a greater breadth, but, in this scientific and physiological age, wings affixed to human shoulders make too great a demand on artistic faith.

AT the Fine Art Society's rooms are a series of very fine sketches by Mr. John Brett, made during "three months on the Scottish coast"; sketches in oil, remarkable not only for their general power, but for the amount and the certainty of the detail which is put into these paintings, mostly executed, we are told, on the spot, with the exception of an occasional boat or other adjunct put in afterwards. They show mostly wild weather and cold grey seas, though there are a few brighter gleams. The minute attention to the structural character of landscape may be remarked on in these works; in the case of islets off a rocky coast, for instance, Mr. Brett does not show us mere bits of land in the middle of water; they are obviously the tops of peaks coming up from a considerable depth. The catalogue is preceded by a most amusing and caustic essay on landscape painting and critics and other subjects, containing much truth, some new lights, a certain amount of exaggeration, and a general contempt for everybody.

Royal Institution of Great Britain.—At the general monthly meeting, held on Monday evening last, Mr. Henry Pollock, Treasurer and Vice-President, in the chair, the following were among the lecture arrangements announced, viz.:—Six lectures (adapted to a juvenile auditory), by Professor Dewar, M.A., F.R.S., on the Chemistry of Light and Photography. On December 28 (Tuesday), December 30, 1886; January 1, 4, 6, 8, 1887. Five lectures on Molecular Forces, by Professor A. W. Rücker, M.A., F.R.S., on Thursdays, January 20, 27; February 3, 10, 17.

ANCIENT SCULPTURES IN CHICHESTER CATHEDRAL.

It would probably be difficult to find, throughout the length and breadth of England, two pieces of early Mediæval bas-relief of so remarkable a character as the two sculptured scenes from the life of Our Lord which are preserved in the wall of the south aisle of the choir of Chichester Cathedral. Remarkable as they are from the vicissitudes of their history, and from the technical and artistic peculiarities which they possess, they are also remarkable from the fact that as they stand at present, the arrangement of their component parts,—for they are, to some extent, imperfect,—is, in some respects, incorrect and misleading. Little is known of the history of these stone bas-reliefs before the present century. Prebendary Stephens, who wrote "Memorials of the South Saxon See and Cathedral Church of Chichester," in 1876, thinks that we may venture to include among the relics, treasures, and works of art which were no doubt for the most part removed to Chichester when the seat of the bishopric was transplanted there from Selsey, about the year 1075, "the quaint, rude, yet forcible, pieces of sculpture, representing the Raising of Lazarus." Even from the time of their recovery in 1829 from their unknown place of hiding behind the choir stalls of the cathedral this suggestion was current. It is not improbable that the concealment of these ancient works of native art was effected by the pious hands of some of the dignitaries of the chapter, to escape the soldiers of Waller, who, during the siege of the city in 1643, made havoc of the cathedral monuments with their pikes and pole-axes. Insufficient as this conjecture is, and resting solely on probabilities, it appears to have directed all subsequent ideas as to the origin of the sculptures under notice. Their artistic value has, however, been recognised by the authorities of South Kensington Museum, who, we believe, have placed plaster casts of the designs near the entrance to the art galleries, but we are not aware that they had in any other way attracted the notice of writers and students of ancient fine art until the Congress of the British Archaeological Association, held at Brighton in the summer of 1885, when the Bishop of Chichester, then President of the Association, pointed them out to the members of the Congress. But at that time the arrangement of the component pieces was accepted without remark. Subsequent examination of them, however, by the medium of photographs (which form Nos. 1 and 2 of our plate) led to the discovery that the broken fragments which had been recovered in 1829 under the circumstances already related, had been wrongly put together, with a somewhat incongruous result; and in a paper read* on the 19th May of this year, by Mr. W. de Gray Birch, F.S.A., suggestions chiefly for the re-arrangement of the second subject were for the first time put on record, and we have reason to hope that the Dean and Chapter are about to make the alterations which they and the cathedral architect, Mr. Gordon M. Hills, admit to be required, upon the lines laid down by Mr. Birch.

The sculptures consist of two scenes connected with the "Raising of Lazarus," a favourite subject with illuminators in the Middle Ages, but rarely found in stonework. The representations of the same miracle on earlier Christian sarcophagi lately published by Signor Tassinelli, of Rome, show that these Chichester sculptures are not derived from those very ancient conventional methods of treating the subject. The first *tableau*, of which our illustration No. 1 shows the present condition, has a cresting of carved foliage arranged in semi-circular cusps of an early twelfth-century style, and the moulding or carved plinth which runs round the base of the ancient font in St. Nicholas Parish Church, Brighton,—remarkable for the scenes from the life of our Lord and St. Nicholas, which are carved on its sides,—has much detail in common with the crestings on this Chichester bas-relief. At best, we must attribute a post-Saxon date to the execution of the work, but it would be difficult to decide whether it was executed before or after the year 1100. On the left hand side is seen a castellated structure intended to represent the town or village of Bethany; the masonry, the

batlements, the arceding of round-headed arches, the overhanging upper story, the conical towers, and the shingled roofing finished off with a spherical knob, are all so many details which may be studied in the partially, but by no means wholly, conventional representations of monasteries and churches engraved upon seals of the late eleventh and early twelfth century. Mr. Birch's remarks, upon which this notice is mainly founded, draw attention to the early seals of Canterbury Cathedral (Dugdale, *Monasticon Anglicanum*, new edit., vol. 1, plate 1); Battle Abbey (*ib.*, vol. iii, plate 18); Burton-on-Trent (*ib.*, plate 17); St. Nicholas, Exeter (*ib.*, plate 19); Chertsey, and others, in corroboration of this date. The frescoes on the wall of St. Gabriel's Chapel, in the crypt of Canterbury Cathedral, contain pictures of architectural details which may be compared advantageously with those on this sculpture. The entrance-gate to the village is a round-headed arch, devoid of ornament, resting on the carved capitals of spirally and deeply fluted semicircular jambs, only that on the left being represented; that on the right is hidden by a figure. The doors are double; they are thrown back widely open, and the idea of massiveness and strength is imparted to them by horizontal ribs, or rails, and two hinges of simple foliated pattern on that on the left, the right-hand door being rudimentary, or, perhaps, imperfect. Martha and Mary are at the entrance, clad in flowing robes of Byzantine style, with tight sleeves and a wimple or linen head-dress, not far removed from the ordinary Saxon and later style of women's clothing. Students may compare the dress of St. Pega in the twelfth-century "Guthlac Roll" in the British Museum (Harley, Y. 6) for corresponding details, and several of the plates of the Palæographical Society's publications furnish similar examples. The one sister is standing, the other kneeling, with hands clasped and uplifted in supplication before the figure of Jesus, a man of colossal size, that occupies the centre, by the cunning skill of the ancient sculptor, who understood the indispensable necessity of balancing and arranging his composition as well as his successors did in the era of the Renaissance. In this figure, the centre of the bas-relief, the cruciformed and ornamental nimbus, the long hair, the stiffly-curved beard, the tablet or book with bordered edge in the left hand, and the robe of ample folds with plaited portions, reaching to the ankle, are carefully sculptured, and breathe the spirit of early native art when it had first emerged from the somewhat barbaric realism of the older Saxon style and caught new ideas and a certain amount of spirituality from a closer study of Byzantine and other foreign examples which ripper contact with the Continent had introduced to notice. The right hand of the Lord is wanting; probably it was not unlike the hand of blessing which fortunately still remains to the corresponding figure on the next design. Behind him are four disciples, in two rows of two each, standing on the peculiar hillocky or "hummocky" ground which is so characteristic of Saxon drawing, as exhibited in almost every illustration which belongs to the Saxon style; the nimbus of these is plain, the book held by one of them not so elaborately bordered, and the size of their figure is smaller in comparison with that of their Master. They form a careful balance to the buildings and the two women on the left. The head of one is wanting, it is true, but the other three heads clearly indicate the technical skill of the artist in rendering the various emotions of grief and expectation. The hair is treated differently in every instance. Similar varieties of representing hair when groups of persons are depicted are seen on the fresco of the birth of John the Baptist in the crypt at Canterbury Cathedral, already mentioned.

It will be seen that the cavities of the eyes are very much depressed, and it has been suggested that the eyeballs themselves were formed of glass or precious stones introduced into the sockets, but there is only slight evidence of this in one of the cavities, where some metal or trace of metal rust has been detected by Mr. G. M. Hills. If this is so (and we have far more ancient evidence as to the practice of thus treating the eye in some of the busts in the Roman Gallery in the British Museum, as well as the method of introducing lustrous *tessera* into the eyes of figures on mosaic pavements) it would account in some measure for the curious and unexplained fact that the eye, being

* The Ancient Sculptures in the South Aisle of the Choir of Chichester Cathedral, by W. de Gray Birch, F.S.A., in the "Journal of the British Archaeological Association," vol. xiii, September, 1888.

convex, is frequently represented in sculpture, — not only classical, but barbarous and prehistoric,—by a concavity, whereas other details of the body are rendered convex for convex, and concave for concave. This subject, just as the second, is not now composed of a single slab of stone; whether it was so or not at first we cannot say, but a cursory glance at the representations show that they clearly consist of six courses laid horizontally, and so fairly straight that the fact can hardly be attributed to chance fractures. The uppermost joint runs along the

and do not match the sculptured lines of the tier above. They will be put right without difficulty when the re-arrangement is effected, but there is a certain amount of cement here and there upon them at present which prevents their proper position being determined, and some paring down has been done. This method of building up a surface destined afterwards to be treated with sculpture is noticeable at the Saxon Chapel of St. Lawrence, Bradford-on-Avon, where the round-headed arches of the external arcading on the north wall of the

condition of the back at the time when they were let into the wall which they now adorn. The drapery of the left arm of the standing figure on the extreme left of the second subject belongs to the right arm and shoulder of Our Lord in the first design, and it has been replaced in that position in our illustration, No. 3, showing the proposed state of this first sculpture.

The second slab is a companion design to the first, and from the hand of the same artist. It represents the crisis of the great miracle. It



FIG. I. (PRESENT STATE).



FIG. II. (PRESENT STATE).



FIG. III.—PROPOSED RE-ARRANGEMENT OF FIG. I.



FIG. IV.—PROPOSED RE-ARRANGEMENT OF FIG. II.

Sculpture at Chichester Cathedral.

arcade over the doorway, under the beard of Our Lord, and through the nimbus of the two lower disciples. The second can be traced running obliquely across the book which is held in Our Lord's hand; the third, across the shoulder of the standing sister; the fourth, along the shoulder and elbow of the kneeling woman, the Lord's knee, and the drapery of the disciples. The last joint may be noticed at the end of the carved jamb of the doorway, across the thigh of the kneeling woman and along the dress of the other figures. Some of the stones of the lower course are evidently out of order,

and do not match the sculptured lines of the tier above. They will be put right without difficulty when the re-arrangement is effected, but there is a certain amount of cement here and there upon them at present which prevents their proper position being determined, and some paring down has been done. This method of building up a surface destined afterwards to be treated with sculpture is noticeable at the Saxon Chapel of St. Lawrence, Bradford-on-Avon, where the round-headed arches of the external arcading on the north wall of the

also shows, as clearly as the other, if not more so, the six horizontal courses of stonework wherewith it is constructed. The uppermost joint runs along the neck of our Lord; the second through the book which he is holding; the third, where the cut break in the skirt of our Lord is seen; the fourth, just below the uppermost hands of the two gravediggers. The lowest line, where the break in the dresses of the figures, on the right hand is seen. This picture is the "Raising of Lazarus," and when complete, and correctly put together, in the manner which has been suggested to the Dean and Chapter,

it becomes perfectly intelligible. It may be compared with other illustrations of the same subject, and of similar antiquity, among the illuminated MSS. in the British Museum. No doubt many works dedicated to the elucidation of ancient Christian art would furnish other examples if they were required. There is, moreover, an interesting sculptured font at Lenton, near Nottingham, where the scene of the same miracle is differently treated, yet with some details in common with this. There, for example, are the Christ with the cruciform nimbus, book, and right hand uplifted in benediction; the bandaged Lazarus in the sepulchre, the attendants opening the grave, the crowd of onlookers. But there is only one Lazarus on the font. Here, at Chichester, as the component pieces of the slab (if this term may be rightly used for many stones) are at present placed together,—we cannot say arranged (see No. 3),—two Lazaruses have been constructed by joining the head and upper part of the body of the resuscitated man to the left arm and hand of the disciple who is standing on the extreme left of the design, while on the lower part of the bandaged mummy-like body of Lazarus there have been superimposed the head and neck of one of the three assistants who are helping to extricate him from the tomb. This curious error has not been carried out without difficulty, and the result is that, not only are there two Lazaruses, but there are a hand and arms (properly belonging to the third attendant) without visible attachment to any other limbs or body. Besides all this, the confusion made with dresses of the disciple on the left, and the colossal figure of Christ on the right,—a figure with many points of general resemblance to that of the Christ in the first scene (No. 1),—is great. A theory has, strange to say, been put forward by some ingenious theorists to explain all this in a mystical manner, and to show that in one case we see the rising semianimate Lazarus dug out of the grave, and still partially enwrapped in grave-clothes; in the other a later action, and the resuscitated man, fully revived, praising his Saviour with upraised hands and upheld by the divine agency, uniquely indicated by a disconnected hand and arm. Behind the figure of our Lord are the heads of two disciples at the top of the panel, and a third disciple with a book in the left hand. The treatment of these resembles that of the corresponding figures on the first subject.

Now, if the disarranged pieces are taken out and re-arranged in the order in which they are shown on No. 4, the two Lazaruses rightly become one again, and we obtain a full-length figure of the rising man, with hands uplifted, naked to his waist, his hair falling down, and on his shoulder the fragmentary left hand of the disciple standing on the extreme left. The triangular piece of drapery which does not belong to this figure belongs to the left arm of our Lord in the first subject. The lower part of Lazarus is still enveloped in crossed bandages, very like those commonly used on Egyptian mummies. The head and neck of the third attendant,—for two have lifted the gravestone away with levers,—are by this arrangement reunited to the body of the man to whom they belong, and the mysterious hand and arm fall naturally to this figure also, who is supporting with his right hand the elbow of the risen Lazarus. It will also be noticed that the feet of Lazarus, enveloped in bandages, are resting on the draped edge of the grave, quite out of the excavated part, which is shown by a rounded rim behind him; and it is by this means that the artist has endeavoured successfully to portray the completion of renovated life. The reanimated figure, before his ceremonies can be stripped from him, stands up erect on the edge of his grave, and worships his Master spontaneously with uplifted hands. The details of the drapery of the skirts, in the present condition (No. 3), do not agree with the folds on contiguous slabs, but when the two slabs are removed from the lower part of the disciple on the left to the figure of our Lord on the right, they will be found to agree perfectly with the parts now in position; and the result is a satisfactory representation of the miracle. Some of the stones of the lowest row still require an examination previously to settling their final places, but the photograph does not enable this to be done so well as in the case of the figures, as they have been, it is feared, partly filled up with cement and otherwise altered to agree tolerably with the sculpture of the second row. The Dean and Chapter

are, as we understand, aware of the necessity of re-arranging the design, and willing to undertake the work at a fitting opportunity, probably when the days grow longer. They will, when this has been done, have the satisfaction of feeling that the error which has been perpetrated since 1829 unnoticed, or at least unrecorded before 1884, has been removed, and they are sure to experience a great satisfaction at the appreciation of their proceedings by every one who will take the trouble to compare the present (Nos. 1, 2) with the suggested arrangement (Nos. 3, 4) of these beautiful sculptures. We all may thus not only rejoice with them in their having removed a blemish from their cathedral, but congratulate them on their possession of two ancient works of high art sculptured by English hands, such as may be sought for in vain in any other ecclesiastical building in England.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

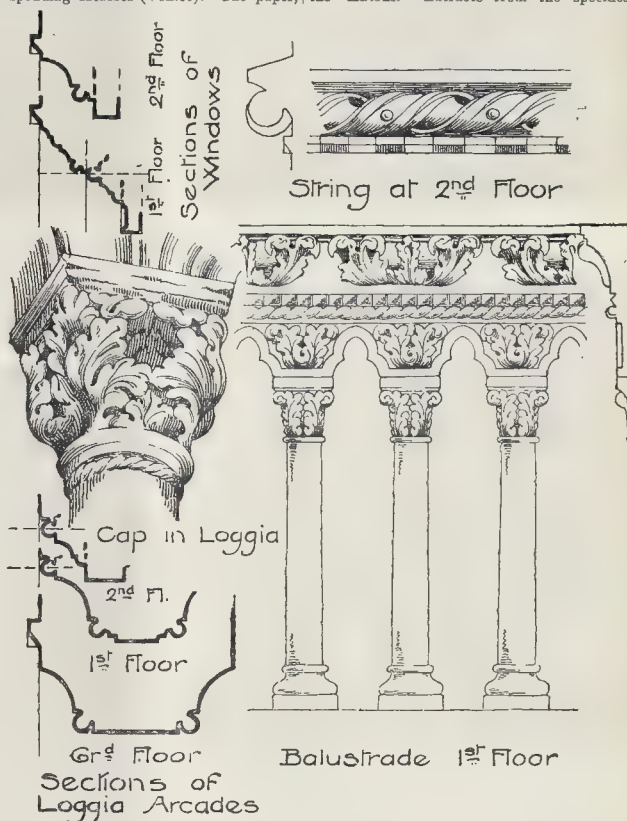
THE CA' D'ORO, VENICE.

The third meeting of this Institute for the present session was held on Monday evening last, Mr. E. P. Anson, F.G.S. (President), in the chair.

Mr. George Aitchison, A.R.A., read a paper entitled "The Ca' d'Oro and its Polychromatic Decorations," by Signor Giacomo Boni, Hon. Corresponding Member (Venice). The paper,

Contarini, who employed him to make the design for building the front of his palace; and in reading the paper he would have frequent occasion to quote the old Venetian terms.

The following is an abstract of the paper:—Signor Boni's examination of the front of the Ca' d'Oro, made during its repair, convinced him that the battlements were original, and that a cornice originally existed along the whole front. This cornice consisted of a rope moulding supported on a trefoiled arcade springing from corbels; each arch curving outwards so as to form a series of niches on plan, and in the spandrels between each half-arch was a rosette. Some of the corbels and remains of arches still exist on the front, while on the return in the alley there is one perfect arch and one half-arch, but the rosettes have perished. The whole treatment shows that the front was coeval with the piazzetta front of the Ducal Palace, in spite of older work being built into the front of the Ca' d'Oro. Signor B. Cecchetti, the Keeper of the State Records, had found the memoranda and contracts made between John Bon (the architect of the Porta della Carta of the Ducal Palace) and Marino Contarini (the procurator and owner of the Ca' d'Oro), for building it; beginning from the year 1424. The sum of 160 golden ducats was to be paid to J. Bon for a year of his own work, of his son, and of his two assistants, Zane and Rosso. The work was undertaken by the owner, who paid the masons. Extracts from the specifica-



Details from the Ca' d'Oro.

which was written in English by its author, was illustrated by some original drawings, including that by Mr. F. T. Bagge, A.R.I.B.A., reproduced in last week's *Builder*, and a drawing prepared by Signor Boni expressly for the occasion, besides some photographs.

Mr. Aitchison explained, by way of preface, that the paper included several extracts from contracts between John Bon, one of Signor Boni's ancestors, who built the piazzetta front of the Ducal Palace. Some very curious extracts were given from the original Venetian in these contracts between John Bon and Marino

Contarini, who employed him to make the design for building the front of his palace; and in reading the paper he would have frequent occasion to quote the old Venetian terms. The following is an abstract of the paper:—Signor Boni's examination of the front of the Ca' d'Oro, made during its repair, convinced him that the battlements were original, and that a cornice originally existed along the whole front. This cornice consisted of a rope moulding supported on a trefoiled arcade springing from corbels; each arch curving outwards so as to form a series of niches on plan, and in the spandrels between each half-arch was a rosette. Some of the corbels and remains of arches still exist on the front, while on the return in the alley there is one perfect arch and one half-arch, but the rosettes have perished. The whole treatment shows that the front was coeval with the piazzetta front of the Ducal Palace, in spite of older work being built into the front of the Ca' d'Oro. Signor B. Cecchetti, the Keeper of the State Records, had found the memoranda and contracts made between John Bon (the architect of the Porta della Carta of the Ducal Palace) and Marino Contarini (the procurator and owner of the Ca' d'Oro), for building it; beginning from the year 1424. The sum of 160 golden ducats was to be paid to J. Bon for a year of his own work, of his son, and of his two assistants, Zane and Rosso. The work was undertaken by the owner, who paid the masons. Extracts from the specifica-

(now lost). When the stonework was done a new contract was entered into for the painting in oil and gilding of certain parts of the work, dated September 15, 1431. In it J. Boni is called "Master John of France, painter of St. Apollinaris." The specification states the colour to be used, the number of coats, the parts to be gilt, and that the ultramarine was to be fine and of the value of 18 ducats a pound. J. Boni was to have 60 golden ducats for this work; by a receipt of June 30, 1432, Contarini appears to have paid for the gold leaf. The parts to be gilt were as follow:—The balls of the battlements, the necking under the fleurs-de-lys, the rosettes in the spandrels, the foliage of the two large capitals, the two lions and the fields of the shields between their paws, and the edges of the mouldings of the tablets over the caps on which they stand, the ducats on the rope moulding; twenty rope mouldings round the circular panels of porphyry, &c., and the balls in the centres of these; the shield on the second floor, the dentil band round the panel and the foliage within it. The ground of the large caps was to be ultramarine, and so were the bands on the shield the lions hold; the underside of the tablets on which the lions stand were to be of ultramarine with gold stars, the bands on the shield of the second floor were to have two coats of ultramarine. The cornice, the arcade under it with the cusps, were to be painted in white lead and oil, the battlements to be marbled and to have a black line inside the edges if it look well. The triangular spaces between the cusps were to be touched with black. All the red marble of the front and the red marble dentil bands were to be rubbed with coloured oil and varnish, so that they should look red. All the roses and vines of the front were to be painted in white lead and oil, and the backgrounds painted with black oil paint, so that they should look well. All the background of the foliage of the ground-floor cornice, with its return on the flanks, to be tarred with black oil colour, and the four sills in the alley. The red marble of the Ducal Palace still shows traces of having once been painted red. There is a learned dissertation on ultramarine in the paper, and a Greek inscription of the expense of building the Erechtheum, found at the Propylea at Athens in 1836, is given; a part of which states two gold leaves had been bought of Adonis at Mileto to gild the eyes of the column, and Signor Boni finishes by saying:—"The Athenian inscription and the Venetian document are the best inscribed records we possess to prove that gold, the richest and most beautiful among temporary means for supplying a new building with colour, was used during the best periods both of Grecian and of Mediæval art."

Mr. Aitchison also read the following translation of a letter he had received from Signor Boni:—

"Excuse me, for charity's sake, for having waited so long before answering, but I am an obstinate man, and was determined at all hazards to find a print of the Ca' d'Oro before it was renewed, and at last I have found it; but then I had to wait for the photograph, because the weather did not allow of its succeeding properly. But I got it to-day at last, and send it off at once. It is taken from a mezzo-tint engraving of the beginning of this century, and is sufficiently correct. It represents a 'Vanity Fair' of the most beautiful buildings at Venice alongside of one another. I hope the Institute will have a cut of it on zinc, or somehow, to illustrate my paper. I also send you a scrap of paper on which I have marked the literal translation, in English and Italian, of the Venetian words which you copied out. I wish to remark that in the print, of which I send you the photograph, you can even distinguish the original shape of the ground-floor windows, which were turned into two-light ones, with the addition of the ugly balcony. The same hand even added the upper balconies, and demolished the open staircase that went through the internal court. Mr. Ruskin noted this piece of vandalism in the third volume of his 'Stones of Venice,' pages 284 and 285. I saw the beautiful slabs of red marble which formed the bases of these balconies, and were carved into noble spiral mouldings of strange sections, half a foot deep, dashed to pieces, when I was last in Venice; its glorious interior staircase, by far the most interesting Gothic monument of the kind in Venice, had been carried away piece by piece, and is for waste marble two years before. I am sorry to have been unable to prepare a coloured drawing, but if you look amongst my letters of two years ago, there is one which exactly shows the distribution of the gold, the blue, and the red of a window dressing of the Ca' d'Oro."

The following is the extract referred to from a letter of the 16th Oct., 1884, in English:—

"As I am studying just now the façade of the Ca' d'Oro, I had an opportunity of making new and interesting investigations on the use of gold and colour. The traceries of the second floor are full of traces of gilding. The smaller window of the first floor is still more important, for it shows the equipment of azure and red. The dentils, being too expensive to show in true colour, left either of gold or of anything else, but the oriole was all gilt. The listello, which comes after it, was painted azure, which is now nearly all gone, but where it was laid thick there remained a dark purple. Scratching it, I found it was of the colour of cobalt. Then comes

the *guscio*, where I could not find any trace at all. Then the indentation of the round *oro*, which in five centuries has turned brown, is still visible, the *oro* itself being entirely gilt. As to the gold itself, it is a beautiful yellow tint, like that of pure gold in the Venetian zecchini, and I do not know whether its granulated appearance is due to the influence of corrosion, but it seems that the gilding was not done with gold-leaf laid on a mordant, but with a gold paint (gold dust and some colla)."

Mr. J. D. Crace, in opening the discussion, said that in listening to the latter part of the paper it seemed to him fortunate Mr. Ruskin was not present that evening to hear how the pinnacles of the Ca' d'Oro were painted in whitelead and figured in imitation of marble. The points which were stipulated by the contract to be gilt appeared to have been selected with extremely good judgment, and one could not help feeling that the result of the gold must in itself have been exceedingly successful, because on looking at the photographs it could be seen how the band of gold gradually led up to the effect of introducing a sort of sunshiny appearance to the constructive points of the building. The use of the black ground also struck him as exceedingly worthy of notice. As far as he had been able to follow the description, black appeared to have been introduced as a sort of ground to the dark band which formed a kind of framing of the panneling-out of the plain surface of the frontage. No doubt where there were such very deep shadows under loggias, this black must have occupied a very useful position in maintaining the balance of the composition, because the photographs showed what an immense deal of dark shadow existed on one side of the building. The general composition of one part of the building, as it was now seen, was almost "flat," whereas blacking the ground must have served the purpose of connecting the building which had not the dark shade with the portion which was cut up into loggias, with their dense shadows. These were the points which had struck him in listening to Signor Boni's paper, and he would conclude by proposing a hearty vote of thanks to that gentleman, and to Mr. Aitchison for reading it.

Mr. John Slater, B.A., in seconding the motion, mentioned that when in Venice four years ago he was quite unable to decide why this building was called the Ca' d'Oro; for to the ordinary spectator from the Grand Canal there was very little gilding visible about it. The mere architecture of the place could not fail to be striking, the building itself being one of the most remarkable amongst the palaces of Venice. It had been mentioned by Mr. Aitchison that the upright pinnacles of the battlements being higher where the pier was, then descending in a curve, coming up again, and descending on the other side, was a very striking illustration of the way in which the builder of those times always wanted to get some central composition. It occurred to him that probably there must have been some provision in the old Venetian law preventing the builders of the common palaces from coming out beyond a certain limit of the buildings, because if they had been able to have a central projection, however small, they would have got what they desired much more easily in that way. But not being able to get a central projection so as to give a central composition, they divided the building absolutely into two portions. Any one who inspected the drawings and photographs on the wall,* would see that the building consisted of two façades, each being treated as a central composition. On the left-hand side, in looking at it, was the loggia with its arcades, while on the other side was the plain wall surface, also treated centrally. Starting with the idea of treating these separately, they would naturally carry out the battlements over the pier, so that they should assist the central composition of the whole building. He believed that Mr. Street, when in Italy, took particular note of this central composition of Italian buildings. Another interesting point had been brought out in the paper, viz., the fact that on both sides of this palace there was originally a *calle*, or small street, because if they looked at the right-hand side of the building they would see how much more distinctly the rope moulding,—which did not project from the building, but accentuated the angle in a striking and delightful manner,—was seen on the side where the opening was. On the left-hand side it was joined to another building, but as they had now learned that the Ca' d'Oro had been a detached building, with a

calle on either side, the *raison d'être* for the rope-moulding coming down the two corners was evident. In hearing this paper he could not help being struck with the immense amount of research which Continental scientists gave to any subject they desired to treat, and in this instance it was evident Signor Boni had ransacked archives and classical literature to illustrate the points he wished to remark upon.

Mr. Thomas Blashill said he thought that he Ca' d'Oro was like a good many other buildings in Venice, in being of incomplete design. Here they saw the ordinary loggia of every typical Venetian house, in the centre, with a wing on the right side, evidently suggesting the idea of a complete composition with another wing on the left, as might be noticed in so many of the Venetian palaces. He wished, therefore, to ask whether there was any material for forming an opinion as to whether the Ca' d'Oro was originally complete with its left as well as its right wing; whether the designer simply built it with the one wing in the hope that he or some one else might ultimately add the missing wing, or whether he did what might be possible, finding it convenient to have the ordinary loggia and only one ordinary wing, both of these having their uses, he was satisfied to leave it in that way for ever? In looking at the building from the Grand Canal he (Mr. Blashill) had considered what evidence there was on the façade, and certainly, at first sight, the rope moulding on the left-hand side, which was not repeated on the other side of the loggia, but which corresponded with that on the extreme corner of the wing, seemed to indicate that it was a finished composition. The architect had put his rope moulding with a capital on both sides, and, if the building was once larger and had been reduced, the rope moulding with the capital must have been removed, and that ought to be discovered by any practical mason. He had been trying to pick out a little evidence from the photograph, and he understood Mr. Aitchison to say that in the contract mention was made of thirty-two of the larger pinnacles. There were twenty-six shown by the photograph. Did the remaining six surmount the wing now missing? He could not quite see the artistic motive for giving the curved line on the top and throwing the highest battlements out of the centre, and not making the highest battlements in the centre of the loggia. It rather struck him that there was an intention of making three hollows in the tops of the battlements, the central hollow being over the loggia in the centre.

Mr. John Hebb said he thought the Institute might be congratulated on the activity of such honorary members as M. Sédille and Signor Boni. Perhaps Mr. Aitchison had not sufficiently emphasised the fact that Signor Boni had written his paper in English, into which language he had correctly translated the words of the old Venetian dialect. Those who had tried to translate technical documents would appreciate the difficulty of the task of finding the exact equivalents for some of the words. He hoped the Institute would encourage Signor Boni by printing his interesting paper with as many illustrations as possible. Several points seemed to be established by Signor Boni's researches. One was that the battlements, which had been supposed not to have formed part of the original design, were contemporary with the rest of the building; another was that a cornice existed under the battlements; and a third was that the date of the building was satisfactorily settled. He hoped that, in conveying their thanks to Signor Boni, the approval of his paper would not be interpreted as an excuse for restoring the cornice. If a new cornice were made, it would be certain to be constructed as all modern Italian work was, in a mechanical way, without any of the feeling of the original. The Venetians had a perfect mania for restorations. They had restored large portions of the front of St. Mark's in a way which all who had seen that building lately must consider unsatisfactory; and in all probability if there was the slightest hint given to the present proprietor of the Ca' d'Oro, he would be only too glad to make a restoration of the cornice.

The vote of thanks was then put, and was very cordially received.

Mr. Aitchison replied on behalf of Signor Boni and himself. Mr. Blashill had asked whether it was intended to have a centre and two wings, and he (the speaker) could not give any decided information on the point. From

* See also a view in last week's *Builder*.

his knowledge of Venetian buildings, however, he should think it was not intended, particularly as there was a *callé* on either side. It was, of course, impossible to look into the minds of the original owners of the property, but it was a very common thing in all the early Renaissance works to find places treated in that particular way, with one side, and that the larger portion, very ornate and pierced for the sake of shadow, and with another piece almost flat and but slightly pierced. So far as the question of the masonry went, he had no doubt that Signor Boni would be glad, if it were possible, to ascertain whether the mason, or the architects and masons, had ever any idea of adding another flank to the building. Mr. Hebb had spoken in complimentary terms of their common friend, Signor Boni, and of the enormous trouble he had taken in going into the matter. Signor Boni was a most brilliant and accomplished man, who was not only a good English scholar, but was also acquainted with French and German, and could read the Greek and Latin authors with the utmost facility. He was also extremely learned in construction and mathematics, and was a charming artist, sketching with an excellence which was most uncommon amongst architects. Considering the great pains he took, Signor Boni was one of the most valuable additions the Institute could have to its Honorary and Corresponding Members. As far as the question of polychromy went, he was in hopes that Signor Boni would have had time to send some coloured sketches, but this he had been unable to do. They knew from the remains that had been found in various parts of the world, that coloured decoration was common if not universal during the whole of the Middle Ages. When he was in Venice some thirty years ago he saw some figure-painting outside a palace said to have been done by Titian. At Brescia, again, there were whole streets with pictures painted on plaster, and very charming they looked. Viollet-le-Duc in his article on colour gave several examples of this. There was no doubt that when everybody who could afford it dressed in magnificently coloured and embroidered robes, often enriched with jewels, precious gems and intaglios, a plain building made of stone looked to them as wanting in vigour, colour, and richness, and they endeavoured to make it answer its purpose and be in harmony with all its surroundings by gilding and colouring it. It was known almost to a certainty that a great portion of the exterior of the Greek temples, which had been looked upon as being so perfect in white, were treated with colour. In fact, it had been ascertained that some of the extremely beautiful white marble had been covered with a coating of marble plaster to absorb the colour, and so permit it to remain for a longer time, than it could on the hard substance of the marble itself. He might reiterate what had been said in M. Sédille's paper, that if it was desired to re-introduce polychromy into such climates as that of London, and of England generally, it must be done by using those substances which were imperishable, such as granite, porphyry, a few of the serpentine, glazed terra cotta, and glass mosaic. These were the only means by which permanent colour could be introduced, and, for his own part, he considered it would be a great enhancement to the beauty of our buildings. In a city like London, with its smoke and dust, they might reasonably hope to see many of the houses of no great pretensions mainly covered with enamelled porcelain, enriched with ornaments and figures.

The President then announced that at the next meeting to be held on the 20th inst. a paper by Mr. William Brindley would be read, entitled "Marble: its Uses as suggested by the Past."

New Hygienic Museum in Berlin.—A large hygienic museum has just been opened in Berlin. The rooms on the first floor, numbering sixteen, contain exhibits relating to saving from fire, building, heating, ventilation, lighting, water supply, and road and street making. On the second floor are eighteen rooms, in which are shown objects used in civil and military nursing, clothing, baths, education, asylums, prisons, &c. It is expected that the Empress of Germany, who is much interested in this institution, will shortly open the museum officially.

THE CHURCH OF ST. MARY MAGDALEN AND ST. GREGORY BY ST. PAUL'S, CITY OF LONDON.

"IN Knight-riding-street, St. Mary Magdalen Church (Rev. E. Hoskins, Rector), roof nearly destroyed, belfry and rest of church and contents severely damaged by fire, heat, &c." So runs a passage in Capt. Shaw's lengthy official report of the disastrous conflagration of Thursday week.

Situated in Castle Baynard Ward, this is the self-same church which was formerly known, for the sake of distinction, as of Old Fish-street. To that thoroughfare its denizen fishmongers gave a name, and there they had two halls. It is at this day identical with so much of Knight-riding-street as lies between the southern extremities of Broad-street and Old Change, Cheapside. Old Fish-street-hill was anciently known as Labour-in-Vain-hill, where the once Church of St. Mary Mount Haw (its eastern walls serving for the old burial-ground wall on the hill) occupied the site of the chapel belonging to a noble mansion on its summit, which, in 1517, had the Bishop of Hereford for tenant. But Queen Victoria-street has altogether changed the aspect and plan of this locality, and the later Lambeth-hill, by St. Mary Somerset's tower, Upper Thames-street, is all that now remains of Old Fish-street-hill. The foundation of St. Mary Magdalen would appear to be one of fairly ancient standing. It is cited in a survey made by the Dean and Chapter of St. Paul's, in the time of Ralph de Diceto, who was Dean during the period 1181 to about 1204, being then a perpetual vicarage. Some three hundred years afterwards it had become a rectory, with John Carpenter for Incumbent. Stow tells us that in the year 1640 the parishioners laid out 140l. for its structural repair. Singularly enough, a vestry meeting had been arranged to discuss some greatly-needed repairs upon the afternoon of the 2nd inst.—the very day of the fire mentioned at the outset. The original church contained one of the customary memorials of Queen Elizabeth, with the as customary epitaph,—“Here lies her type, who was of late, The prop of Belgia, stay of France; Spain's foil, Faith's shield, and Queen of state, Of arms, of learning, fate, and chance.” &c. The fire of 1666 entirely consumed the Church of St. Gregory by St. Paul, whose position is now marked by the cathedral's southern campanile, and that of St. Mary Magdalen, together with its registers and archives. The former parish was thereupon joined with the latter; and in 1685 Sir Christopher Wren rebuilt the church in Old Fish-street, at a cost of 4,291l. 12s. 9d. Its plan, being 48 ft. by 60 ft., is not quite rectangular. The walls to the top of the balustrade are 30 ft. high. The eastern end and southern side alone are unblocked by other buildings. Their elevation is of no uncommon design, consisting of ranges of round-headed windows, above the southern door level, having trusses at their sides which support a bold and continuing cornice. The stone steeple rises to 86 ft. over all. Whilst by no means elaborated, it has a singularly pleasing effect. An octagonal dome, 9 ft. in diameter, and rising 10 ft., interior measurements, rises from the tower's belfry stage. A plain pendentive brings this to the square. The exterior of the dome recedes by regular steps, to the number of five, and is capped by a plain lantern, also of stone, narrowly pierced; at top is a little concave spirelet surmounted by a vase.* Within the church were the large monument of Thomas Lockington, who died January 17, 1716, and a leaden tablet having a man's figure at the side thereof, and an inscription in black letter,—of date 1586. The twelve lines invoke blessings upon Elizabeth our Queen most just, and retribution upon “all papistes desiers.” They conclude as follows:—

“How small sever thy gifts shal be,
Thank God for him who gave it thee,
Xii penie leaves to xii poor foules
Give every Sabbath day for aye.”

On the plate appears the monogram and merchant's mark of the benefactor, one Thomas Berrie. It appears that he devised certain property in Southwark, known as “The Red Cross,” to the parish, charging that rent with an annual payment to the Bootle and Walton parishes, which have since been embraced

* We take these dimensions from Mr. Andrew T. Taylor's “Towers and Steeples designed by Sir Christopher Wren,” London, 1881.

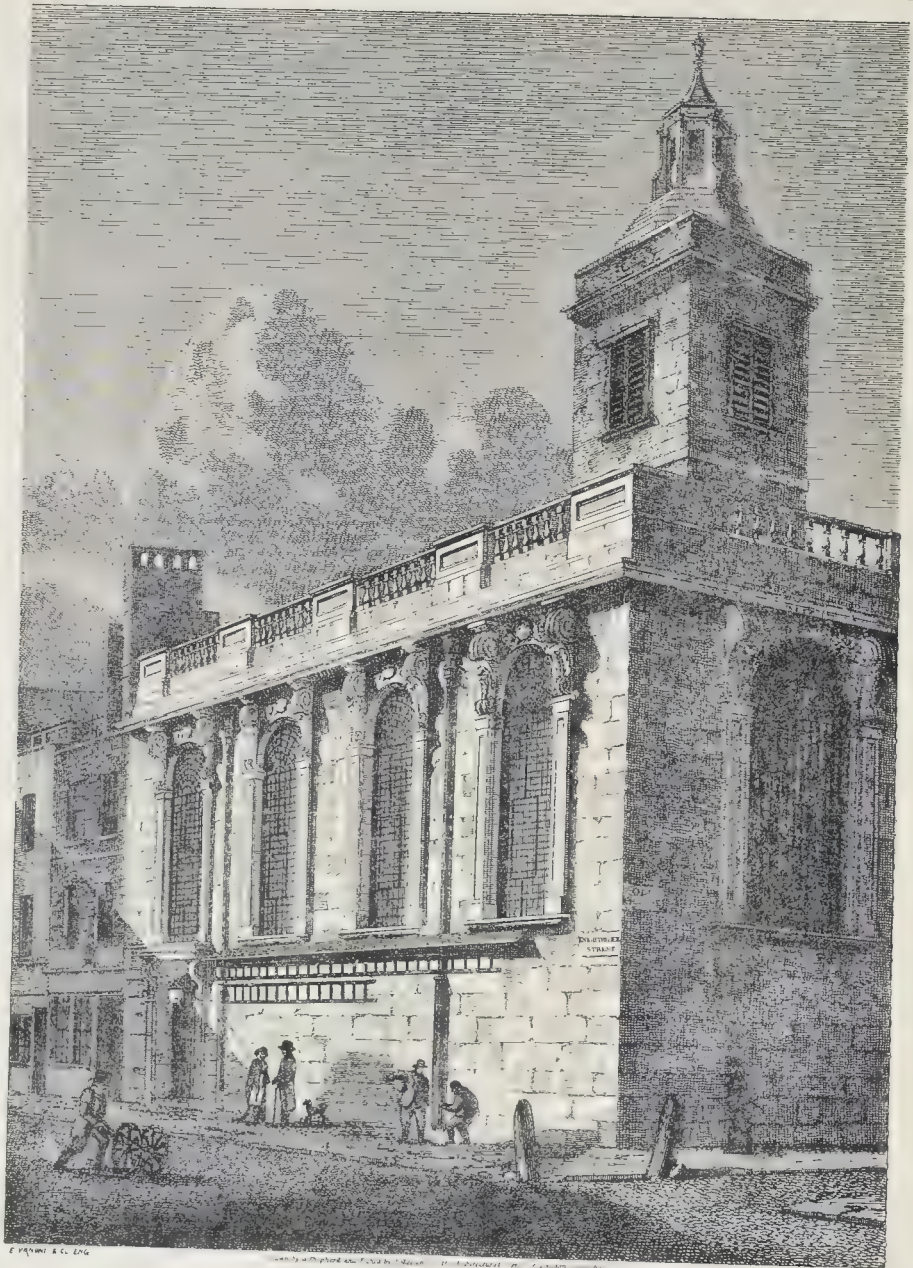
within the area of Liverpool.* The parish itself has but a small extent, and 150 years since contained 103 houses. The population of the united parishes would seem to be diminishing, if we compare the last census with that of the next previous period. At the last census it was scheduled as 900. The living is worth less than 400l. a year, and has for ages past been in the patronage of the Dean and Chapter of St. Paul's. One of their most popularly known nominees was the late Rev. Richard A. Barham, appointed in 1824, a Pauline, and author of the “Ingoldsby Legends.” The church property was insured. We hear that a question has already arisen as to the expediency of reconstructing the fabric. We do not mean to decide here what conclusions or action should be legitimately based on the data furnished by a recent “religious” census, privately taken, of attendance on Sunday in certain metropolitan places of worship; nor can we say how far the figures are correct that, in the case of St. Mary Magdalen, give a congregation in the morning of fifty-two, and one of sixty in the evening. At the same time, this particular quarter, certainly, cannot complain of a deficiency of church accommodation; for, on the opposite side of the street, and but a few yards removed from St. Mary Magdalen, stands the Church of St. Nicholas Cole Abbey and St. Nicholas Olave (united), which is also devoted to the uses of the parishioners of St. Mary Somerset, St. Mary Mount Haw, St. Benet, Paul's Wharf, and St. Peter, Paul's Wharf. Within the compass of a small radius are several others; as, for instance, those of St. Augustine with St. Faith under St. Paul's; the already threatened St. Mildred, Broad-street, with St. Margaret Moses; All Hallows, Broad-street; St. Benet, Paul's Wharf (lately committed to a Welsh congregation); St. Andrew-by-the-Wardrobe; St. Michael Paternoster-Royal, with St. Martin Vintry; St. James Garlickhithe, with Holy Trinity-the-Less and St. Michael Queenhithe; St. Mary-le-Bow, Cheapside; and St. Paul's Cathedral.

The ruin of the church is fortunately not altogether a total one. The walls stand uninjured, while there is no trace of fire on those of the south and east. Much of the glass even remains unbroken. The tower and belfry are, however, greatly scorched. The fire made its entrance into the church from the west, and through the northern window of the belfry, consuming the bell-framing, and causing its single bell to fall down, crashing through the trap doors of the various floors, and it now lies cracked at the level of the church.

The building had a strong oak-framed queen-post roof covered with lead, hipped at the east and west, the ceiling being flat internally, with a large bold cove returned around the circular windows of the south side, and with similar vaultings to correspond on the north, and at each end, there being corbels of cherubim, all of which remain, although the coving is more or less wrecked north and south. The fire rapidly spread around the roof, making its way through the coving and setting the timbers in so great blaze that the central principals fell bodily into the church, setting the pews alight and breaking a portion of the northern gallery.

The firemen, however, soon got the mastery of the flames, before the roof either at the east or west was consumed, and the truss of the former portion, deeply charred on face, still stands firmly in position, a curious study of the endurance of timber against fire, while much of the modern ironwork of the neighbouring warehouses is lying twisted and bent among the masses of ruin. The east end has an altar-piece of Corinthian columns and pilasters, with arched and broken pediment, and the usual arrangement of the Lord's Prayer, Decalogue, &c., “all finely done in gold letters and flourishes on black,” with fruit, flowers, leaves, branches of palm, &c. The fire has not touched any of this, and the bright effect of the old work is in curious contrast to the mass of black and charred wood fallen from the roof all around. The pulpit, of oak, has been a very good example of ornamental work. The sounding-board remains, but the pulpit is sadly broken by the falling timbers. The stone font, on the north side, a pretty carved bowl on a slender baluster stem, has been struck by a falling timber, and lies broken off from its pedestal, although capable of repair. The pews are mostly reduced to ashes; but a great part of the north gallery, and the whole of the western lobby, the western

* Vide “The Churches of London,” by George Godwin F.R.S., London, 1839.



THE CHURCH OF ST. MARY MAGDALEN, BURNED LAST WEEK.

gallery, and the organ in it, are untouched, except by water. The monuments are uninjured, and the small brass plate, portion of the monument to the memory of Thos. Barrie, merchant of the Staple, who left a dole of twelve loaves of bread for distribution every Sunday, is also perfect. This is a relic of the old church destroyed in the Great Fire of 1666.

The organ, erected in 1781, may be described as "severely damaged by water," the pipes and fittings being full. An oil painting which existed over the reredos, representing the Transfiguration, erected in place of some rays of glory, which formed the original design, was hardly injured by the fire, and has since been taken away for better preservation.

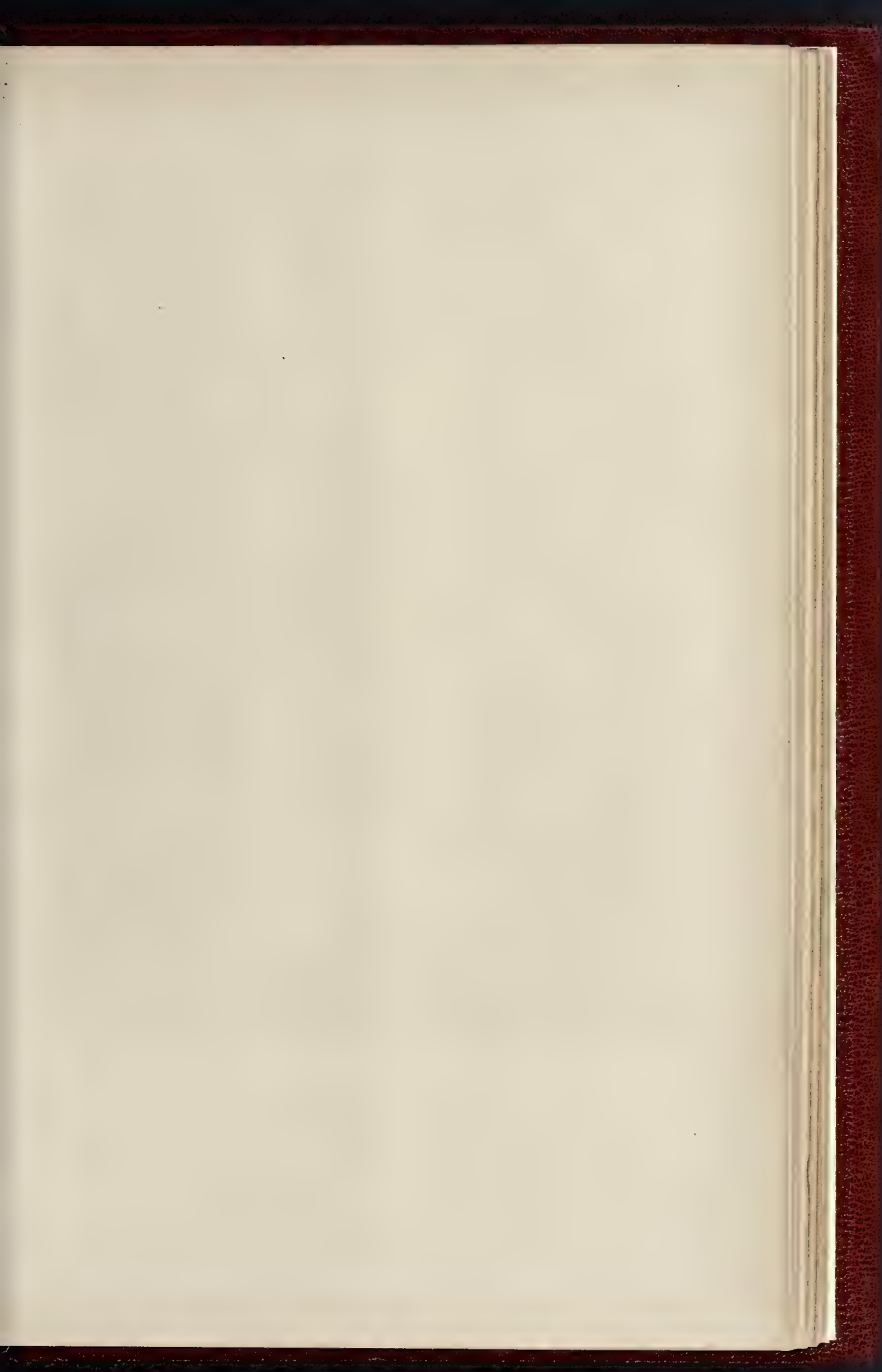
The solid walls of the church have undoubtedly been of vast service in preventing the further spread of the fire.

The occurrence of a fire in the City now appears to mean a calamity of no ordinary kind. The widespread mass of ruin behind the church indicates how rapidly a fire spreads, and how impossible it is beginning to be for even a large force of steam fire-engines to restrict the flames to the site of the first outbreak. The lofty buildings with their sides and fronts more or less pierced with large windows, necessary for light, render them almost as ready a prey to conflagration as were the timber buildings of olden times. When shall we learn to widen the narrow streets of the City, and, in addition, to

adopt some system of decentralisation which will prevent so great a mass of buildings being crowded together in the limited area of the City?

Archæological Discovery in Russia.—

During some recent excavations at Cherson, in Southern Russia, at a spot where the rivers Koschewoya and Korabelka join the river Dnieper, the remains of an old town have been discovered. The streets are very regular and run towards the river, whilst in the houses utensils, sculpture, and coin have been found, which indicate that the town once situated here was a Greek one.





THE STAFFORDSHIRE JOINT STOCK BANK

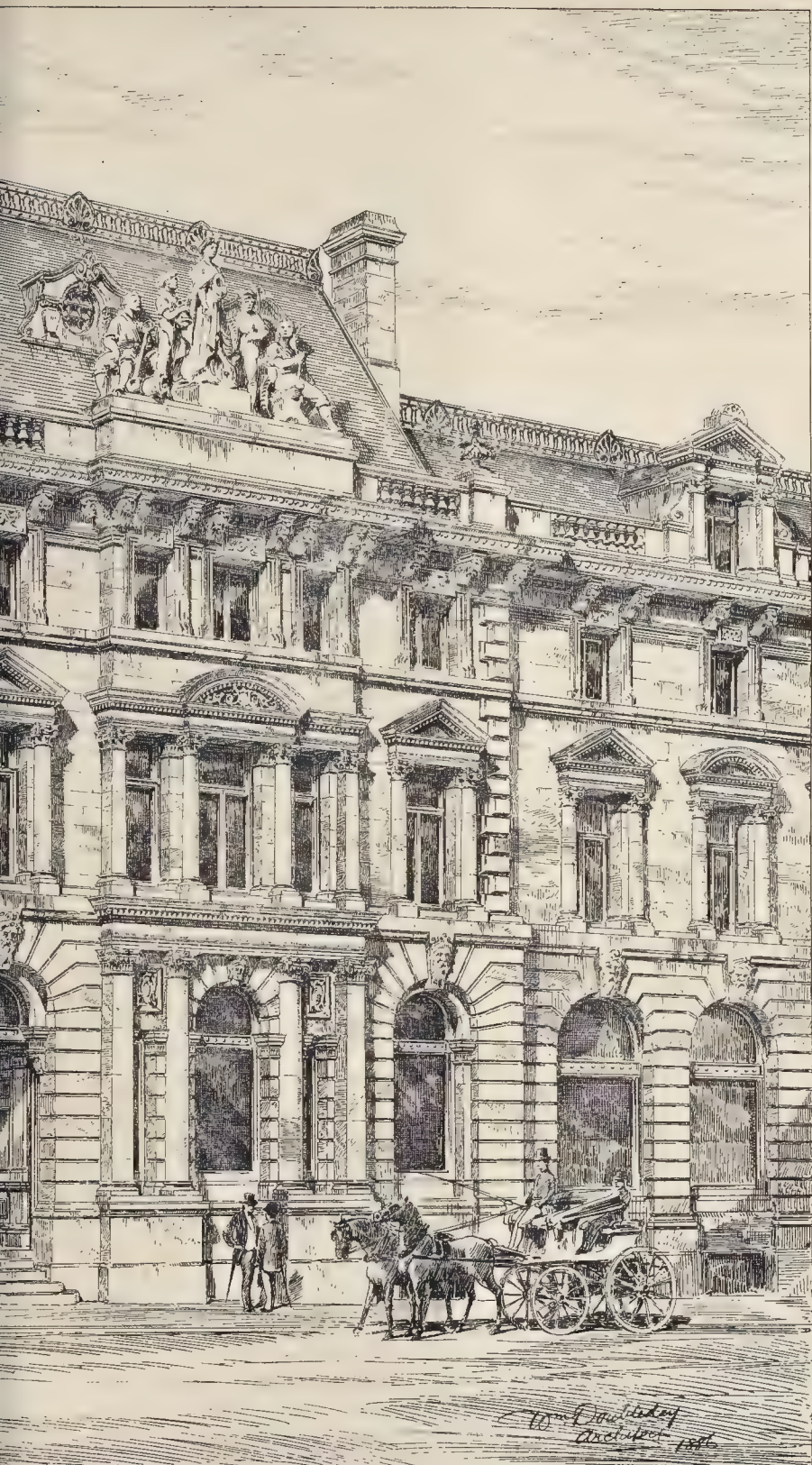
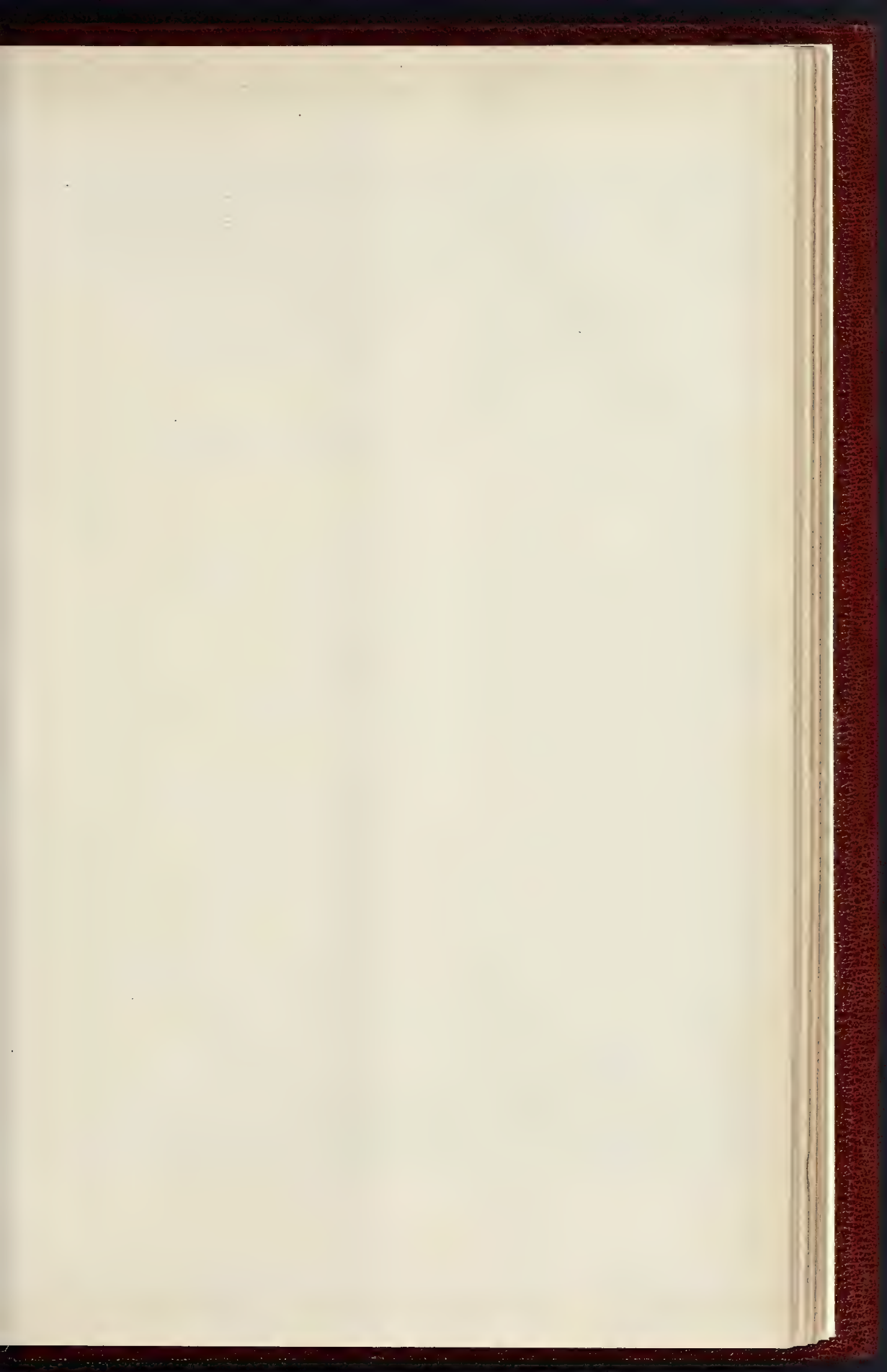
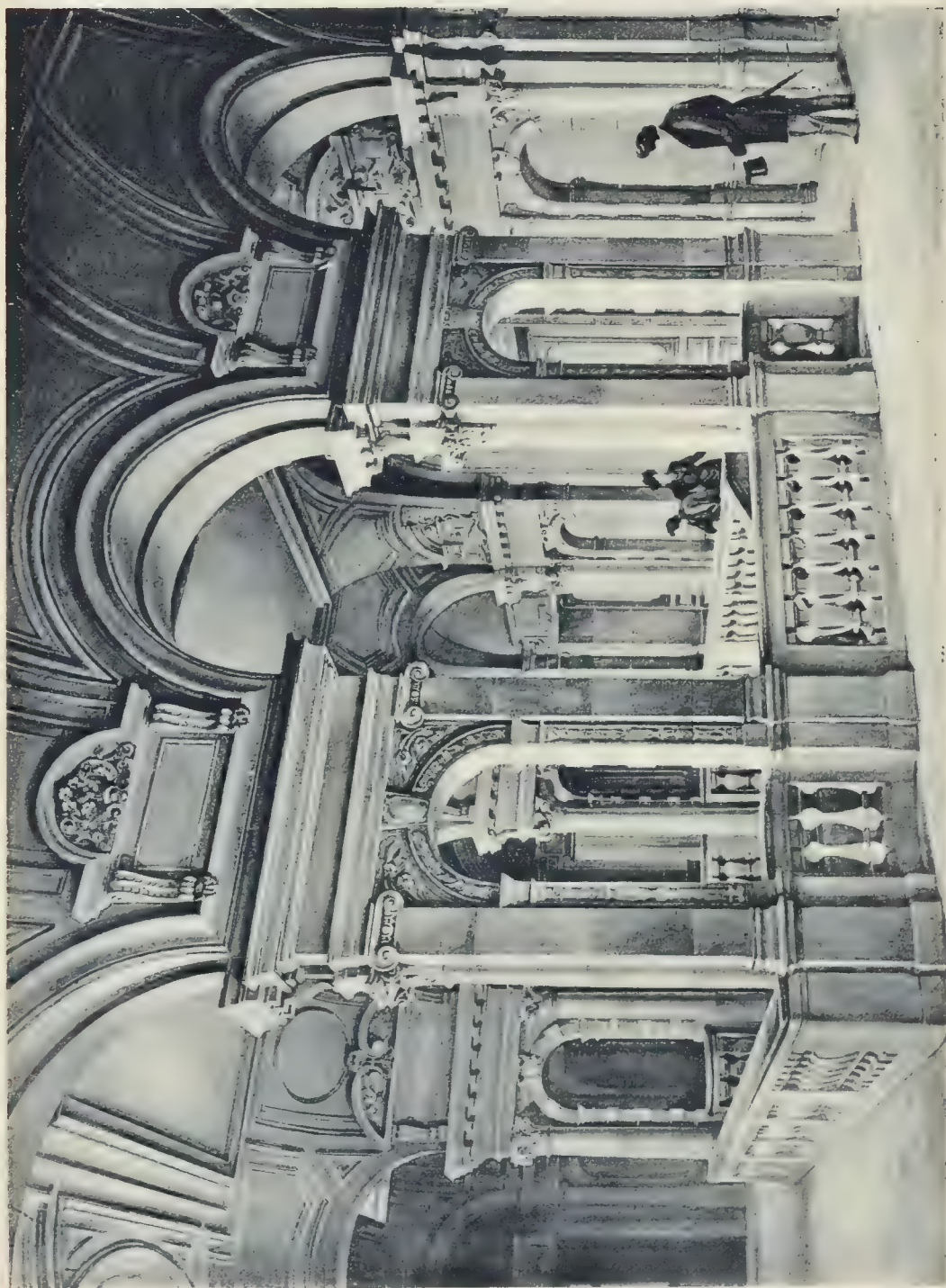
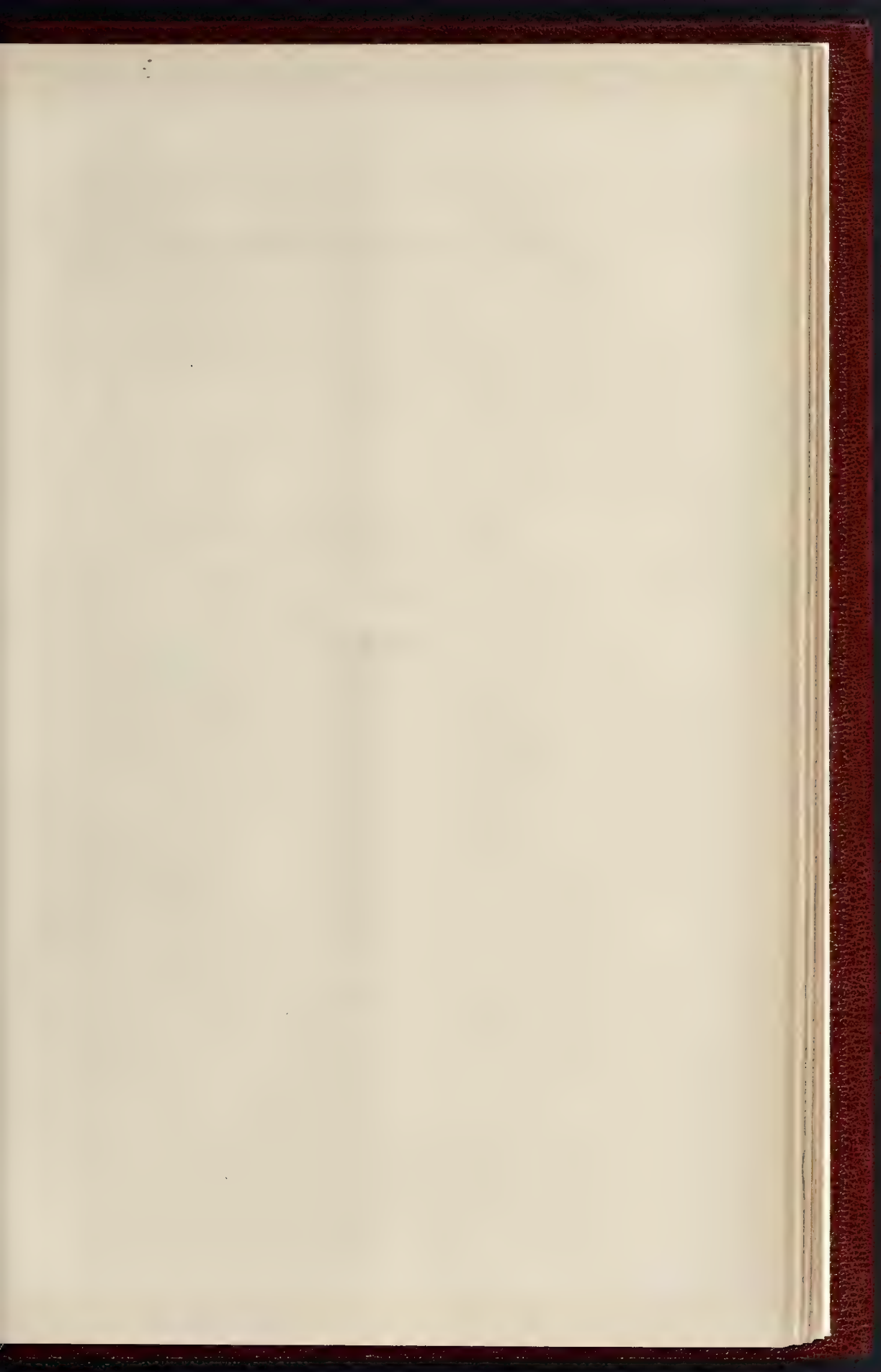


PHOTO-LITHO "SHAGUE & CO. 25, MARK LANE, LONDON E.C."

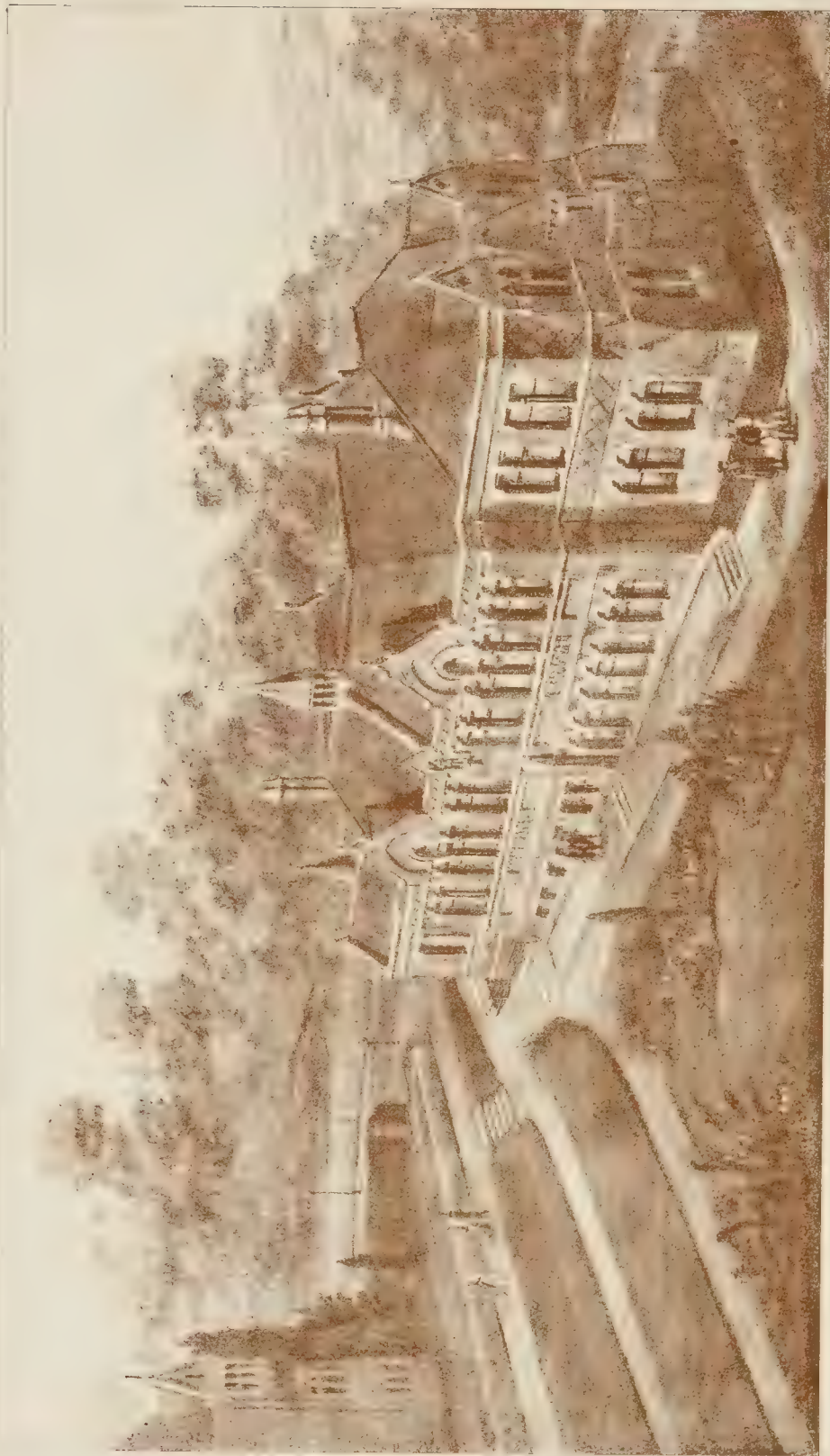


THE BUILDER, DECEMBER 11, 1886.

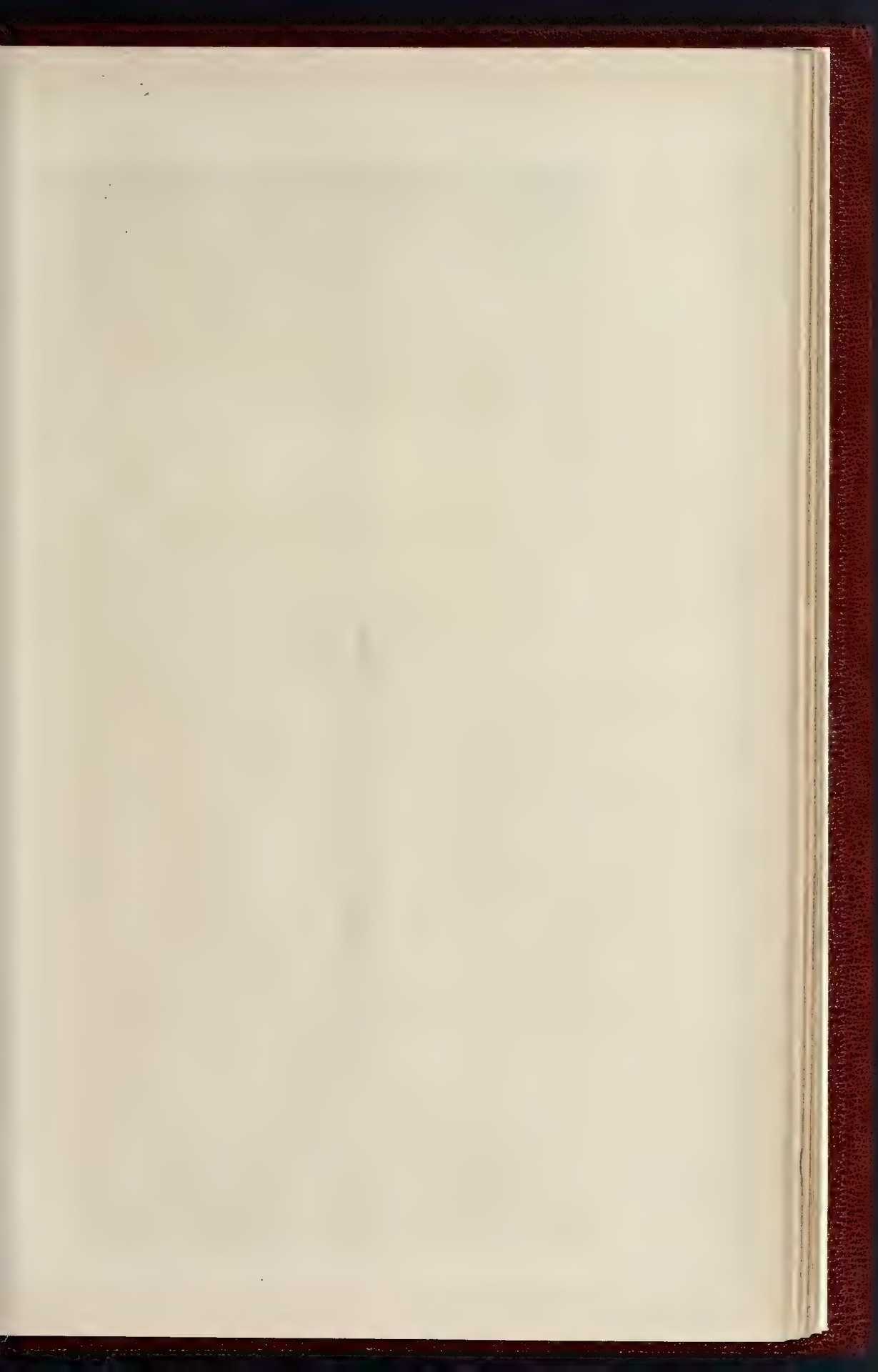




THE BUILDER, DECEMBER 11. 1886.



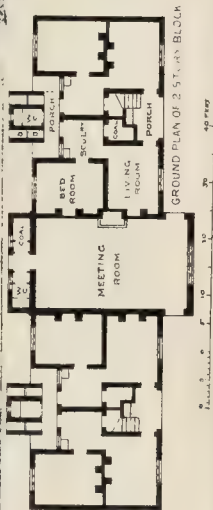
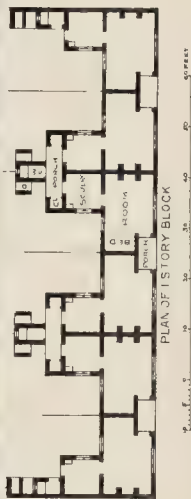
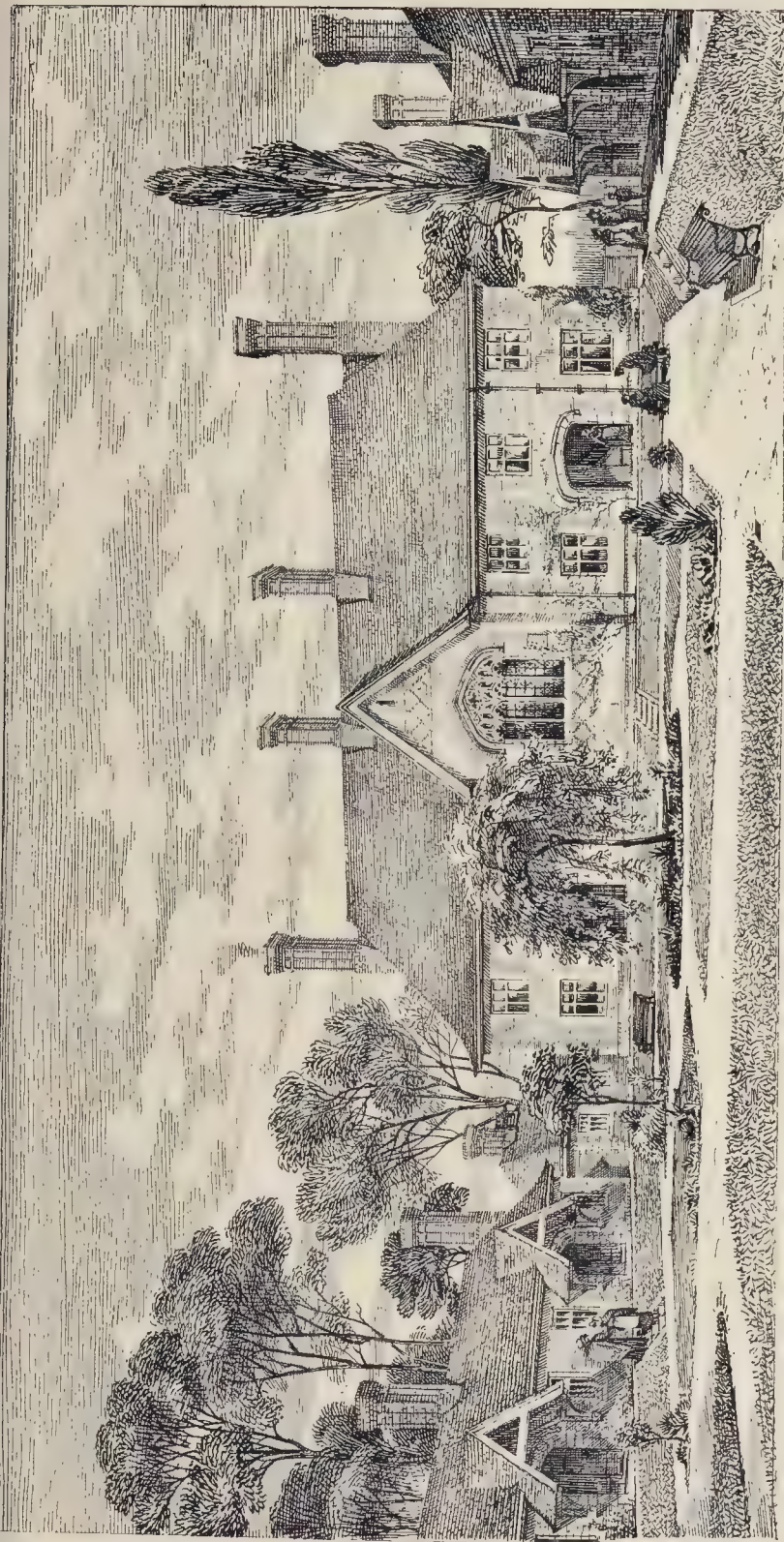
NATURAL SCIENCE SCHOOLS, HARROW.—MR. CHARLES FOSTER HAYWARD, F.S.A., ARCHITECT.



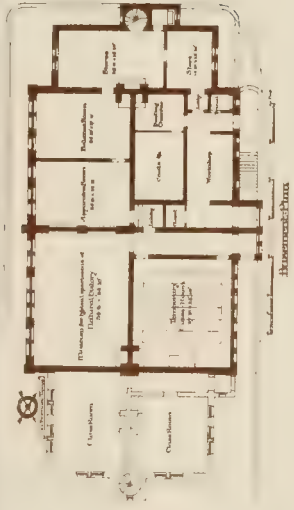
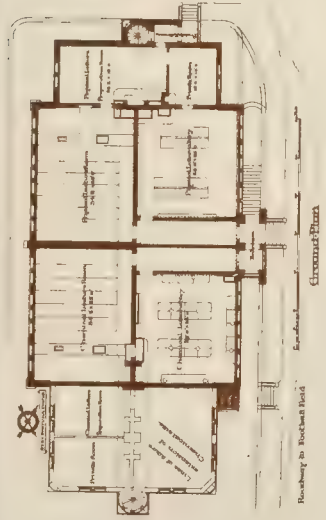
THE BUILDER. DECEMBER 11, 1886.



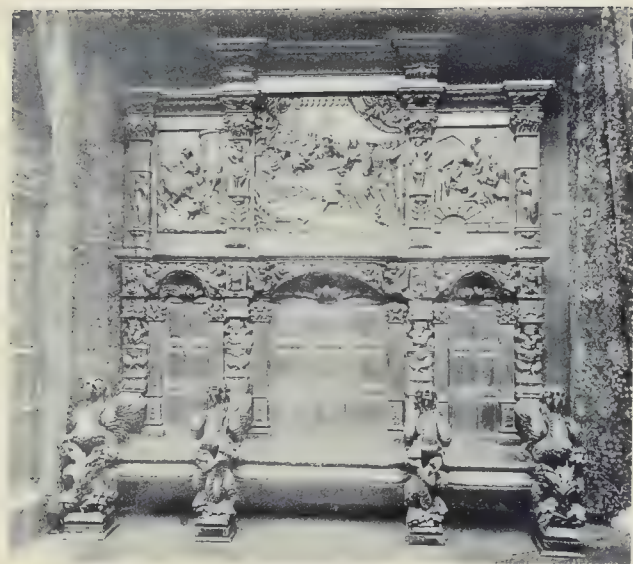
THE DONJON, LOCHES.—FROM A DRAWING BY MR. A. BERESTORD PTE.



NEW ALMSHOUSES AT FULHAM.—Mr J. G. HALL, A.R.I.B.A., ARCHITECT.



NATURAL SCIENCE SCHOOLS, HARROW.—MR. CHARLES FOSTER HAYWARD, F.S.A., ARCHT.



SIDEBOARD

AND

CABINET

EXHIBITED AT THE

EDINBURGH

EXHIBITION

EXECUTED

BY

Mr. W. ADAMS.

Illustrations.

STAIRCASE, THE MAIRIE, NEUILLY.

THIS is the main staircase of the Mairie or Hôtel de Ville of the suburb of Neuilly, Paris, of the exterior of which an engraving was given in the *Builder* for January 2nd of this year, and which was fully described in our issue of that date.

The illustration is reproduced from a sepia drawing by the Phototype process, and is given here partly to give our professional readers an example of the manner in which water-colour drawings of a high class can now be reproduced in our pages, as illustrations of contemporary architecture.

SIDEBOARD AND CABINET.

This sideboard and cabinet are a portion of some furniture exhibited at the recent Edinburgh Exhibition, for which their maker, Mr. W. Adams, received a gold medal.

The sideboard is carved in oak, the panels illustrating scenes from "Ivanhoe," and the angle figures of the pedestals represent Garth, the Templar, King Richard, Friar Tuck, Robin Hood, Ivanhoe, Athelstane, and Wamba.

The first pedestal panel represents "The old Jew writing out the order for the Horse and Armour,"—he and Ivanhoe mounted on mules.

The second pedestal "Wamba receiving the horn from the Black Knight in the forest."

The centre panel shows the "Lists at Ashby."

The large centre panel shows in bold relief the siege of the castle of Tarquistone.

The panel under the shelf shows the "king and Friar Tuck making merry in his cell," the friar singing his song.

The panels on the right and left show the division of the spoil; the friar taking in the Jew with a halber after finding him in the ruins, and the king attacked in the forest; Waldemar, Fitzgine, and Wamba hamstringing the horse; the whole surmounted by richly-carved cornice.

The Hall Cabinet and Settle has four heavy Griffins, with extended wings supporting arms, which terminate in handsome satyr trusses supporting heavy arched frieze, carved in bold relief in ornament and Cupids, with plain frame seat and backs. The upper part, formed by three handsome carved panels showing the assassination of Edward the Confessor on the left; in the centre, the trial of Queen Catherine; and on the right, the death of Prince Arthur, divided by richly-carved trusses supporting heavy carved cornice.

The illustrations are reproduced from photographs by the phototype process.

THE STAFFORDSHIRE BANK, BIRMINGHAM.

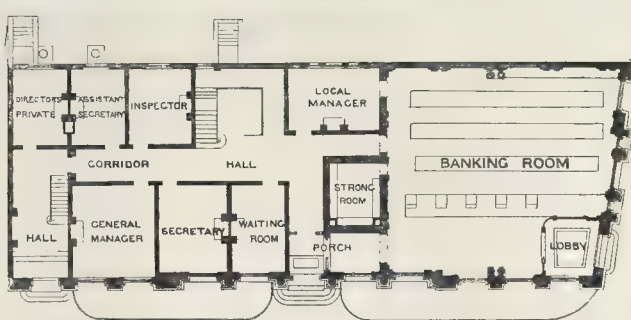
This design for the new premises for the Staffordshire Bank was selected in a limited competition. The building is now completed.

On the ground floor is the banking-room, entered by a lobby from Temple-row. The arcade formed by the external windows is repeated on the inside walls, the piers consisting of coupled Ionic columns. The main design is continued round the two blank sides of the room. The somewhat elaborate ceiling is a constituent part of the fireproof floor above. This is of one span without columns, and no timber is used in its construction.

The richly-panelled dado and all the fittings are of mahogany, and the work above, including the fluted pilasters, capitals, cornices, and ceilings, are of Parian cement. The local manager's room and one strong room open directly from the banking-room. The corridor beyond, with side entrance from St. Philip's Churchyard, gives access to the directors' staircase and to the offices of the general manager, the secretary, and assistant secretary, inspector, waiting-room, and directors' private room.

The furniture and marble chimneypieces of these rooms have been specially designed by the architect. The chimneypieces are by Mr. John Ward, of Birmingham, and the fittings by Messrs. Plackett & Co., of Warwick.

The public portion of the bank floor is laid with Ebnor's marble mosaic, while the space behind the counter is laid with wood-block flooring. The halls and corridors of ground floor are laid with ceramic mosaic by Craven, Dunnill, & Co.



SCALE 1" = 10' FEET
The Staffordshire Bank, Birmingham.—Plan.

The entire ceilings over basement and ground floor are fire-proof, and wood blocks are used for flooring in all the principal rooms.

In the basement are a strong-room, a large fireproof room, extensive stationery stores, clerks' luncheon room, messengers' room, lavatory, water-closets, and heating apparatus.

The heating is by hot-water coils, executed by Messrs. Jones & Attwood, of Stourbridge.

On the first floor are the board-room, the shareholders' meeting-room, ante-room, waiting-room, lavatory, &c., and directors' room.

The resident managers' house consists of large dining, drawing, and breakfast rooms on the first floor, and kitchens, &c., and eight bedrooms, bath-room, &c., on the floor above.

A concrete flat over a considerable part of the first floor is divided into two portions, one forming kitchen-yard, with coal-shed and lift from basement, the other being reserved for house garden and conservatory.

The two elevations, 123 ft. and 48 ft. long respectively, are of Bath stone.

The three sculptured groups represent Manufactures, Agriculture, Art, and Science, and are by Mr. Joseph O'Reilly.

The contractors are Messrs. Wm. Bissett & Sons, of Sheffield; the ornamental ironwork is by Messrs. Hart, Son, Peard, & Co. The clerk of works was Mr. Samuel Clapp.

The illustration is from a drawing by Mr. J. King James. The architect is Mr. William Doubleday, of Birmingham.

THE NATURAL SCIENCE SCHOOLS, HARROW.

THESE schools, of which we give views and plans in our present issue, were part of the outcome of the tercentenary celebration of the foundation of the school, by John Lyon. In commemoration of this event a large subscription was raised in the year 1872, and works taken in hand for the benefit of the school. Amongst these were gymnasium and workshop, designed by Mr. C. F. Hayward (see *Builder* for year 1875, Jan., p. 74, with illustrations), and also the Speech-room, by the late Mr. W. Burges, for which latter work so large a proportion of the funds collected were appropriated that it left less than was really requisite for these science school buildings. Thus, a portion of the building required to finish the chemical side was left unbuilt, and from circumstances which have arisen cannot now be completed as actually designed by Mr. C. F. Hayward, the architect, and as intended by the committee who appointed him to carry out the work. This is shown in outline upon the plans, but entire in the views.

The arrangement of the plan as adapted is the result of much consultation with scientists and specialists (the advice of Spottiswoode, Tyndall, Liebreich, and others, being obtained), and also of the careful examination, by the architect, of buildings erected for a similar purpose at Oxford, Eton, and elsewhere, together with much thought and deliberation of Mr. G. Griffiths, the Physical Science Master, and others. The two halves of the building, into which it is divided by a central line and double porch, are nearly identical

in size and arrangement on the ground floor, and comprise for each department—Physical Science and Chemistry,—a lecture-room, 34 ft. by 25 ft.; preparation-room, 28 ft. by 15 ft.; laboratory, 28 ft. by 26 ft.; and private rooms, all without any floor overhead, the one great point (at that date) being to keep any buildings low and unobstructive to the fine views of London obtained from the site selected.

In the basement, which at one part is quite out of the ground while in the other almost entirely below it, owing to the steep slope of the hill, are rooms intended for the care of apparatus, about 25 ft. by 17 ft. each; and one for a typical museum, 34 ft. by 25 ft.; classroom, about 28 ft. by 25 ft., &c.; but these have been from the first appropriated as classical and other class-rooms till further class-room accommodation could be built.

The site was a difficult one, being a steep sloping garden, upon a subsoil of running sand, amidst stiff London clay, and it required special skill and local knowledge, which the architect, having built much previously in the neighbourhood, and with the help of a good local builder, was able to insure, the result being perfect stability. It was known that too much or too little drainage, or any carelessness in adjacent excavations, would be highly detrimental to the structure, so that when new buildings being about to be erected close by (instead of the extension originally intended by Mr. Hayward, as shown upon the plans in outline only) excessively deep excavations were made without any shoring of these existing adjacent buildings, it was a necessary consequence that cracks should appear in all directions, as they accordingly did, and the buildings would have been entirely ruined except for great and hasty temporary support from shoring, and since from the more permanent arched buttressing recently erected.

In carrying out the work economy was so much insisted upon that the chief ornamental work, though only enough indeed at first to keep up the character of the adjoining school buildings, had to be cut out and everywhere brick substituted for stone, so that the building erected is not, in detail, precisely similar to the views which we give. The bricks were specially selected of a deep crimson red, so as to tone better with the surrounding greenery than the glaring "brick" red now so often adopted. The architect is Mr. Charles Forster Hayward, and the builder was the late Titus Lander, of Harrow, a "worthy" man and an honest builder in his day. Dr. H. Montagu Butler, the present Dean of Gloucester, was the Head Master of the school under whose auspices and vigorous management the same architect and builder had previously carried out the Sanatorium and other school works at Harrow.

ALMSHOUSES, FULHAM.

We give this week an illustration of the Fulham Waste Land and Lygon Almshouses recently erected in the Fulham Palace-road, to replace those originally built in Dawes-road, which had become dilapidated and were in other respects unsuitable.

The new buildings are of brick, with stone

dressings, and are planned to accommodate seven single inmates and the same number of married couples; a room is also provided for divine service and trustees' meetings.

The work has been executed by Messrs. Stimpson & Co. for 2,653*l.*, and the architect is Mr. John G. Hall, of Hammersmith.

THE WORK OF THE DONEGAL INDUSTRIAL FUND.

THE private view that was held on Saturday, on the premises of the Donegal Industrial Fund, Wigmore-street, of the work recently executed under its auspices,—avowedly to enable the critical public to judge of the progress that has been made during the last year,—was highly creditable to all concerned. It showed, too, that "the fund" is worked strictly on economic lines, and is run as a regular trading concern to enable it to compete successfully with existing houses. Philanthropy and sentiment make a poor foundation for successful trading, and we take it that the reason so many otherwise good schemes fail is because the promoters attempt to supplant other trading concerns, but neglect to use the means whereby success in that particular is assured. People will not continue to buy goods, even though made by distressed ladies, if they do not get a good return for their money, and the Donegal Fund appeals to the public on other than sentimental grounds, for it professes to give full value for the money spent. We are in entire sympathy with the movement, as a movement, in its two-fold attempt,—first, to enable the Irish workers to make use of their own raw material, and, in the second place, to restore the almost extinct village industries. Ireland has too long exported her raw produce instead of using it herself, and so getting all the wage-earning power possible out of the raw material for her own workers,—an important point, and one not sufficiently noted when considering the distressed condition of Irish peasants and possible remedies for this state of things. The work executed under the auspices of the Donegal Fund is the produce of the district (the wool used is that from the Donegal sheep, which is spun, woven, dyed, and embroidered in the district), and is wrought by the villagers in their own homes, so that the important element of "individualism" is not eliminated in the work produced. The best praise we can give the work we saw on Saturday is to say that it has "character." The embroidery designs are many of them adapted from old Celtic patterns,—the Kells Bible, illuminated by St. Colomb in the seventh century, has been largely drawn upon,—but there are many patterns derived from Oriental and Sicilian sources which are also successful. Special attention is given to the dyeing of the fabrics, and the promoters appear to have successfully overcome the technical difficulties that have hitherto attended the dyeing of flax,—a material largely employed by the Donegal people in their embroideries, owing to its brilliancy and cheapness. Curtains, portières, bed coverlets, and rugs are some of the uses to which the work is put, and the Fund makes a spécialité of "dyeing" to order, to suit any decorative scheme.

LOCHES.

THERE are few districts that offer so many features of interest to the students alike of history, archaeology, and architecture, as that portion of France situated on both sides of the river Loire, between Orleans and Angers. The close connexion of the old French provinces of Anjou and Touraine with the Norman kings of our own country causes the whole district to abound with reminiscences of the time when England was not much more than an appanage of the Dukes of Normandy. The archaeologist will find scattered about among the fields and villages several of the most interesting remains of the Celtic inhabitants of the country, the so-called dolmen of Bagneux being the largest monument of its kind. This is really a covered chamber, measuring 65 ft. 7 in. by 23 ft. by 10 ft. 8 in. high. The whole of this structure is now composed of twenty huge blocks of sandstone, of which sixteen, set up vertically, form the sides, and four the roof, while one other stone which has fallen down probably formed the covering of a small vestibule. The architect will find many examples, not only of the best work of the Early French Renaissance

style, which is free from the eccentricities and vagaries which disfigure its later developments, but also some most interesting specimens of the Romanesque and Gothic periods. Perhaps the town of the most varied interest in the whole district is Loches, with its suburb of Beaulieu. Loches is about twenty-nine miles from Tours, and the older part of the town is built on the sides of a somewhat steep hill, close to the river Indre. The situation would render it a place of some importance, and there can be little doubt that at a very early period the summit of the hill was occupied by a fortress, and from the eleventh century Loches has been connected with many of the most important episodes of French history. Its chief interest to the architect lies in the remains of its old dungeon, and in the collegiate church of St. Ours. This dungeon was probably commenced in the middle of the eleventh century by Foulques Nerra, Count of Anjou, and it has received considerable additions since. The oldest part consists of two rectangular towers of different sizes, the smaller one, which served as vestibule to the larger, measures 41 ft. 6 in. by 23 ft., and the other is exactly double the size. The latter is now 131 ft. in height; it is strengthened at the angles with semi-cylindrical buttresses, and there are indications of the walls having been originally crowned with a projecting cornice supported on corbels. Each tower originally contained four stories, the floors and vaulting of which are now entirely destroyed, though the rake of the stone staircase which gave access to the floors is still clearly discernible. On the second floor of the small tower was situated the chapel, the walls of which were decorated with frescoes. In the large tower it appears at first sight as if the level of the first floor had a considerable inclination from one side to the other, and various reasons have been given to account for this peculiarity. It is, however, much more reasonable to suppose,—as has been suggested by M. Baillargé,—that the floor was really level throughout, but that along one end, where the embrasures existed overlooking the open country, there was a raised stone platform to enable the soldiers the better to observe and attack an approaching enemy. The footings of this platform with the wall are still visible, and give the impression of the floor having been on the slope. The walls are now nearly 9 ft. thick, but originally they were only about 6 ft. thick, as Louis XI., who largely added to and strengthened the fortress, increased the thickness of the walls, the junction of the new work with the old being clearly visible. The same king also excavated numerous cells in the rock, which served as prisons for many celebrated men, and their walls are covered with inscriptions cut by the inmates. In one of these "black holes" was placed one of the celebrated iron cages invented by Cardinal la Balue for Louis XI., and one feels a certain amount of grim satisfaction on learning that by a freak of fortune the same cardinal was the first to be immured in one of his own cages. On the southern side the fortress is defended by a fosse, and a very strongly fortified wall, flanked by large towers, which are interesting as being almost the earliest example in which the ogival form is given to such towers instead of the circular; these date from the thirteenth century. The illustration which we publish, reproduced from a pen drawing by Mr. A. B. Fite, shows this side of the fortress.

Near the northern extremity of the hill on which the château of Loches is situated, is the Collegiate Church of St. Ours, one of the most interesting in France to the student of church architecture. It is recorded that a church dedicated to St. Mary Magdalen was erected at Loches in the year 450 A.D., but this was pulled down by Geoffrey I., Count of Anjou, and a new one built in 965 A.D., part of which remains to the present day. This is the lower part of the main wall of the nave, which shows masonry of large irregular-shaped stones, with very thick projecting mortar joints, which are as hard as the stone itself. Towards the close of the twelfth century, a considerable portion of the church was rebuilt by Thomas Pactus, prior of Loches, and, although it has been frequently restored since then, the general character of its work has been retained. In front of the church proper is a square narthex or porch, of the full width of the church, and with a roof vaulted in pointed arches, with plainly-moulded ribs. As is so often the case

in the Transitional period, we find that the round arch is retained in the main doorway, which is a very elaborate specimen of its kind. It is recessed in three planes, and small circular shafts are used in the jambs, the capitals consisting of conventional foliage and grotesque heads. Both the capitals and the heavy impost mouldings are continued through the whole jamb, and stop on each side against a corbel carrying a statue. The archivolts are elaborately enriched with sculpture of a very quaint design, comprising grotesque figures, monsters, grinning heads, &c. The upper part of the spandrel between the door arch and the pointed wall rib of the porch has a group of sculpture, which has been so much mutilated that it is impossible to tell precisely what was intended to be represented. The interior of the church is very peculiar, in fact, almost unique. The first bay forms the lower part of the west tower, and there is also a central tower at the crossing of the nave and transept, but between these towers the nave proper consists of two square bays, separated by an arched opening. Each bay is separately covered by a hollow octagonal stone pyramid, a sort of compromise between a dome and a vault. We believe this is the only instance known of this method of evading the difficulties which were inherent in the construction of vaults before the pointed arch had become thoroughly established. There is no doubt that this portion of the church was built before the porch which has been already mentioned. The apse and the aisles are all of much later date. The illustration which we give shows the towers and the two pyramidal roofs over the nave.*

Loches also contains some interesting examples of sixteenth-century work,—the Tour St. Antoine and the Chancellerie being the most worthy of examination. About a mile from Loches are the ruins of the old Abbey Church of Beaulieu, with some interesting remains of twelfth-century work.

HAMPSTEAD PUBLIC BATHS COMPETITION.

THE competitive designs for these buildings were exhibited at the Vestry-hall, Haverstock Hill, on Monday and Tuesday last. The competition is a private one, ten architects having been invited to prepare designs, of whom eight have responded to the invitation, one sending two schemes.

The conditions ask for men's first and second class swimming-baths, each to be 100 ft. by 35 ft.; and a women's bath, 60 ft. by 25 ft., as well as forty-five private or "slipper" baths, divided into two classes for each sex, or four suites in all. Administrative offices, superintendent's residence, and laundry and engine-house, were also required. The site, which abuts on the Finchley New-road, is a long narrow strip, about 320 ft. deep by 70 ft. wide for the greater part of its length, but narrowing off to 28 ft. of frontage only; it falls quickly from front to back, the difference being as much as 30 ft. at one point. The cost was not to exceed 12,000*l.* Most of the competitors have dealt with the problem of the planning and general arrangements with considerable success, and in this respect the average of merit is high.

Taking the designs in the order in which they are hung: "Suitability, Design A," puts the men's second-class swimming bath and the private baths all together at the back of the site, reached by a long corridor from a separate entrance in the front; the women's bath is placed across the site in the middle, and the men's first-class bath in front, immediately behind the administrative block. The general arrangements and grouping are open to one grave objection, namely, that all three entrances, including that for the women, are side by side.

The design marked with the device of a triangle in a circle is similar to the last in the main features of its plan, but the details, especially as regards the entrances, are better. The elliptical trusses of the roofs over the swimming baths seem to be intended to be of timber, but no construction is shown, and it

* Viollet-le-Duc has the following remark on this church. "Il est en France précisément dans la limite séparant les édifices à colonnes de ceux qui n'en comportent pas un monument unique, d'origine dans lequel viennent, pour ainsi dire, se fondre les influences de l'art oriental avec les méthodes de l'architecture adoptées dans le nord au commencement du douzième siècle: c'est l'église de Loches."

may be doubted how they could be put together so as to stand. The elevation to the road would make an effective group.

"Practical" has a plan which is excellent in every respect, except as regards the entrances, which are practically side by side. The women's swimming-bath and both classes of private baths are in the front of the site, so that they are the most easily reached, and the waiting-rooms are very conveniently placed; the men's first-class baths are similarly grouped together behind the women's, and the men's second-class baths are in the rear of the site and reached by means of a corridor. The elevation shows a not ineffective brick front with a tower and high-pitched gable; some objection might be taken to the rather heavy timber trusses of the roof over the men's first-class bath; but, on the whole the design is a very good one.

"Felix" has placed the men's first-class bath at the back, the second-class one next, and the women's bath in front; the private baths are badly arranged in a kind of galleries over the women's and the second-class men's baths. The best thing about this set of drawings is the drawing of the effective pen-and-ink views; the front elevation is pretty, but hardly appropriate or of sufficient importance. We noticed also the light, well-designed, iron roofs of the swimming-baths.

"Progress" has a plan similar in its main lines to "Suitability." The access, waiting-rooms, &c., are well arranged, and the approaches for men and women kept well separated. The roofs of the swimming-baths are rather heavy in appearance, but the design is, on the whole, a good one.

"Cavendo Tutus" has also managed the entrances and separation of the sexes carefully, but some of his other arrangements are open to objection; and the design, on the whole, would bear further thinking out.

"Suitability, Design B." by the same architect as the first we mentioned, is an attempt at a remarkable engineering feat, the proposal being to erect one of the large swimming-baths over the other, and to carry the brick tank, with its immense weight of water, upon iron columns. We do not question the possibility of such a thing, but we find it difficult to credit that the building would cost 350l. less than the author's other design, as he thinks it would. The object aimed at is apparently the inadequate one of getting a roadway on one side of the building to the laundry and engine-houses, which are situated in the rear; the remaining arrangements of the building are not satisfactory as regards either lighting or arrangement, but the neat elevation is better than most of the others.

"Aquarius" has one of the best plans, if it were not for the mistake of providing but one entrance for the use of both sexes, which are only separated at the bottom of a staircase well inside the building. There are sensible light iron roofs to the swimming-baths, and the brick Gothic elevation might look well, though it wants height and importance.

MISS HARRISON'S LECTURES AT SOUTH KENSINGTON.

THE last of these lectures was given on Wednesday. A short account of the first appeared in our issue of November 20th. Miss Harrison had dealt with the legends centering round the first earth-born kings of Attica, Kekrops, and his successor Erichthonios, during whose reigns the worship of Athene had gained firm hold of the Attic race. In her second lecture, Miss Harrison passed on to Pandion, who came after Erichthonios, and in whose reign the worship of Dionysos and Demeter, marking a further advance in civilisation, was introduced into Attica. Of the great struggle between Eumolpos, king of Eleusis, son of Poseidon, and Erechtheus, the successor of Pandion, there is no representation in vase-paintings; but one of the finest works of the potter Hieron, a *colytos* in the British Museum, embodies for us the peaceful side of this period of Attic mythology. On the obverse the young god of agriculture, Triptolemos, on his winged car drawn by serpents, is being sped on his way to sow the grain on the earth by Persephone and Demeter, attended by the nymph of the land *Eleusis*. On the reverse, under the one handle sits Eumolpos, in peaceful attitude; facing him under the other handle is his father, Poseidon; standing between the

two are Amphitrite, Zeus, and Dionysos. After the war with Eumolpos, land and sea seemed at peace. Once again we find them face to face, not in strife, but in emulous rivalry for both Agaius, king of Athens, and Poseidon claimed each as his son the great Attic hero Theseus. Miss Harrison illustrated the two-fold mysterious parentage by two vases. One, the famous *cylind* by Euphronios (Louvre), representing Theseus borne down triumphantly by a Triton, special messenger of Poseidon, to the very presence of Amphitrite, to fetch the ring Minos had thrown into the sea, proved how readily the sea-god acknowledged the young hero as his son. The interior of the *cylind* (Berlin) showed Agaius sorrowful at his childlessness, consulting the oracle of Themis. On his way home Agaius married Aithia, daughter of Pittheus of Troezen, and their son was Theseus. The heroic adventures of Theseus on the road from Troezen to Athens, together with the contest with the Marathonian bull, are embodied in a *cylind* by Duris (British Museum). The centre of the *cylind*, being the most prominent place, is given to the slaying of the Minotaur, the crowning deed of the career of Theseus. This slaying of the Minotaur is one of those legends which, typifying as it does the struggle of East and West, was of pan-Hellenic importance; therefore we find it represented, not only in the work of the vase-painters of the fine Attic period, but also in the earliest archaic art, long before any other of the exploits of Theseus had received an artistic form. Theseus, the brave young hero of the West, overcame the hideous Eastern monster, the Minotaur, the man-eating creature, which is but another form of the god Baal, the embodiment of the fierce sun-god. This conception of the triumph of West over East we find again in the myth of Perseus and the Gorgon Medusa. Miss Harrison showed, as an example of the archaic treatment, a very ancient cup, a *skyphos* (Louvre), where Theseus, represented as a bearded man, is in the act of slaying the Minotaur. He is being watched by Ariadne, on one side, and by two rows of Athenian captives on the other. The next illustration, from a *krater*, recently found on the Acropolis, showed how in the work of the fine period Theseus was conceived as a lovely youth. The love and desertion of Ariadne led to a comparison between the celebrated Vatican statue, where Ariadne is represented in troubled sleep, and a *cylind* of the fine Attic period (Corneto), where Ariadne, all unconscious of her human lover, who is just preparing to leave her, lies in peaceful slumber under a vine-tree, symbolical of the divine husband who is to comfort her. The two great contests which Theseus engaged in after he had become king,—that with the Amazons, and that with the Kentaurs,—Miss Harrison only touched on briefly, for they are adventures not peculiarly belonging to the Attic mythology. Theseus has to engage in these contests like every brave hero had done before him. The coming of Theseus to Hades, and his punishment, is found only on Lower Italy vases. One interesting vase, the *Codrus cylind* (Bologna), links the name of Theseus with that of the last king of Athens, and with that of Menestes, who supplanted him. In the centre the brave Codrus is in the presence of Ainetis, probably the seer who prophesies his doom. On the obverse is Theseus starting on the exploit of the Marathonian Hill, while on the reverse Ajax and Menestes are starting for Troy.

The fourth lecture Miss Harrison devoted exclusively to the heroines of Attic mythology. She pointed out that the legends concerned with them have the unity, not only of pathos, but also of origin, for they belong to the class of transparent nature-myths. First, the lecturer told the sad story of the two daughters of Pandion,—Phroke the swallow, with her boy Itylos, and Philomela the nightingale,—and the terrible vengeance they wrought on Tereus. The interior of a *cylind* (Louvre) showed the two sisters plotting their revenge. Passing to the daughters of Erechtheus, Miss Harrison showed the rape of Oreithyia by the god of the north wind, Boreas, as represented on an *amphora* in Berlin. In connexion with the more melancholy fate of Prokris, her sister, Miss Harrison examined the myth of Eos, who bears away or pursues Kephalos, the beautiful hunter, husband of Prokris. Eos, like Boreas, is another winged immortal creature, bearing away the beautiful mortal it loves,—a notion which has its counterpart in the rape of Ganymede by the

eagle of Zeus. Miss Harrison pointed out carefully the two aspects of the dawn in the Attic myth, the cosmical and the human one, and showed how in the Blacas vase (British Museum) the two thoughts are combined. Helios, the sun-god who follows the dawn, is rising up from the sea, while at his approach Selene, the Moon, is striking; four little figures, embodiments of the stars, are plunging into the darkness, while in the foreground Eos, in her human aspect, is, as ever, pursuing Kephalos. In illustration of the mournful love of Prokris and Kephalos Miss Harrison showed first a vase from the British Museum representing the death of Prokris, who is sinking under her wound, with her father Erechtheus on one side and Kephalos on the other, while her faithful hound looks mournfully on. Lastly, she showed the beautiful picture by Piero di Cosimo, in our National Gallery, where, perhaps, the legend has received from an art which understood better how to deal with pathos some subtle additional touch which the Attic vase-painter had missed.

We are glad to hear that these lectures, which are among the most brilliant which Miss Harrison has ever delivered, are to be embodied by her in an introductory essay to her edition of Pausanias's "Attika." Miss Harrison has, in this course, dealt with a mythical period of the highest importance for the study of the history or of the monuments of ancient Athens, but one which, owing to the scantiness of any continuous literary record in Attic literature, and to the confused accounts of the logographers and of the late age, is one of the most difficult to unravel, and for her clear presentation of it her audience must feel grateful. Miss Harrison not only treats myths in a scholarly and lucid manner, but also with a suggestiveness which imparts new life and meaning to the legends of ancient Greece, making even the best-known facts stand out in a new and unexpected light.

In the introductory part of the first lecture Miss Harrison had stated that the particular advantage to be derived from a study of vase-paintings in connexion with mythology was, to those unacquainted with the original Greek, and thus unable to go to the fountain-head for a knowledge of the literature, an original language, the language of art, to make up in some measure for the loss of the other; but that to classical students the advantage was two-fold, for they gained the language of art added to the language of literature, and each of these in turn would be found to embody some subtle thought or feeling which the other was powerless to render. This method of teaching, by close comparison of the literary and artistic form of a myth, is one which Miss Harrison is making peculiarly her own.

THE OFFICE OF SUPERINTENDING ARCHITECT:

METROPOLITAN BOARD OF WORKS.

AT the meeting of the Metropolitan Board of Works on the 3rd inst., the Works and General Purposes Committee presented a further report on the whole question of the appointment of a Superintending Architect, and recommended "That an advertisement, in the form herewith submitted,* for the office of Superintending Architect be inserted in the leading professional papers; that the age of the candidates be unlimited; and that the salary be 1,500l., inclusive of travelling and incidental expenses."

Mr. Edwards, the Deputy-Chairman of the Board, having formally moved the adoption of the recommendation,

Mr. John Jones said he took exception to the Committee's recommendation. What did they mean by saying that "the age of the candidates be unlimited"? He contended that "a Superintending Architect" was not an officer the Board was empowered to elect. The Building Act said that the Board was to elect "a Superintending Architect of Metropolitan Buildings." That was the exact title and description of the officer whom the Board was empowered to elect, and he must express his conviction that such an officer should not be saddled with the heterogeneous and foreign duties, ranging from the management of "baby-farms" to the valuation of properties required for street improvements, which the Board had from time to time imposed upon him. In his opinion the saddling of such

* For the advertisement, see p. xvi. of this week's *Builder*.

an officer with the miscellaneous (not to say ignoble) duties which had been imposed upon the late incumbent of the office would be sufficient to deter eminent architects and scientists in construction from competing for the appointment. He believed that by the adoption of the recommendation of the Committee the Board would be merely getting out of one difficulty into another, and he could not but feel that the Committee's previous action in the matter was not such as to entitle them to the confidence of the Board. The Committee, by having previously reported that out of the twenty candidates who made application for the appointment, they could not select the names of six gentlemen who were competent to take the post, had cast an aspersion upon the professional capacity of the whole of the candidates. ("No, no.") He concluded by moving, as an amendment, that the maximum age of candidates be fixed at fifty years.

Mr. Wetenhall seconded the amendment, and said he could not help thinking that the Board would not gain credit for its past action in regard to the matter. It was now some months ago since the late Mr. Villiamy tendered his resignation, and men of the highest ability in the architectural profession had come forward as candidates, their applications being backed up by testimonials from leading men in the profession. What did the Committee mean by saying that the age of candidates was now to be "unlimited"? Did they want the office filled by a centenarian?

After some remarks by Mr. Tolhurst and Mr. Richardson, the motion to agree with the Committee's report was carried by 31 votes to 2.

Mr. Edwards said that, as the Deputy-Chairman of the Board, it was his duty to bring up the following recommendation of the Committee:—

"That the candidates who have already applied for the office and sent in their testimonials be informed that their applications will be considered, together with those which may be received in answer to the further advertisement, unless they express their wish to withdraw."

He could not move its adoption, as he did not agree with it.

Mr. Harben, however, moved its adoption, and this motion having been seconded, considerable discussion ensued, it being argued by Mr. Selway, Mr. Shepherd, and others, that the Board, having already adopted the report of the Committee declaring that there were not six suitable candidates amongst those who presented themselves in answer to the first advertisement, would be stultifying itself by the adoption of the present recommendation. Adopted it was, however, by 35 votes to 9.

The Works Committee further reported, stating that, having fully considered the reference by the Board as to the death of the Superintending Architect in connexion with the pension recently voted to him by the Board, they regretted that they were unable to advise the Board to take any action in the matter. This was agreed to; but later in the day it was resolved, on the motion of Mr. Richardson,—

"That it be referred to the Works and General Purposes Committee to consider and report as to the remuneration to be given to the representatives of the late Superintending Architect in consideration of his services given at the special request of the Board from and after the date of his resignation to the day of his decease."

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

THE opening meeting of this society for the Session 1886-87 was held at the society's rooms, No. 7, Westminster-chambers, on the 1st inst., when the President, Mr. E. H. G. Brewster, A.M.Inst. C.E., delivered his inaugural address, in the course of which he gave a history of the society from its foundation in May, 1859, to the present time. Mr. Brewster then proceeded to describe some of the principal engineering works that have been recently finished, that are in progress, and that are proposed. His first category included the Canadian Pacific Railway, the reader pointing out the immense importance of it not only in peace, but in time of war. He then passed to the Severn Tunnel, referring to the extraordinary difficulties that had been met with in its construction; then to the Mersey Tunnel. The Forth, Tay, Putney, Battersea, and the Tower Bridges were next described, as was also the Hawkesbury Bridge, New South Wales, an interesting circumstance in connexion with which is that although it will be built by an American firm, all the steel for

the superstructure will come from England. Passing on, the President next described the new waterworks at Liverpool, Manchester, and Hong Kong, and incidentally mentioned that when this colony came into the possession of the English in 1841 it was inhabited by only a few poor fishermen, whereas it is now the fourth largest shipping port in the world. The Panama Canal and many other important works were described, and on the conclusion of the address Mr. Twigg, M.Inst. C.E., proposed, in complimentary terms, a vote of thanks to the President. This was seconded by Mr. D. Gravel, A.M.Inst. C.E., and carried unanimously.

The meeting then adjourned to the 15th instant, when Mr. M. A. Pollard Urquhart will read a paper on "Copper Production in the South of Spain."

THE OLD PALACE, CROYDON.

A COMMITTEE has been formed with the view of preserving for Croydon, if possible, the old palace, banqueting-hall, guard-chamber, and chapel of the Archbishops of Canterbury. Some of the oldest work at this palace is composed of brick, of the time of Henry VI., and the eastern and western parts of the great court were some of the first brick buildings of that period. There was a vineyard attached to the palace early in the fourteenth century. Manning and Bray, the county historians, give two views, taken from the north and from the south, which show the architecture and the comparative proportions of the buildings fairly well. In the year 1412 Archbishop Arundel kept the captive king, James I. of Scotland, in confinement here. In July, 1573, the Archbishop Matthew Parker entertained Queen Elizabeth and her whole court retinue here for seven days. During the uncertain times of the Commonwealth the palace was leased to the Earl of Nottingham for an annual payment of 40*l.*, and afterwards to Sir William Brereton, Colonel-General of the Cheshire forces. This tenant resided in the palace, and turned the chapel (which has a fine timber roof), into a kitchen. At the restoration of the Stuarts, Archbishop Juxon carried out considerable repairs, and many succeeding archbishops spent large sums of money in improving the property. Secker and Cornwallis, however, did not reside in this palace, and in the year 1780,—at which time it had ceased to be occupied by the archbishops for twenty years,—an Act of Parliament was obtained, vesting the palace buildings and two adjacent closes, in certain trustees, who were required to sell the same and apply the proceeds, according to specified directions, towards building a new archiepiscopal palace on Park-hill, the old site being found to be bad and inconvenient. In pursuance of the Act of Parliament, the trustees sold the site October 10th, 1780, to Abraham (afterwards Sir Abraham) Pitches, for a sum of 2,520*l.* The palace, with the servants' apartments, stables, gardens, court-yards, canal, and fishponds, covered a space of upwards of eight acres; the area in all, with the meadows adjoining, amounting to 14*a.* 1*r.* 17*p.* It is now used as a manufactory of printed calicoes, and a bleaching-ground. The Committee believe that many of the residents of Croydon who take an interest in local antiquities, and other lovers of Medieval English edifices, would be glad to avail themselves of an opportunity of inspecting these ancient buildings in their present condition; it has, therefore, been arranged that they shall be open on Saturdays, the 11th and 18th inst., from two to four p.m. Mr. E. P. L. Brock, F.S.A., has kindly undertaken to conduct those who are provided with cards of admission over the site of the palace chapel, banqueting-hall, and guard-chamber, and to point out the features of architectural and historical interest in which the buildings abound. These cards of admission may be obtained on application to any member of the committee, viz., the Rev. J. M. Braithwaite, M.A., chairman; Mr. Alderman Layton, J.P., Mayor of Croydon; Alderman Dr. Benson, Mr. G. W. Leveson-Gower, F.S.A.; Mr. J. Pelton, J.P.; and others; or of the honorary secretaries, Mr. E. P. L. Brock, 36, Great Russell-street, W.C., and Mr. S. W. Kershaw, F.S.A., St. James's-road, Wandsworth Common, S.W. The entrance for visitors is by the banqueting-hall in the Old Palace-road, and tea will be served in the chapel at the close of the inspection.

THE ARCHITECTURAL ASSOCIATION.

THE fourth meeting of this Association for the present season was held at 9, Conduit-street, on the 3rd inst., Mr. J. A. Gotoh (President) in the chair.

The following new members were elected, viz.:—Messrs. Charles Bywater, C. J. Willett, Ethelbert Fagg, Thomas MacLaren, Alfred H. Clark, Vincent Craig, Herbert Goodman, G. E. Nield, C. M. Harvey, Ernest Marshall, Arthur Turnbull, R. O'Brien North, C. E. Andoie, Sidney French, Adrian Collins, J. M. Elton, J. D. Scott, H. S. Tiffin, C. A. Ligon, H. St. Clair Cory, R. D. Warry, John Borrowman, W. G. Morrison, C. H. Freeman, F. R. Taylor, and H. D. Lloyd.

Several donations of books to the library were announced, and votes of thanks were passed to the donors.

Mr. H. D. Appleton (Hon. Sec.) stated that the members would shortly receive the conditions and particulars of the additional prizes, viz.:—(1) The conditions on which the Aldwinckle Travelling Studentship would be awarded; (2) the offer of Mr. Blashill to give a prize of 10*l.* for the encouragement of the study of Italian architecture; (3) the offer of Mr. Cates to found a prize for the encouragement of members of the Association in the preparation for the R.I.B.A. Examination in Architecture; and (4) Mr. E. Turner's offer of a prize of 3*l.* 3*s.* for students of the elementary division.

On the motion of Mr. Cole A. Adams, a vote of thanks was passed to the gentlemen who had so kindly offered these prizes for competition.

Dr. T. Prigdin Teale then read a paper on "Fireplaces," inviting the meeting to follow each head by discussion, so as to thoroughly thrash out the subject. As the paper was substantially the same as the lecture delivered at the Royal Institution by the author early in the present year, and printed in the *Builder* for February 13th last, p. 285, we need not do more now than give the following rules laid down by him:—

(1) As little iron as possible; (2) the back and sides of the fireplace should be of brick or fire-brick; (3) the fire-brick back should lean over the fire, not lean away from it, and at an angle not greater than 70°; (4) the bottom of the fire, or grid, should be deep from before backwards, probably not less than 9 in. for a small room, nor more than 11 in. for a large room; (5) the sides or coverings should be vertical, but inclined to one another as the sides of an equilateral triangle; (6) the slits in the grating or grid should be narrow, not less than $\frac{1}{2}$ in., nor more than $\frac{1}{2}$ in. in width; (7) the front bars should be vertical, that ashes may not lodge and look untidy; narrow, perhaps $\frac{1}{2}$ in. in thickness, so as not to obstruct heat; and near together, perhaps $\frac{1}{2}$ in. apart, so as to prevent coal and cinder from falling on the hearth; (8) there should be a rim 1 in. or 1½ in. in depth round the lower insertion of the vertical bars; (9) the chamber under the fire should be closed by a shield or "Economiser"; (10) whenever a fireplace is constructed on these principles it must be borne in mind that a greater body of heat is accumulated about the hearth than in an ordinary fireplace. If there be the least doubt whether wooden beams possibly run under the hearthstone, then an ash-pan should be added with a double bottom, the space between the two plates being filled with artificial asbestos, 1½ in. or 2 in. in thickness; (11) see that no woodwork comes within 10 in. or 12 in. of the back of the fire.

In concluding his lecture, Mr. Teale replied to some criticisms of his Royal Institution lecture which had appeared in other journals, and complained that from the Smoke Abatement Institution his stove,—which was open for use by all, without any royalty, patent, or restriction, and which he claimed to be applicable to every fireplace, and inexpensive,—had received no encouragement, but the contrary; and not even intelligent investigation.

In the animated discussion which followed each head of the paper as it proceeded, Messrs. Baker, R. P. Notley, W. Hilton Nash, Cole A. Adams, C. H. Brodie, G. A. Pryce-Cuxson, and others, took part.

A cordial vote of thanks to Dr. Teale closed the proceedings.

Macclesfield Church.—We are asked to mention that the wood-block flooring of this church (noticed by us a fortnight ago) was executed by Messrs. Geary & Walker.

COMPETITIONS.

Carlisle Market Buildings.—The Markets Committee have selected the plans submitted by Messrs. Cawston & Graham, of London, and Mr. Geo. Dale Oliver, of Carlisle, for the prizes of 100l. and 50l. respectively, for the best designs, with specifications and estimates, for the erection of new market buildings at Carlisle. There were thirty-five competitors.

The Yorkshire Penny Bank: New Premises at Halifax.—The directors of this bank having acquired a suitable site in Waterhouse-street, Halifax, invited a limited number of architects to compete for the commission to design and carry out the proposed buildings; the following firms were selected, viz.:—Messrs. Kelly & Birbhall, Perkin & Bulmer, Smith & Tweedale, and Mr. W. H. Sharp and Mr. Kaye, of Leeds; Messrs. Milnes & France, of Bradford; and Messrs. Buekley & Son, of Halifax. The directors decided to give the work to the author of the design placed first, and to pay an honorarium of fifteen guineas to each of the unsuccessful competitors. At the general board meeting held on Friday last the designs by Messrs. Perkin & Bulmer were unanimously chosen. The building will consist of a bank with the necessary adjuncts, and over it two floors of offices to be let. The design is in Gothic style, and will be executed with wrought stone. At the rear of this building and separated by a wide area or court will be erected a substantial block, to be let as a wool warehouse. The total cost of the whole scheme will be about 7,000l.

ARCHITECTURAL SOCIETIES.

Bradford Society of Architects and Surveyors.—The awards in the annual competition by pupils have been made as under:—Architectural subjects: First prize, Mr. Charles E. Hope; second, Mr. F. M. Rattenburg; third, Mr. Sam. Dawson. Surveying subjects: First prize, Mr. Fred. Wm. Milnes; second, Mr. E. B. Barlow; third, Mr. Ernest Longden. The drawings and other papers submitted in competition are to be on view to the public in the reading-room of the Church Institute for a few days. After the distribution of prizes, Mr. T. Healy gave a short address on "The Picturesque in Architecture," showing that although good Gothic work was not necessarily picturesque, good Classic work often was; citing as examples some of the quadrangles of the Oxford Colleges, and some of the Renaissance buildings in Oxford lately described by Mr. T. G. Jackson. Mr. Charles C. P., afterwards explained some of the difficulties which he had had to overcome in connexion with the Sheffield sewage scheme, and described the system of precipitation tanks which are in use in Bradford and Sheffield.

Edinburgh Architectural Association.—The usual fortnightly meeting of this Association was held in the Professional Hall, 20, George-street, on the 2nd inst. The President, Mr. Hippolyte J. Blanc, occupied the chair. After the preliminary business, a paper was read by Mr. J. W. Small, F.S.A. Scot., on "Old Scottish Woodwork."

ST. BARTHOLOMEW'S.

SIR,—I quite endorse your remark, at p. 798, on the almost suicidal arrangement of the choir-stalls, the chorists' seats, and the organ, mainly, because I fear the nave, as now restored, may prove too large for the permanent congregation; but also because of the great inlet of chilly air from unoccupied and damp story passages. Accepting the conditions of site as now standing, I further remark, (1) the organ might have been built into the recess of the north transept, over the archway at the crossing; (2) it would be desirable to shut off the remaining west end by a glass screen, with folding doors, enclosing within its shelter the font, at the west angle of the south transept wall. But, better still, the retention of the organ, under any conditions, at the west end, is now an anachronism, for I prefer to place it as near the altar as practicable; for this purpose, and here I tread upon dangerous ground, I would have opened the large bow-window which is built out on the face of the north wall, and constructed an organ over the vaulting of the north aisle: the carved organ-gallery might then face the opening, and be stained to harmonise with the ancient walling; at present, it is too bright.

I recommended that the choir west end might be screened off. It would leave a cosy church, and a vacant transept space could be enclosed for study and robing-room. I do not know what accommodation they have at present.

A MERE AMATEUR.

CORSEHILL STONE.

SIR,—Referring to Messrs. W. G. Wyatt & Co.'s letter in yours of the 4th inst. (p. 825), these gentlemen are in error in the denial they made.

It came to our knowledge during the construction of the Dispensary at Battersea that Corsehill stone was not being used.

We wrote to Mr. Thomas Lye, of High-street, Sutton, who was providing the stone and carrying out the masonry work for the said Dispensary, calling his attention to the fact. He called upon us and stated that he had used other stone in error, but that it had been supplied to him by a dealer, who had invoiced it to him as "Corsehill."

Unfortunately we could not sue this person for damages, as we are informed he has left the country.

Messrs. Wyatt say that some of the stone has been supplied indirectly by us. This may be so for a small portion, but the bulk is not Corsehill.

Will you permit us, through your columns, to state that we are the sole representatives of Corsehill stone for the South of England, and the only parties licensed to use the trade mark "Corsehill."

No Corsehill stone can be supplied to London and neighbourhood except through us.

Millwall.

JAMES TRICKETT & SONS.

The Student's Column.

STONE QUARRIES.—XXIV.

SANDSTONES (continued).

ISHPONDS QUARRIES.—These workings are near Bristol, and the stone obtained is known as "Blue Pennant." As this name indicates, the prevailing colour of the stone is blue, but occasionally it approaches a grey, according to position in the quarries. It is very compact, absorbing but little water, and is no doubt a durable material. It is largely used in the West of England, and examples may be seen at, amongst other places in Bristol, the Philosophical Institute.

Forest of Dean Quarries.—The stone coming from these quarries must be looked at from a general point of view, rather than from a specific one, because it is not of uniform texture, and as it comes from quarries some distance from each other, all being situated, however, in the neighbourhood of Coleford and Lydney, in Gloucestershire, in strata of Carboniferous age. The stone is in good repute in the West of England, and the demand has caused many people to start quarrying, mostly on a small scale, but whose operations form an important industry in the aggregate. It will be needless for us to mention these quarries in detail. The largest, show that there are at least three good beds of workable stone, and it would seem that the softer and coarser varieties are found towards the top of the workings, the finer kinds forming the lowest beds. We may also observe that the degree of hardness,—as shown by facility of working,—likewise increases, within certain limits, as the lower beds are reached, so that the top stone is more easily worked than the bottom. Both the middle and lower strata produce fairly good building material, and the blocks are remarkably large. The stone varies in colour from grey to blue, but the presence of iron causes it occasionally to assume a brownish tint. The blue rock is generally found at the base of the quarries. Forest of Dean stone exhibits the lines of stratification tolerably well, and should always be built up with those lines in a horizontal position. This is the principal matter to be attended to in using the stone; the lines in the more compact kinds can only be distinguished by masons in working, as they are sometimes otherwise rather difficult to detect. When it has been carefully selected, it is very durable, as is evident from that used in the churches at Stanton, Newland, and Mitcheldean, which has been exposed 400 years to the rather moist atmosphere of the district. These buildings are decidedly creditable to those who erected them, as far as their preservation is concerned. The stone must have been obtained from the better quarries, as the marks of the masons' chisels are even to-day very clearly seen on them. It has also been used for engineering purposes in the Cardiff, Newport, and Swansea docks; and for building Cardiff Castle and Barracks; the National Provincial Bank, Marlborough; several public edifices in Oxford; Eastern Castle, Witely-court, Doncaster, &c.

Other quarries in the carboniferous rocks are *Abercarn* and *Newbridge*, near Newport (Mon.), where the stone is of a dark bluish grey colour, and, besides being used locally, has been supplied for Newport and Cardiff docks;

Darley Dale or *Standcliffe*, near Bakewell, in Derbyshire, the colour being a light ferruginous brown, largely used in the Midland counties, at Birmingham and Nottingham; *Headon*, near Newcastle-on-Tyne, light brown stone, spotted with iron, occasionally with thin laminae of carbonaceous matter, much used in Newcastle; *Kenton*, also near Newcastle, the stone being raised in large blocks; and *Stenton*, near Durham, rather coarse rock, yielding large blocks, used in and around Barnard Castle. We cannot pass by the quarries,—six in number,—at *Longridge Fell*, Lancashire. The stone obtained from them is a medium-grained sandstone, of various tints of yellow and grey. Some of the workings are more than 100 ft. in depth.* The stone is said to weather well, and has been largely employed in the churches and public buildings in North Lancashire, amongst which Preston Town Hall may be mentioned. It has also been used at the Royal Bank, &c., in Liverpool.

The Permian formation, which overlies the Carboniferous, although largely made of sandstones, supplies, with a few exceptions, material for local buildings only. The principal reason why they are not more extensively raised is that, generally speaking, the stone is not pleasing to the eye, being dirty red or purple, much speckled. The spotted appearance at once shows that the stone is not very durable,—a fact borne out by its open and soft texture. Even where it is of little better quality than usual, the competition of the Carboniferous and Triassic sandstones keeps it, comparatively speaking, out of the market.

There are, however, a few notable exceptions to the above rules. For instance, along the valley of the Eden, near Carlisle, at *Peurith*, *St. Bees*, and *Corby*, the prevailing colour of the stone is red, and of good quality; whilst at *Furness*, North Lancashire, it also holds its own ground.

Next to Carboniferous sandstones, in point of importance, are those found in the Trias, or New Red Sandstone. As far as England is concerned, they are principally quarried in Cheshire, Shropshire, Staffordshire, Cumberland, and Lancashire. The Triassic formation is divided into two parts (in spite of its name), viz., the *Bunter* and the *Keuper* beds. Of these, the lower part of the *Keuper* is the more productive of good building materials, being remarkable in having rocks of fine grain, closeness, and uniformity of texture. We speak of them as being good in a comparative sense only; for, taken as a whole, they are not quite so durable and serviceable as the sandstones of Carboniferous age, whilst they are immeasurably superior in those respects to the ordinary Permian sandstones. The colour of Triassic stones varies from grey, yellow, and brown, to light and dark red. The following are a few of the more important quarries:—

Grinshill Quarries.—These are near Shrewsbury and comprise at least three large workings known respectively as the "Bridge," "Curoton's," and "Red" Quarries.

The top rock being flaggy, is manufactured into steps, setts, and kerbs. The white, perhaps, is the best kind of stone the quarries produce, being fine-grained. After it has been exposed to the weather for some time, it turns into a very light yellow tint, in addition to becoming harder,—a remark applying equally to all such freestones. It is easily worked, and from the character of its texture is largely used for ashlar and ornamental purposes. That known as the yellow stone is not unlike the white, except in colour, and is used for general work. The sandstone from the red quarry is stated to be even in texture and easily wrought.

The chemical analysis is about the same as most stones of this class, viz., 95.46 silica, 1.17 alumina, .61 carbonate of lime, &c. The stone appears to have been derived from a granitic area, and the alumina and part of the silica exist in the shape of felspar. Supposing it were otherwise, and the alumina existed with silica in its commonest form,—clay,—the material would be an argillaceous sandstone, and weather indifferently. As it is, Grinshill freestone is in good repute amongst London architects, and we think deservedly so, but the published chemical analysis does not show this. The microscope, however, does, as usual.

The results of Mr. David Kirkaldy's experiments as to resistance to thrusting stress of three 6 in. cubes of stone from the Bridge Quarry

* See Mr. De Rance, in Hall's "Building and Ornamental Stones," p. 249.

show as follows, the figures indicating the stress per square foot in tons, at the time the stones were crushed and the steel yard dropped:—

378.4 350.4 276.6

They appear to have crushed very suddenly. We prefer to take the lowest result as the actual outcome of the experiments, for reasons previously explained.*

Grinshill stone has been extensively used in public buildings, both ancient and modern, in Shrewsbury and the district, including Battle Church on Shrewsbury Battlefield. It has also been used in Manchester, Liverpool, Birmingham, Crewe, Wolverhampton, and London.

Hollington Quarries.—These are near Uttoxeter, in Staffordshire, and the stone is of a greyish-brown colour, though occasionally white. It is fine-grained, yielding blocks 30 ft. to 40 ft. square and 8 ft. thick. Examples of the material, built up, may be seen in the Town Hall, Derby; Meer Hall, Cheshire; Trentham Hall, &c.

Manley Quarries, near Dunham, in Cheshire, supply two kinds of stone, one of a light red tint, and the other white. Large blocks are obtained. It is strong grained, and said to be suitable for columns. Chester Cathedral is restored with it, whilst it has also been used at the Town-hall, Market-hall, and Castle in that city.

Other Triassic sandstone quarries are at **Colwick and Colton Hill**, near Rugeley, Staffordshire, where the stone, being soft, is suitable for fine work. It has been used in buildings and churches in the vicinity. **Ombersley and Hadley**, near Worcester, the stone being white, light brown, and reddish, and of good quality. The largest blocks are obtained from the lowest part of the workings. It has been used, amongst other places, in Worcester Cathedral. **Park Quarry**, Tixall, yields a light brown or greyish sandstone, micaceous in parts, and used in St. George's Church, Birmingham, &c.

Some of the better lower Triassic beds are quarried near Liverpool, and used in that city. This part of the series, however, is to a large extent unfit for building purposes, being in greater demand for mouldings and for ironworks and foundries.

The Jurassic beds produce but very little sandstone. The best-known quarries in the formation are at **Park Spring**, near Farnley, Leeds which (it appears) are nearly worked out; and **Aislaby**, near Whitby, Yorkshire. In both cases, they have supplied the locality with building material, whilst the stone known in the market as "Park Spring" usually comes from other quarries.

Wealden sandstone is worked in the neighbourhood of Tunbridge Wells. The stone, which contains much carbonate of lime, is fine-grained, and of a speckled brown appearance. It has been used in the Roman Catholic chapel and other buildings in Tunbridge Wells.

Cretaceous sandstones are few in number, the principal being at Godstone, Godalming, and Colley, in Surrey; and at Beer, near Axminster, in Devonshire.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

NOVEMBER 29.

By MASTERMAN, EVANS, & CO.
Rotherhithe—The moiety of a ground-rent of 391l. 1s. 6d., term 67 years, with reversion for three years to rack rent £2,175
Wanstead, Essex The Cottage and stabling, freehold 1,210

By WEAVER & GIBBS.
Strand—One-third share of 12, Houghton-street, freehold 810
One-third share of 9, New In-passage, freehold 100
Half-share of 18, Houghton-street, freehold 420
Keston, Kent—4, Leonard-place, 60 years, ground-rent 1l. 15s. 290

Merton—Freehold rental of 22l. 10s., reversion in 91 years 600
Ground-rents of 7l. 10s., reversion in 91 years 150
Five peppercorn rentals, reversion in 91 years 13

By W. HALL.
Paddington—42, Burlington-road, 73 years, ground-rent 12l. 700

By GRAVES & SON.
Brixton—42 to 56 and 58 to 76 even, Sankey-street, 91 years, ground-rent 78l. 4,800

By J. BLAKER & SON.
Greenhill, Havelock-place—Two freehold cottages 365

By T. TURNER.
Haverstock Hill—32, Prince of Wales-road, and improved ground-rent of 4l., term 54 years 760

By E. & H. LUMLEY.
Bucks—The Lilington Dayrell Estate, of 471a. 2r. 18p., freehold 30,100

* See the Builder, vol. 1, pp. 567, 561.

† See Hull's "Building and Ornamental Stones," p. 256.

By W. KNIGHT.
Hyde Park—16, Wilton-crescent, term 11 years £300
By HANDS & JENKINSON.
South Lambeth—2 and 3, Wyvil-street, 63 years, ground-rent 10l. 610
Wandsworth-road—1, Bradley-street, 51 years, ground-rent 4l. 200
Erith—The Britannia beer-house, and plot of land, 62 years, ground-rent 20l. 265

By ROBBY & FRERIE.
Stroud Green—127, Stroud Green-road, 77 years, ground-rent 8l. 7s. 6d. 575
55, Florence-road, 92 years, ground-rent 7l. 10s. 410
Finsbury Park—6, Cornwall-road, 90 years, ground-rent 7l. 10s. 400

By BROAD, PRITCHARD, & WILTHURNE.
Regent's Park—52, Gloucester-crescent, 76 years, ground-rent 7l. 520
Fulham—31, Fulham Park-gardens, 91 years, ground-rent 9l. 395

DECEMBER 1.

By MESSRS. CHOMY.
Camberwell—21 and 23, De Crespigny Park, 70 years, ground-rent 18l. 1,030
2 and 3, Claude-villas, 60 years, ground-rent 2l. 7s. 1,240
48, Goldharbour-lane, 26 years, ground-rent 9l. 350
Pinlar—42 and 43, Montpelier-street, 40 years, ground-rent 12l. 1,040

Chelsea—Ground-rent of 26l., term 16 years 220
Ground-rent of 10l. 10s., term 16 years 100

By CHARLES & TUNNS.
King's-cross—13, Euston-road, 20 years, ground-rent 18l. 13s. 965
Holloway—18 to 28 even, Hertford-road, freehold 2,490

By S. S. WALKER & CO.
Wandsworth—13, Park-road, freehold 780
9 and 11, Park-road, freehold 1,575
26 and 28, High-street, freehold 1,720

Blackfriars—14, Nelson-square, freehold 925

By C. B. MURRAY.
Lewisham—6 to 9, Springfield-avenue, 95 years, ground-rent 48l. 1,470
5, Gresham-villas, 95 years, ground-rent 6l. 195

DECEMBER 2.

By G. PRACE & SONS.
Leyton, Oliver-road—Rushon House, and three plots of land, freehold 850
Hoxton—7 to 10, Underwood-street, 13 years, ground-rent 12l. 510

By H. FIELDING.
Chelsea—100, Walton-street, 54 years, ground-rent, 7l. 705

By M. MILLS.
Lower Norwood, Norwood-road—Fern Lodge, freehold 1,180
New cross—Improved ground-rents of 32l. per annum, term 48 years 470
17, 19, and 21, Amersham-road, 46 years, ground-rent 10l. 7s. 6d. 415

Pinlar, Warwick-new—A, two-fold, stable, 43 years, ground-rent 12l. 140

By NEWSON & HARDING.
King's-cross—8, Derby-street, freehold 855
6, Liverpool-street, freehold 855

Holloway—2, Cardwell-terrace, 80 years, ground-rent 9l. 9s. 705
Canonbury—61, Grosvenor-road, 63 years, ground-rent, 8l. 8s. 625

Islington—36, Dean-street, 41 years, ground-rent 9l. 280
Stoke Newington—9, Millard-road, 88 years, ground-rent 5l. 10s. 280
Islington—187 and 189, Upper-street, copyhold 2,800

DECEMBER 3.

By BAKER & SON.
Kingland—107 and 109, Devonham-road, 32 years, ground-rent 1l. 760
Islington—33, Gordon-street, 39 years, ground-rent 6l. 155

Clarendon—6, St. John's-lane, freehold 840
Kennington—A profit rental of 61l. per annum, term 35 years 720
Essex, Telsley—The residence called The Limes, freehold 650

Enclosure of land, containing 6a. 3r. 38p., freehold 250
Finsbury Park—7, Alexandra-road, 57 years, ground-rent 12l. 12s. 250

Upper Tooting, Wandale-road—Two freehold residences 675
Berks, West Challow—The White Horse Manor Works, 1,000 years 280
West Hanny—Three freehold houses 165

MEETINGS.

MONDAY, DECEMBER 13.

Society of Arts (Lector Lectures).—Mr. Lewis F. Day on "The Principles and Practice of Ornamental Design," III. 8 p.m.

Liverpool Architectural Society.—Mr. J. M. Hay on "The Liverpool Cathedral.—What! Something more about it?" 7 p.m.

TUESDAY, DECEMBER 14.

Institution of Civil Engineers.—Discussion on Dr. John Robinson's paper on "The Electric Lighthouses of Macquarie and of Timor." 8 p.m.

Birmingham Architectural Association.—Mr. A. Reading on "Venetian Architecture." 7.30 p.m.

Manchester Architectural Association.—Discussion on the Proposed Charter of the R.I.B.A. 7.30 p.m.

WEDNESDAY, DECEMBER 15.

Society of Engineers.—Annual Dinner, 6 p.m.

Civil and Mechanical Engineers' Society.—Mr. M. A. Pollard-Urquhart on "Copper Production in the South of Spain." 7 p.m.

Builders' Firmans and Clerks of Works' Institution.—Ordinary meeting, 8.30 p.m.

Society of Arts.—Discussion on Dr. C. Meymott Tidy's paper on "Sewage Disposal." 8 p.m.

Royal Meteorological Society.—Five papers will be read. 7 p.m.

Liverpool Architectural Society.—Associated soirée at St. George's Hall, 8 p.m.

York Architectural Association.—Mr. A. Pollard on "Architectural Federation." 7.45 p.m.

THURSDAY, DECEMBER 16.

St. Paul's Ecological Society.—Mr. Somers Clarke F.S.A., will read a paper entitled "A Rambling Discourse on Churches, &c." 7.30 p.m.

Bradford Historical and Antiquarian Society.—Mr. Wm. Cadworth on "Old Bradford Lawyers." 7.30 p.m.

Edinburgh Architectural Association.—Mr. W. T. Aldrie on "An Architectural Student's Impression of Vienna and Berlin." 7.30 p.m.

FRIDAY, DECEMBER 17.

Architectural Association.—Mr. H. Lorgdon on "Decorative Metal Work." 7.30 p.m.

Institution of Civil Engineers (Students' Meeting).—Mr. C. E. Davenport on "Water-supply in Rural Districts." 7.30 p.m.

Edinburgh Architectural Association.—Annual dinner, 6.30 p.m.

Miscellaneous.

Archæology at Athens.—The Athens correspondent of the *Standard* telegraphs that the Minister of Public Instruction has granted permission to Mr. Penrose, Director of the English School of Archæology, to continue the excavations in the neighbourhood of the Great Temple of Jupiter Olympus at Athens.

Architectural Education in America.—The *Sanitary News* (Chicago) says that there are forty-eight students in the architectural department of Columbia University. Of this number fifteen are freshmen, thirteen are sophomores, ten are juniors, and six seniors. There are four post-graduate students.

The Leaseholders' Fund Corporation (Limited) is the title of a new company now in course of formation for the purpose of securing to owners of leasehold property, and others, the return of principal at the expiration of a fixed period, in the manner explained in the advertisement which appears in another column.

Machinery at the Smithfield Club Show.—There was a good representative collection of steam engines and other machinery at Islington this week, the exhibitors including Messrs. Barrows & Stewart, Clayton & Shuttleworth, Davey Paxman & Co., W. Eddington, Eddington & Stevenson, E. S. Hindley, Isler & Co., F. W. Reynolds & Co., E. R. & F. Turner, and other well-known firms. Ensilage appliances were well illustrated, and, with the specimens of English-grown tobacco shown at some of the always attractive seed stalls, came in for a large share of attention by the visitors.

Grindstones of Glass.—The German Plate Glass Company, of Freden, in Saxony, has just manufactured grind-stones of glass. A circular disc, 8 to 9 cm. in diameter, is furrowed on one side by means of diamonds, and then the grooves are cut with specially-made chisels. In order to make the stones as thick as necessary, cement is added to the upper surface. Several considerable orders have already been received for these new kinds of grind-stones, and the makers maintain that they will last twice as long as those now in use of granite, &c.

Liverpool Engineering Society.—The usual fortnightly meeting of this society was held at the Royal Institution, Colquhoun-street, Liverpool, on Wednesday, December 1st. The retiring president, Mr. Coard S. Pain, Assoc. Inst. C.E., delivered an address on the "Depression of Trade as affecting Engineering." After speaking of the difficulty in arriving at any satisfactory reason for the universal depression experienced, he proceeded to compare the present condition of the iron trade and that under which future trade would have to be secured. Statistics culled from the evidence given before the Royal Commission on Depression in Trade were quoted, showing the estimated consumption of iron per head of the world's population as well as the consumption by individual nations. The next table showed the various uses to which the iron raised in the world was applied, as far as could be ascertained, from which it appears that about one-fourth of the whole quantity raised is rolled into iron rails: hence the selection of the iron trade as that by which the position of engineering may be gauged. The prospects of this country as regards the future supply of railway plant, ships, &c., were then considered, followed by an inquiry into the cost of production. The interesting questions of natural resources, wages, royalties, railway rates, and food in the different countries were entered into, from which it was argued that, on the whole, Great Britain was not unfavourably situated for competing in the world's markets.

Society of Engineers.—At a meeting of the Society of Engineers, held on Monday evening, December 6th, at the Westminster Town Hall, Mr. Perry F. Nurey, President, in the chair, a paper was read on "River Pollution caused by Sewage Disposal," by Mr. G. B. Ferram. The author premised that it was well known that the Act for prevention of pollution of rivers and streams was ineffectual, and hoped that in the ensuing session, either by the extension of Local Government in counties or otherwise, greater powers may be obtained to restore the purity of the rivers, &c. The chief pollution arose, no doubt, from the influx into the rivers and streams of the so-called purified sewage from the many sewage disposal works, especially where chemical treatment is used. Owing to the daily varying quantity and quality of the sewage, it was not possible so exactly to proportion the supply of the deodorising agents as to ensure an evenly pure effluent passing into the streams. The fact that the effluent was at times charged with so much chemicals was in itself a presumed means of pollution of the rivers, as, owing to the presence of this excess of the precipitating agent, not only was the organic matter, which is present in all streams and rivers, precipitated, but also the excess of sewage that may have been present in the effluent that had been passed into the river some short time previously. To minimise this effect it was necessary to employ automatic machinery, whereby the variable flow of the sewage may itself regulate the quantity of chemicals to be used. A description was then given of the new Sewage Disposal Works at Walthamstow, where the principles held by the author had been put into practice.

British Archaeological Association.—At the meeting of this Association on Wednesday, December 1st, the Rev. Dr. Sparrow Simpson, in the chair, the completion of the operation of the old Tolhouse of Great Yarmouth was announced, the buildings being now used as a public library. The safety of a Roman Circular Tomb at High Rochester (Bremenium) was reported, but some others, square in form, have been demolished to obtain stone for agricultural purposes. They stood along the course of Watling-street. The formation of a Committee for the preservation of Old Croydon Palace was announced, and also the gratifying intelligence that funds have been subscribed sufficient to enable a lease to be taken for a short period. The demolition of the building for a time is thus averted, and it is hoped that some useful purpose may be found to ensure their permanent preservation. Dr. Alf. C. Fryer described the discovery of a vessel about 80 ft. in length, deeply embedded in mud, at the Catwaters, Plymouth. The craft is clinker built, of unknown age, having a quantity of flints in her hold. There do not appear to have been any masts. The chairman exhibited some portions of a Roman pavement recently found beneath the site of his former church, St. Matthew's, Friday-street, removed a few years since. The first paper was read by the chairman, and was entitled, "St. Vedast." Foster-lane was mentioned, and the change of the name of the lane from that of the saint was traced through various gradations. There is no reason for the latter part of the name, St. Vedast, *alias* Foster, by which the church is now known. The second paper was on the "Traders' Signs of Old London Bridge," by Mr. H. Syer Cuming, F.S.A. (Scot.).

Discovery of Church Remains in Norway.—We referred recently to the discovery at Thronthjem, in Norway, of some interesting remains of the old church of St. Olave, dating from the first part of the eleventh century, and which was burned down in 1531. Since then several other remains have come to light in and around the same locality. Thus, it has been found that the present town-hall is built directly on some of the walls of the former church. The foundations of several of the towers have also been found, and the bases of several pillars, all of which are clearly cut.

PRICES CURRENT OF MATERIALS.

TIMBER.			
	£. s. d.	£. s. d.	
Greenheart, B.G.	6 10 0	7 0 0	
Teak, E.I.	9 0 0	14 0 0	
Negundo, U.S.	0 2 4	0 2 7	
ash, Canada	3 0 0	4 10 0	
Birch	2 5 0	3 10 0	
do.	3 10 0	4 10 0	
do. Danzig, &c.	1 10 0	4 0 0	
do.	2 10 0	4 10 0	
Canada	3 0 0	6 0 0	

TIMBER (continued).			
	£. s. d.	£. s. d.	
Pine, Canada red	2 0 0	3 10 0	
do. yellow	2 5 0	4 0 0	
Lath, Danish	3 0 0	5 0 0	
St. Petersburg	4 0 0	5 10 0	
Wainscot, Riga	2 15 0	4 0 0	
do. Odessa, crown	3 5 0	3 7 6	
Deals, Finland, 2nd and 1st	7 0 0	8 0 0	
do. 4th and 3rd	6 0 0	6 10 0	
Riga	5 10 0	7 0 0	
St. Petersburg, 1st yellow	8 10 0	14 0 0	
do. 2nd	7 0 0	8 0 0	
do. white	7 0 0	10 0 0	
Swedish	6 0 0	15 0 0	
White Sea	7 0 0	17 0 0	
Canada, Pine, 1st	17 0 0	29 0 0	
do. 2nd	11 0 0	17 0 0	
do. 3rd, &c.	6 0 0	8 0 0	
do. Spruce, 1st	8 0 0	11 0 0	
do. 3rd and 2nd	5 0 0	7 10 0	
New Brunswick, &c.	5 0 0	7 0 0	
Battens, all kinds	4 0 0	12 0 0	
Flooring Boards, sq. 1 in. Pre-	0 9 0	0 13 0	
pared, first	0 7 6	0 8 6	
Other qualities	0 5 0	0 7 0	
Cedar, Cuba	0 0 3	0 0 3 3/4	
Honduras, &c.	0 0 2 1/2	0 0 3 1/4	
Australian	0 0 2	0 0 3	
Malagasy, Cuba	0 0 4	0 0 7	
St. Domingo, cargo average	0 0 4	0 0 7	
Mexican	0 0 3 1/2	0 0 4 1/2	
Tobacco	0 0 4	0 0 6 1/2	
Honduras	0 0 4	0 0 6 1/2	
Maple, Bird's-eye	0 0 6	0 0 8	
Rose, Rio	7 0 0	10 0 0	
Bahia	6 0 0	10 0 0	
Bet, Turkey	5 0 0	17 0 0	
Satin, St. Domingo	0 0 6	0 10 0	
Porto Rico	0 0 7	0 1 0	
Walnut, Italian	0 0 4	0 0 5	

METALS.			
	£. s. d.	£. s. d.	
IRON—Bar, Welsh, in London...ton	4 7 6	4 15 0	
do. do. in Wales	4 2 6	4 7 6	
do. Staffordshire, London	5 10 0	8 0 0	
Sheets, single, in London	6 15 0	8 10 0	
Hoops	6 0 0	7 0 0	
Nail-roads	5 15 0	6 10 0	
COPPER—			
British, cake and ingot	43 10 0	44 0 0	
Best selected	44 0 0	45 0 0	
Sheets, strong	61 10 0	52 0 0	
Chili, bars	59 7 6	40 0 0	
YELLOW METAL	0 0 4	0 0 4 1/2	
LEAD—			
Pig, Spanish	13 17 6	0 0 0	
English, common brands	13 2 6	0 0 0	
Sheet, English	14 0 0	14 2 6	
SPELTER—			
Silesian, special	14 10 0	14 12 6	
Ordinary brands	14 7 6	14 10 0	
TIN—			
Straits	101 10 0	0 0 0	
Australian	102 0 0	0 0 0	
English ingots	105 0 0	0 0 0	
OILS.			
Linseed	20 3 6	20 7 6	
Cocunut, Cochin	37 10 0	38 0 0	
Ceylon	26 10 0	0 0 0	
Palm, Lagos	24 0 0	0 0 0	
Rapeseed, English pale	22 8 0	0 0 0	
do. brown	20 15 0	0 0 0	
Cottonseed, refined	18 10 0	19 10 0	
Tallow and Oleine	25 0 0	45 0 0	
Lubricating, U.S.	8 0 0	19 0 0	
do. refined	8 0 0	13 0 0	
TERPENTINE—			
American, in casks	1 8 0	0 0 0	
Stockholm	0 15 0	0 15 6	
Archangel	0 10 6	0 11 0	

COMPETITIONS, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Designs for Jubilee Medal	Art-Union of London...	50l., 30l., and 20l. ...	Feb. 1st	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Sea Wall and Steps, and Cutting Cliff	Dawlish Local Board...	J. S. Delbridge	Dec. 14th	xviii.
Making-up Roads	Tottenham Local Board	do. De Pape	do.	ii.
Works at Infirmary	St. Leonard, Shoreditch	F. J. Smith	Dec. 15th	ii.
Granite Paving, &c.	Wandsworth, &c., Uta	T. W. Aldwinckle	Dec. 16th	ii.
Glazed Stoneware Pipes	Folkstone Corporation	A. W. Conquest	Dec. 18th	ii.
Building Durham College of Science	Newcastle-on-Tyne	R. J. Johnson	do.	xviii.
Sea Wall, &c.	Paddington Vestry Co.	Official	Dec. 20th	xviii.
Works, Repairs, and Alterations	Great Eastern Ry. Co.	J. Wilson	do.	ii.
Broken Granite and Flints	Southend Local Board...	F. H. Tulloch	Dec. 21st	xviii.
Pipe-Sewer, &c.	Greenwich Bd. of Wks.	Official	Dec. 22nd	xviii.
Stores and Materials	Nottingham Corporation	A. Brown	Dec. 23rd	ii.
Nine-Floor Granary	Bristol Corporation	J. W. Girdlestone	Dec. 26th	ii.
New Municipal Buildings	Sunderland Corporation	Brightman Binyon	Dec. 29th	xviii.
Outfall Sewerage, &c., Works	Barnet R. S. A.	W. H. Mansbridge	do.	ii.
Enlargement, &c., of Schools	School Bd. for London	Official	Not stated.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Superintending Architect	Met. Board of Works	1,500l.	Jan. 12th	xvi.

TENDERS.

CHICHESTER.—For sanitary improvements and works for the disposal of sewage, at the West Sussex, East Hants, and Chichester Infirmary. Mr. Mark H. Judge, architect, Paddington—

John C. Christie, Aldgate (accepted) ..	£715 0 0
CHISWICK. —For the erection of entrance-gates, fitters' shop, &c., at the Chiswick Depot for the West Metropolitan Tramways Company. Mr. H. I. Newton, architect, Queen Anne's-gate, Westminster—	
Foslin	£420 0 0
Wilkes & Co.	232 0 0
Bryant	243 0 0
Chafen (accepted)	215 0 0

DOVER.—For decoration of the principal room at Aldersham Park, near Dover, for the Trustees of the late Earl of Guildford. Mr. Robert Baker, architect, Messrs Karlake & Mortimer, quantity surveyors—

Croce & Son	£1,332 1 5
Collins & Lock	1,319 10 0
Simpson & Co.	977 0 0
Gillow & Co.	957 4 2
Cowtan & Sons	851 0 0

EARLEY (Reading).—For the erection of new schools, &c., for the Rev. C. R. Honey. Mr. W. Ravenscroft, architect, Reading. Quantities supplied by Messrs.

J. H. Margoties	£934 2 8
Higgs & Sons	925 0 0
S. East	905 0 0
G. Seale	850 0 0
J. Winter	850 0 0
J. Bottrill	812 12 0
J. C. Cook	784 0 0
W. H. Edwards	768 0 0

* Accepted subject to a few modifications.

GREENHAM (Berks).—For alterations and additions to old hall-houses (exclusive of floors), for Mr. William Skinner. Mr. James H. Money, architect, Newbury—

G. Elms, Stockcross	£230 0 0
S. Elliot, Newbury	325 0 0
E. James, Newbury (accepted)	313 0 0

HENDON.—For residence, for Dr. Cameron. Mr. Banister Fletcher, architect—

Hasby & Hodges	£1,799 0 0
H. J. Williams	1,600 0 0
J. P. Donne	1,350 0 0
J. Garrud	1,270 0 0
W. Toot (accepted)	1,150 0 0

HERNE BAY.—For the erection of four dwelling-houses, at Herne Bay, for Mr. D. C. Chambers, Mr. E. L. Elgar, architect, Ramsgate—

E. T. C. Adams, Herne Bay	£1,250 0 0
C. Welby, Herne Bay	998 0 0
J. Newby, Ramsgate	895 0 0
T. Corbridge, Whitstable	866 0 0
T. Elgar, Ramsgate	800 0 0
Regis & Coppen, Margate	799 10 0
C. Home, Ramsgate	785 0 0
W. W. Martin, Ramsgate	719 0 0
H. Miller, Ramsgate (accepted)	710 0 0

HOARSEY.—For paving, kerbing, channelling, sewerage, metalling, and making up Dickensons'-road, Crouch-bill, for the Hornsey Local Board. Mr. T. De Courcy Meade, engineer and surveyor—

Jackson & Sons, Finchbury Park	£311 0 0
Apinal & Sons, Hoxton	785 0 0
Pizzey, Hornsey	784 0 0
Mowlem & Co., Westminster	725 0 0
Nicholls, Wood Green (accepted)	705 0 0

HOXTON.—For underpinning and putting shop-fronts to No. 69, New North-road. Mr. Brett A. Biphica, architect, Tunbridge Wells—

E. Trill	£245 0 0
----------------	----------

KINGSLAND.—For alterations to No. 1, Kingsland Green, for Mr. W. A. Wigg. — Mr. Banister Fletcher, architect. —
 With Zinc With Fire proof Roof.
 H. J. Williams £258 0 0 ... £258 0 0
 Aldridge & Co. 198 0 0 ... 223 0 0
 Andrews & Roberts 198 0 0 ... 218 0 0
 J. Jarvis & Son 170 0 0 ... 197 0 0
 Steele Bros. (accepted) ... 198 0 0 ... 198 0 0

LONDON.—For the erection of warehouse, &c., Custom House Quay, Lower Thames-street, for Messrs. Cruckshank & Co., Mr. C. A. Richards, architect. Quantities by Mr. A. Howard. —
 J. Lidstone & Sons, Snow Time.
 Hill £2,171 0 0 ... 2 months.
 J. Woodward, Wilson-street 2,030 0 0 ... 2 months.
 N. Lidstone, Finsbury Park* 2,030 0 0 ... 2 months.
 * Accepted subject to modifications.

LONDON.—For shop-fronts, &c., at Queen-street, E.C. Mr. H. H. Bridgman, architect. —
 W. H. Lascelles & Co. (accepted) £937 19 6

LONDON.—For pulling down and rebuilding No. 12, Pantry-lane, E.C. Mr. H. H. Bridgman, architect. Quantities by Mr. F. Thomson. —
 C. Weeks £1,743 0 0
 Scrivenor & Co. 1,549 0 0
 E. Tomlinson 1,517 0 0
 Longmire & Barge 1,465 0 0
 H. Burman 1,418 0 0
 W. Brass 1,412 0 0
 North Bros. 1,398 0 0
 Collis & Sons 1,396 0 0
 Patman & Fotheringham 1,363 0 0
 J. R. Hunt (too late) 1,329 0 0
 Wall & Co. 1,310 0 0
 S. R. Lambie 1,293 0 0

LUTON.—For alterations to shop, for Mr. G. Alexander. Mr. A. E. Smith, architect, Luton. —
 Parkins £219 0 0
 Mardel 181 0 0
 Neville Bros. (accepted) 155 0 0
 [All of Luton.]

LUTON.—For erecting house, High Town, Luton, for Mr. Spickett. Mr. A. E. Smith, architect. —
 Cox Bros. £849 0 0
 Parkins 698 0 0
 Saunders 557 0 0
 Hodge 550 0 0
 Long 480 3 6
 Sinfield 438 0 0
 [All of Luton.]
 * Accepted, with additions, at 451l.

LUTON.—For building underground stores, for Mr. S. G. Hobbs. Mr. A. E. Smith, architect. —
 Saunders £275 10 0
 Pryor 260 0 0
 Neville (accepted) 190 0 0

LUTON.—For alterations and additions to the offices of the Luton Reporter. Mr. A. E. Smith, architect. —
 Without With Bay.
 Stone Bay.
 Rance Bros. £515 0 0 ... £525 0 0
 Neville Bros. 512 0 0 ... 593 0 0
 Parkins 485 0 0 ... 558 0 0
 W. Dunham & Son 480 0 0 ... 550 0 0
 G. Smart 477 0 0 ... 563 0 0
 J. Sinfield 460 0 0 ... 519 10 0
 G. W. Fryer 445 0 0 ... 469 0 0
 E. Ford 412 0 0 ... 465 0 0
 [All of Luton.]
 * Accepted, with additions, at 549l.

SIDCUP.—For re-making and re-metalling roads and footpaths, and other works, on the Longlands Park Estate, Sidcup, for Mr. G. P. King. Mr. R. Tomlinson, surveyor, Gunnersbury. —
 Road. Lake. Fencing. Total.
 J. Pizze, Hornsey £598 ... £125 ... £723 0 0
 E. Owen, Sevenoaks 385 ... 250 ... 635 0 0
 Cook & Son 320 ... — ... 320 0 0
 Rowland Bros. 299 ... 130 ... 429 0 0
 Penny Stratford 299 ... 130 ... 429 0 0

THATCHAM (Barks).—For proposed cemetery chapel, for the Thatcham Rural Board. Mr. James H. Money, architect, Newbury. —
 Omit vestry and shorten chapel.
 W. H. Simonds, Reading £905 0 0 ... £557 0 0
 E. James, Newbury 411 0 0 ... 344 0 0
 G. Elms, Stockcross 383 15 0 ... 341 0 0
 H. Botsford, Newbury 349 0 0 ... 321 0 0

TOTTENHAM.—For the construction of engine-house, engine foundations, boiler-house, chimney-shaft, flues, setting boilers, water-towers, and works in connection with the waterworks extensions, Longwater, for the Tottenham Local Board of Health. Mr. A. M. de Page, engineer. —

Cave & Son, New Barnet £5,768 0 0
 W. Downes, Waltham 4,563 0 0
 P. Hart, Tottenham 4,428 0 0
 Cook & Co., Battersea 4,322 13 1
 G. Bell, Tottenham 4,273 19 1
 Howell & Son, Lambeth 4,170 0 0
 W. Bell, Saffron Walden 4,071 7 4
 Wall, Chelsea 3,973 0 0
 Boyd, Mckinlay, Walbrook 3,895 3 10
 Wilkinson Bros., Finsbury Park* ... 3,648 0 0

For Engines, Boilers, Pumps, &c.
 Wanner & Son, Clipplegate £3,473 5 0
 Duncan-Stewart & Co., Glasgow 6,840 0 0
 Easton & Anderson, Whitehall-place 6,800 0 0
 T. Watson, Burton 5,900 0 0

Renshaw, King, & Co., Stoke-on-Trent 5,799 0 0
 Coalbrookdale Iron Company, Coalbrookdale 5,287 0 0
 Goddard & Massey, Nottingham 5,159 10 0
 Gimson & Co., Leicester 5,027 0 0
 Glensfield Iron Company, Kilmarlock 4,807 0 0
 Lilliehall Iron Company, Thosbail 4,784 0 0
 G. Waller & Co., Southwark 4,616 0 0
 Wood Bros., Sowerby Bridge 3,900 0 0
 H. Ainsworth, Dewsbury 3,640 0 0
 Thanet, Walker, & Co., Leeds (informal) —

* Accepted.
Schools, Eastbourne.—We are asked to mention that the tenders for this work were submitted by firms "All of Eastbourne," one of the competitors being Mr. James Longley, not Langley, of Crawley. The amount of Mr. Backhurst's tender was not £1,160l., but £4,012l. Messrs. "Dow & Son" should be "Dore & Sons" (accepted).

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 48, Catherine-street, W.C., not later than Four p.m. on THURSDAYS.

PUBLISHER'S NOTICES.

Registered Telegraphic Address, "THE BUILDER, LONDON."

CHARGES FOR ADVERTISEMENTS.
 SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE, AND GENERAL ADVERTISEMENTS.
 Six lines (about fifty words) or under 4s. 6d.
 Each additional line (about ten words) 6d.
 Terms for Series of Trade Advertisements, also for special Advertisements at front page of last issue, to be sold by Auction, &c. may be obtained on application to the Publisher.

FOUR LINES (about thirty words) or under 2s. 6d.
 Each additional line (about ten words) 6d.
PREVALENT IS ABSENTLY NECESSARY.
 ** Stamps must not be sent, but all small sums should be remitted by Cash or Registered Letter or by Money Order, payable at the Post-office, Government, W.C. to
 DOUGLAS FOURDRINER, Publisher.
 Addressed to No. 48, Catherine-street, W.C.
 Advertisements for the current week's issue must reach the Office before THREE o'clock p.m. on THURSDAY.
 The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, &c. left at the Office in reply to Advertisements, and strongly recommends that the latter COPIES ONLY should be sent.

SPECIAL.—ALTERATIONS IN STANDING ADVERTISEMENTS OR ORDERS TO DISCONTINUE same, must reach the Office before TEN o'clock on WEDNESDAY mornings.

PERSONS Advertising in "The Builder" may have Replies addressed to the Office, 48, Catherine-street, Covent Garden, W.C. Free of Charge. Letters will be forwarded if addressed and fee are sent, together with sufficient stamps to cover the postage.

TERMS OF SUBSCRIPTION.
 "THE BUILDER" is supplied direct from the Office to residents in any part of the United Kingdom at the rate of 19s. per annum. Foreign, to all parts of Europe, America, Australia, and New Zealand, 25s. per annum. To India, China, Ceylon, &c. 35s. per annum. Remittances payable to DOUGLAS FOURDRINER, Publisher, No. 48, Catherine-street, W.C.

AN EDITION is sent on THIS PAPER, for FOREIGN CIRCULATION, issued every week.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

W. D. & S. (list was printed substantially as received).—R. & G. (amounts should be sent).—W. F. (already received).—W. G. (corrected).—E. L. (next week).—E. G. (next week).—R. H. D. (next week).—F. T. W. G. (next week).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication. We are compelled to decline pointing out books and giving addresses.
 NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.
 He cannot undertake to return rejected communications.
 Letters or communications (beyond mere news items) which have been duplicated for other journals, are NOT DESIRED.
 All communications, including literary and artistic matters should be addressed to THE EDITOR; all communications relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

Colonial and Foreign Postage.—AN EDITION of "THE BUILDER" printed on this paper, for foreign circulation, is issued every week.

Best Bath Stone.
 CORSHAM DOWN, } SUMMER DRIED
 FARLEIGH DOWN, }
 BOX GROUND, COMBE DOWN.
 WESTWOOD GROUND.
 RANDELL, SAUNDERS, & CO., LD.
 CORSHAM, WILTS.

Bath Stone.
 BEST QUALITY OF ALL KINDS.

PICTOR & SONS,
 BOX, WILTS. [ADV.]

Douling Freestone and Ham Hill Stone.
 of best quality, in blocks, or prepared ready for fixing. An inspection of the Douling Quarries is respectfully solicited; and Architects and others are CAUTIONED against inferior stone. Prices, delivered to any part of the United Kingdom, given on application to CHARLES TRASK & SONS, Norton-sub-Hamdon, Ilminster, Somerset.—Agent, Mr. E. WILLIAMS, No. 16, Craven-street, Strand, W.C. [ADV.]

Douling Free Stone. For prices, &c., address S. & J. STAPLE, Quarry Owners, Stone and Lime Merchants, Stoke - under - Ham Ilminster. [ADV.]

Asphalte.—The Seyssel and Metallic Lays Asphalte Company (Mr. H. Glenn), Office, 36 Poultry, E.C.—The best and cheapest material for damp courses, railway arches, warehouses floors, flat roofs, stables, cow-sheds, and milk rooms, granaries, tun-rooms, and terraces. [ADV.]

Asphalte.
 Seyssel, Patent Metallic Lays, and White Asphalte,
 M. STODART & CO.
 Office:
 No. 90, Cannon-street, E.C. [ADV.]

MICHELMORE & REAP
 Manufacturers of

CHARLES COLLINCE'S PATENT.

COLLINGE'S PATENT HINGES
 LEVER, SCREW, & BARREL BOLTS
 and IMPROVED GATE FITTINGS of every description
 36A, BOROUGH ROAD
 DISCOUNT TO BUILDERS. LONDON, S.E.

TWELVE GOLD AND SILVER MEDALS AWARDED.
ZINC ROOFING.
F. BREY & CO.
 LONDON. ++ LIVERPOOL. ++ GLASGOW.
 VIELLE MONTAGNE SOLE MANUFACTURING AGENTS.
NO SOLDER. NO EXTERNAL FASTENINGS.
 Particulars on Application. Chief Offices:—352 to 364, EUSTON ROAD, LONDON, N.W.

The Builder.

Vol. LI. No. 2329.

SATURDAY, DECEMBER 18, 1886.

ILLUSTRATIONS.

Sketches in Tewkesbury Abbey.—By Mr. Rowland W. Paul	876, 877
Wesleyan Chapel, Schools, and Premises, Birmingham.—Messrs. Osborn & Reading, Architects	880-881
Additions to Sherwood, Tisbury Wells.—Mr. L. P. Crace, Architect	884
Mission Church, Moolborough.—Mr. John D. Webster, Architect	885
House at Hampstead.—Mr. Basil Fletcher, Architect	888
Congregational Church, Woodford.—Mr. Thomas Arnold, Architect	889

CONTENTS.

Canal and River Engineering	885	Additions to "Sherwood," Tisbury Wells	874	Chimney-Shaft for "Destructor"	893
The Liverpool Cathedral Competition	867	Design for Mission Church at Moolborough	874	Provincial News	893
Notes	868	Surveyors' Institution: The Title Question	874	Church-Building News	893
The Academy Prize Drawings	870	The Queen's Park Estate, Harold Wood	874	Stained Glass	893
Tests for Building Materials	871	House Drawings in London	881	The Student's Column: Slown Quarters—XXV.	894
The Dry Rot Fungus: Marulius Lachrymans	872	The Society of Engineers	891	Books: La Néropole de Myrina; Pilling's Order from Chanc	
Good Screen and Monument, Lullingstone Church, Kent	873	Architectural Societies	892	(Chapman & Hall)	894
West London School of Art	873	Copyright: Cox and Another v. Pardon & Sons and the General		Recent Patents	895
Sketches in Tewkesbury Abbey	874	Polishing Company	892	Recent Sales of Property	895
Wesleyan Chapel, &c., Corporation-street, Birmingham	874	Light and Air: Harris v. Brooks	892	Meetings	896
Residence, Hampstead	874	A Dispute as to Stone-Cutting Machines: Hall v. Burke	892	Miscellaneous	896
Congregational Church, George-lane, Woodford	874	Embossed Gables	893	Prices Current of Building Materials	897

Canal and River Engineering.



THE issue of a third edition of Mr. David Stevenson's valuable treatise* on this subject appears at an opportune moment, and confers additional significance, if such

were wanting, on the fact that the attention of the British public is at length seriously aroused to the necessity of re-establishing on an effective footing the existing system of water transport throughout the United Kingdom. The trading community are at present so heavily handicapped by the action of the railway companies in the unduly preferential rates given to foreign produce and manufactures, and by the great pressure which the railway interest brings to bear on the Legislature to uphold that action, that their only remedy lies in persistent and united efforts not only in insisting on modifications of existing tariffs, but in following the example of Continental countries in re-establishing a thoroughly efficient system of water lines which shall be worked on equitable and economical principles. Every agency, therefore, that will help towards a practical attainment of that end is to be welcomed.

Mr. Stevenson's book may be shortly defined as a treatise on Inland Navigation. Its scope is not confined to a description of artificial waterways only, but embraces every portion of the subject, from the simple barge canal to the great natural highways of rivers, ranging from their estuaries, through their tidal compartments, up to the highest navigable points in their courses. The chapters devoted to the treatment of the sea and tidal compartment, to the laws of tidal propagation and tidal currents, to the formation and removal of bars, works for the accommodation of vessels, and the reclamation and protection of land, teem with valuable information, the importance of which is enhanced by its being the outcome of close personal observations and recorded facts, on both which rests the basis of his treatment of the several problems discussed.

The heads under which Mr. Stevenson has divided his subjects are:—

1. Barge and Ship Canals.
2. Rivers, subdivided into (a) the "River Proper" Compartment; (b) the Tidal Compartment; (c) the "Sea Proper" Compartment.

* The Principles and Practice of Canal and River Engineering. By David Stevenson, F.R.S.E., &c. Revised by his son. Third edition. Edinburgh: Adam & Charles Black. 1898.

3. Works for the Accommodation of Vessels.
4. The Reclamation and Protection of Land; and
5. A few Remarks on the Crossing of Navigations by Bridges.

Though the main contents of this treatise have previously passed under review, yet it may not be amiss to revert again to a few of the more prominent questions discussed, especially in the light of the additional experience gained since the work was first written. The following remarks, made in the opening chapter, are especially timely, in serving to correct the erroneous impression which more or less still prevails as to the real extent to which canals are used at the present day. "Though all efforts to improve barge canals can never bring them to compete with railways in the quick conveyance of passengers, yet it is surprising to find in how many places they still command an enormous traffic in goods and minerals, and thus act as a valuable relief to over-burdened railways. This is especially the case in the manufacturing districts of England, where the Birmingham, Grand Junction, and other canals seem to carry on as brisk a trade as they did in days gone by, when they had no better competitors than the stage coach and the carrier's van."

The annexed table of the average freight per ton of wheat from Chicago to New York by water only, by water and rail combined, and by rail only, shows an advantage of 50 per cent. in favour of water conveyance:—

Year.	By Lake and Canal.	By Lake and Rail.	By all Rail.
	Cents.	Cents.	Cents.
1891	8 19	10 4	14 4
1892	7 89	10 9	14 8
1893	8 40	11 5	16 5
1894 Jan. to Sept.	6 60	9 75	13 0

In Belgium, the relative charge on canals worked by steam and on railways, is stated to be 284 and 483 of 1d. per ton per mile, or again nearly one-half less in the canal's favour. In describing the Languedoc Canal, with its hundred locks and fifty aqueducts, and its course of 148 miles carried over a summit level of 600 ft. above the sea, Mr. Stevenson observes, "It seems strange that Britain should not, till nearly a century after its completion in 1681, have engaged in vigorously following so laudable an example"; but, it is stranger still that a maritime nation should, after a lapse of two centuries, and with its prosperity built up by and mainly dependent on external water transport, and after having in olden days constructed some 4,700 miles of inland waterways, be still asleep to the necessity of re-modelling and perfecting those waterways so

as to adapt them to the exigencies of the present day.

One of the difficulties besetting canal engineering has always been the delay occasioned in overcoming differences of level, and various expedients have from time to time been devised to meet that difficulty. It has never been explained why the inclined-plane system, as modified on the Monkland Canal, where the boats are not wholly grounded on the carriage, but are transported over the incline in a caisson holding 2 ft. of water, and so are water-borne, has not been more extensively substituted for the ordinary locks; for it is far more quickly worked, a lift of nearly 100 ft. being accomplished in about ten minutes, which is quicker even than by the apparatus on the Weaver Navigation, where about 50 ft. of elevation is provided for by a single hydraulic lift of ingenious though expensive design, its cost having been 50,000l., or at the rate of 1,000l. per foot of lift. It is the principle of the inclined plane that Mr. James B. Eads has adopted for his projected Ship Railway across the Isthmus of Tehuantepec, in Mexico, where an elevation of 726 ft. above mean sea level has to be overcome, the steepest gradient being 1 in 100 and the total length 134 miles. Very strong objections have been urged by nautical men against Mr. Eads's proposal, but were the plan of floatation, in part or in whole, combined with the design, possibly those objections would be met. Another modification necessary to meet the special requirements of the present day is the substitution of steam haulage for that of horse or manual power. It is true that the improvement has been already introduced on several canals, but its full advantage and economy cannot be reaped so long as the canals themselves have not been remodelled for the passage of steamers. Where they have been so, as on the Aire and Calder Canal, for instance, the cost of transport, as stated in evidence before the Canals Committee, has been reduced to so exceedingly low a figure as one-thirtieth of a penny per ton mile. It is to be wished that while endorsing the great advantages of employing steam traction, the practical part of this question had been more fully treated by the reviser, and particulars afforded of the resistance of vessels from piling and friction at different speeds, of the relative advantages of steamers for hauling or for carrying cargo, and of the relative cost of the different modes of steam traction in this and other countries. It would have added, too, to the value of the treatise had some of the evidence given before the Canals Committee on these points been embodied in it.

In discussing ship canals, the author justly observes that the statement of railways having

so far superseded canals is not applicable to these large works, but that ship canals retain all their usefulness, while the Suez and New Amsterdam Canals have acquired an importance before unclaimed for works of this class. The effect of the Suez Canal in reducing the freights formerly charged by the Cape route, as evidenced in the following table, has not, perhaps, been fully recognised by the general public:—

Comparison of Rates of Freight by Suez Canal and Cape of Good Hope.

Calcutta to United Kingdom.	Article.	1831.	1882.	1883.	1884.
		s. d.	s. d.	s. d.	s. d.
Via Cape	Jute	85 0	45 0	37 6	30 6
" Canal	Jute	85 0	37 6	35 0	31 3
" Cape	Wheat	82 6	33 0	25 0	20 0
" Canal	Wheat	71 6	35 0	28 3	17 6
" Cape	Linsed.	87 6	45 0	37 6	30 0
" Canal	Linsed.	87 6	37 6	35 0	30 0
" Cape	Rapeseed ..	77 0	47 6	37 6	30 0
" Canal	Rapeseed ..	35 0	40 0	37 6	32 6

Ship canals are divided by Mr. Stevenson into four classes, of each of which he gives an example.

First. Canals traversing high districts, and surmounting the elevation by locks supplied from lakes and reservoirs, such as the Languedoc and Caledonian canals.

Second. Canals in low-lying districts carried on a uniform water level from end to end, like those in Holland, but defended by locks from inroads of the sea.

Third. Open canals, like the Suez, communicating freely with the sea at each end; and

Fourth. Dredged canals through estuaries or maritime canals, such as the Clyde below Port Glasgow, the St. Petersburg Canal, and the Lough Foyle Navigation.

Plates illustrative of each of these classes of works are given, as also particulars of their cost, from which it appears that the Caledonian Canal, sixty miles in length from end to end, and overcoming an ascent of 102 ft., cost 1,000,000*l.*, or at the rate of 16,666*l.* per mile: the Amsterdam Canal, 16½ miles long, but of very much larger sectional area and depth, cost nearly 3,000,000*l.*, or about 180,000*l.* per mile: the Suez Canal, 100 miles long, and 26 ft. deep, cost 20,000,000*l.*, or 200,000*l.* per mile: and the St. Petersburg Canal, 18 miles long, 275 ft. at base, and 22 ft. deep, which allows ships to pass direct to that capital, will, it is supposed, have cost 1,500,000*l.*, or at the rate of 83,333*l.* per mile.

Other ship canals are mentioned, such as the Panama and the Corinth Canal. The construction of the first of these two projects is now being watched with much interest, as a work of immense magnitude, and one involving considerable engineering difficulties, the surmounting of which can only be accomplished at a very heavy outlay. Mr. Stevenson states the estimated probable cost at 30,000,000*l.*, but if recent reports are to be trusted, the outlay is more likely to reach double that sum. An important point to be noted in connexion with these enormous undertakings is, in most instances, their remunerative character notwithstanding their great initial mileage cost. One other project is mentioned which, when carried out, will be scarcely second in usefulness to any yet executed, viz., that of making the Paumotu Straits, which separate the island of Ceylon from the mainland, navigable for the largest ships passing through the Suez Canal. This work which, it is believed, was advocated fifty years ago by Sir Arthur Cotton was in later years, under instructions by the Indian Government, inspected by Mr. G. Robertson, of Edinburgh, who selected a line where the distance from sea to sea is only two miles, and the ground a flat sandy plain, raised on an average about 7 ft. above high water, and where, judging from the borings that have been made, but little rock is expected to be met with. The cost has been estimated at 440,000*l.*, and as the canal will save 350 miles of exposed navigation in the direct Suez route to Calcutta and Madras, its execution can scarcely be long delayed.

In the chapter devoted to hydrometric observations, many curious and interesting anomalies in river tides are explained; amongst others, that which occurs in the Amazon, where the tide is said to extend against the stream for several days, and to penetrate to the distance of 200 leagues from its mouth, and where seven or eight tides with intermediate low waters follow each other in succession. A similar phenomenon occurs in the Thames on a small scale, the cause of which was explained by Dr. Whewell to arise "from the peculiar circumstance of the rivers having a tide compounded of two tides arriving by different roads after journeys of different lengths," in allusion to the two branches into which the tidal wave is divided on reaching the British shores, one of which flows up the English Channel, while the other proceeds along the west and northern coast of the country, and, flowing down the east coast, again joins the other branch.

The diagrams, compiled from several series of careful observations, showing the slope of the surface during flood and ebb on different rivers, and the degrees of parallelism at different stages of the tide, are very instructive, leading to the conclusion that "the deviation in parallelism decreases in proportion to the decrease in the rise of tide."

In treating of the discharge of rivers, and the modes and instruments employed in measuring it, the author gives the preference to the current meter. That instrument, however, has not been found to succeed so well in large rivers, like those in America and India; in fact, where great depths have to be gauged, its manipulation in a strong stream is very difficult, and in rivers charged with large quantities of silt in suspension, the action of the vanes is apt to be impeded. Notwithstanding the objections urged against float observations, engineers who have been employed in gauging the discharge of rivers of great magnitude have preferred the method used by Messrs. Humphreys & Abbott on the Mississippi, as well as their formula deduced therefrom; at the same time, it is quite true that that formula is by no means generally applicable. Mr. Stevenson's remarks as to the floods of rivers bearing no constant ratio either to the summer water which they discharge or to the area drained by them are correct; but it is doubtful how far his statement that "the only general result to be gathered from published observations perhaps being, that the flood discharge has a higher ratio to the ordinary discharge in small rather than in large rivers," is applicable to the rivers in South India, the summer volume even of large rivers there being often scarcely appreciable.

Chapter VI. is devoted to the consideration of the first of the divisions into which the author has divided the subject of rivers, and is occupied chiefly with a description of the Mississippi as given in Mr. Ellet's well-known report. One feature connected with its floods, that of the "peculiarly warped" form assumed by the surface from side to side and point to point, Mr. Stevenson thinks may be accounted for on the principle of "conservation of energy." The term "warped form" seems to be used to indicate the difference of level in the surface during flood observable on either bank; but probably the centrifugal action generated by the curves more or less found on every river of magnitude would produce an elevation alternately on either bank. There is, however, another curious phenomenon which is not noticed by Mr. Stevenson, and that is the varying transverse form assumed by the surface of rivers during the rise and fall of floods, a form which is quite apparent to the eye of a practised observer, and that is, the convexity of surface in rising, and concavity in falling floods,—phenomena all the more observable in proportion to the rapidity with which the flood may rise or fall.

Not the least valuable part of this treatise is that which deals with the phenomena of tidal propagation and currents, the explanations regarding which, based on many long and carefully-conducted observations, and illustrated by very clear diagrams, are given with great lucidity; and though experts may differ

as to the treatment recommended for tidal rivers, yet it is difficult to see how any difference of opinion can arise, and how any one can fail to realise the mastery way in which the subject is handled by the author.

In connexion with the improvements in the tidal compartments of rivers, some interesting data are given as to the cost of dredging. The impetus which the excavation of the Suez Canal gave to dredgers called forth the ingenuity of manufacturers, so that the effectiveness of those machines has been greatly increased, while the cost of excavation by their means has been simultaneously much reduced. The work performed on the river Clyde has perhaps been the most successful in this country. It appears that in the years 1882-83-84, 1,220,752 cubic yards were dredged from the river, and carried to Lock Long by steam hopper barges, and deposited there at a total inclusive cost of 48,533*l.*, or about 9-54 pence per cubic yard; the actual cost of excavating clay and sand in 1882-83, including interest and depreciation of plant, ranged from 3-6d. to 4d., but in the following year it averaged only 2-3d. per yard. The dredger at Lough Foyle worked still cheaper, the cost for excavation averaging only 2-18d., and the total expense, including conveyance for 10 miles, only 2-50d. The actual depth of the dredging in each instance is not given, but the Lough Foyle machine is capable of working in 35 ft. of water. One of the most extensive dredging works in operation is at the harbour and approaches to Baltimore, where the monthly excavations exceeded 500,000 cubic yards, and in six months 13 miles of channel were increased in depth from 24 ft. to 27 ft. for an average width of 250 ft., at a cost, on the average, of 18½ cents, or 9½d. per yard.

The most important chapter in the book is, perhaps, that in which Mr. Stevenson explains the instances in which his principles have been applied, and the results obtained therefrom, viz., on the Tay, the Ribble, the Lune, the Clyde, and the Tees. The description of the work which was carried on on the Clyde is particularly interesting, while the effect produced on the estuary of the Foyle is specially instructive, the depth of its channel having been increased 6 ft. 6 in. since 1853, while the tonnage of the port had increased nearly fourfold.

The explanation given as to the formation of bars at the mouths of estuaries may not, perhaps, commend itself to every one, but the arguments adduced certainly carry much weight; though, if we remember rightly, they do not coincide quite with those given by Captain Calver, who is likewise a great authority on the subject. The treatment of bars cannot be uniform, but each case must depend on the particulars of its surroundings. The mouths of the Danube, for instance, situated in a tideless sea, require of course to be differently dealt with from those of rivers debouching on the Atlantic or Indian Oceans. As might be expected, Mr. Stevenson condemns the idea and practice of trying to reclaim flooded lands in the tidal or sea compartments of rivers, as reclamation can very rarely be attained except at the expense of the navigation. He cites, however, certain instances in which such processes may be carried out without detriment, but the instances are necessarily very few.

The treatise is concluded with a short chapter on the crossing of navigations by bridges, which the author rightly considers should only be permitted with certain essential stipulations as to sufficiency of headway, width of opening, and suitability of position. He adds: "No one at present would propose to interpose a railway crossing and swing bridge between London and Greenwich." We trust not, but has not the Tower Bridge been sanctioned since those words were penned? Though certainly within the limits of London itself, yet the portion of the river between it and London Bridge has hitherto been considered too valuable a location for shipping to admit of its ever being invaded by the obstacle of a bridge. What guarantee, therefore, remains of the railway interest not finding some day a very urgent necessity for con-

necting the two lines now running along its banks by a bridge still lower down the Thames.

THE LIVERPOOL CATHEDRAL COMPETITION.

HIS report on the three designs, by Mr. Ewan Christian, long delayed on account of his temporary ill-health, has been now sent in to the Committee, who have at once, as it seems to us very unnecessarily and with questionable taste, made it public property through the medium of the Liverpool papers, in which it appears *verbatim*. Criticism by an eminent architect of the work of his contemporaries is a delicate matter in any case, and we should very much doubt whether the author of the report contemplated that his document should be treated as a public one. However, the cat is out of the bag now, so it is no use saying more as to how far the "propriety" of the Committee (as the German gentleman says in this week's *Punch*) ought to have extended in this direction; and Mr. Christian, we are given to understand, has acquiesced in the publicity after the fact.

Not that there are any very trenchant criticisms on any of the designs; what criticism there is, is expressed in a very moderate tone, as that of one desirous to say as little as possible to the detriment of any of the competitors. This fact, while it lessens the objection to publishing the report, makes it less interesting reading, no doubt, than it might otherwise have been, and also a less decisive guide to the Committee in their choice. In fact, one has to weigh and compare passages rather carefully to find out which design Mr. Christian really prefers. It does appear, however, at the close of the report, that he would recommend Mr. Emerson's design for adoption, although the previous portions of the report hardly prepare one for this conclusion.

In touching upon a few points in the report, we are glad to notice that Mr. Christian supports the selected site, as we have done previously, as being on the whole the best that has been suggested for the purpose, and one of which the advantages far outweigh the defects. On this point Mr. Christian observes:—

"There are those, I believe, who think that a striking position is all-important, and there are others who think that a cathedral should stand in a large open space, and that whether near or far away from the great centre of population is a matter of only secondary consideration.

The men of former ages rarely acted upon such views. Excepting St. Peter's at Rome,—the reasons for the comparative isolation of which are obvious enough,—and the cathedral at Pisa,—a great monument for which, with its adjacent buildings, open space was a necessity,—almost all cathedrals in large cities with which I am acquainted are to be found in the midst of the people they were intended to serve. The crowding round of houses and other buildings was little regarded, but the cathedral was a necessity of the daily life, and a central position was therefore of paramount importance.

That the cathedral church of a great commercial city should stand in the very heart and centre of that city is, to my mind, an axiom of the most evident truth and the very highest importance: that it should be a central gathering place for all classes, high and low, rich and poor; a place of resort for which, with its adjacent buildings, open space was a necessity,—almost all cathedrals in large cities with which I am acquainted are to be found in the midst of the people they were intended to serve. The crowding round of houses and other buildings was little regarded, but the cathedral was a necessity of the daily life, and a central position was therefore of paramount importance.

That the cathedral church of a great commercial city should stand in the very heart and centre of that city is, to my mind, an axiom of the most evident truth and the very highest importance: that it should be a central gathering place for all classes, high and low, rich and poor; a place of resort for which, with its adjacent buildings, open space was a necessity,—almost all cathedrals in large cities with which I am acquainted are to be found in the midst of the people they were intended to serve. The crowding round of houses and other buildings was little regarded, but the cathedral was a necessity of the daily life, and a central position was therefore of paramount importance.

That this site is one of difficulty cannot be denied; that it is capable of considerable improvement, if the municipality think fit to deal with the adjoining properties in a large and liberal spirit, cannot, I think, be doubted; and if a high-level roadway from Dale-street were at any time to be effected, an opportunity would be afforded of combining with a cathedral so placed all the best buildings of the city, and of making an approach such as very few cities could surpass. That all this is possible is, in my opinion, certain; whether it is probable is not for me to conjecture or determine."

Taking first Mr. Emerson's design, the report notes that there are three distinct

schemes:—A, No. 1, which treats the site as laid down; B, No. 2, which shows the nave lengthened one bay and encroaching beyond the western limits of the site; combining the design with the formation of a high-level street from Dale-street up to St. George's Hall; and C, No. 3, which is another variation, suggesting a different disposition of the buildings, but which the report passes over as of minor interest. In regard to Scheme B, Mr. Christian refers to it as "a legitimate suggestion," which, of course, it is; but it may be observed that the author has apparently taken trouble to call special attention to this form of his design, which is really inadmissible by the terms of the competition,* and we find that all the illustrations published in our pages, which were selected by Mr. Emerson as those he wished published, were of this design, which really goes beyond the limits of the site. This would not influence Mr. Christian, of course, nor does it affect the real merits of the design, but it is rather a piece of special pleading with the public as against the other competitors, who have kept within the lines of the site. The practical points which Mr. Christian notes in favour of Mr. Emerson's design are, a fine floor plan, with little obstruction for the congregation, good and well-designed approaches and entrances, and presumably good acoustic qualities (though the report seems to state this rather on Mr. Emerson's authority than as the assessor's own opinion). The practical disadvantages noted are want of sufficient space for clergy and choir, in which the design falls very short of the other two. In regard to design, we will endeavour to select and condense from Mr. Christian's own expressions:—

"As regards the exterior, taking the respective portions *separatim*, I would observe on the western façade that the general idea of breadth attained by placing the western towers outside the general lines is unquestionably good; and the idea of the open porch, adapted from Peterborough, is also good, but fails in effect, by reason of the want of mass, and flatness of the arches, as compared with the richer mouldings of its prototype. The simple dignity of the general front is marred by the unnecessary projection of the staircase turret on the western face of the south-western tower, which also overrides the boundary; and it is, I think, by no means certain that the steps shown in the larger perspective drawing, and which, under the present circumstances of the site, could not be had, would not be better omitted. There are, nevertheless, in this composition elements of a fine design, especially the details of it were modelled, rather on the best English than on foreign examples.

Taking next the north and south flanks, the centre portions suffer from want of boldness in the treatment of the roofs; the semicircular vaultings at what may be called the four corners of the great central feature, seem almost to demand domical coverings, but are treated with flats; and the transept roofs might be higher with advantage. The porches also would seem to demand more projection where practicable.

The eastern end of the building is less satisfactory than any other, by reason chiefly of the management of the roofs, which seem to have but little relation to the curves of the apses which add so much beauty to the plan.

All these points are, I think, capable of improvement.

As regards the great central feature of the dome, the outline is good; but the small gables shown would mar the general beauty of its form, and, as there is no real need for them, might be altogether omitted or changed for something of less projection. The great buttresses round the dome are constructed in the necessities; but there is no reason why their terminations should be ungraceful, and they are capable of being made things of beauty. The same might be said of most of the solid terminations of buttresses and pinnacles, which further study would doubtless considerably improve."

As regards the interior, I think the general lines are good, but there is much in the detail that requires further study; and I cannot but think that ancient English forms and practices are more suitable for an English cathedral than those which give the detail in which Mr. Emerson so largely indulges. I do not think the beauty of his design is increased, but very much to the contrary, by clothing the pillars of the choir with elaborate sculptures, which confuse the outlines, and detract from the simple dignity of the pillars. It is a practice almost unknown in England, and so far as noble work is concerned, in my judgment more honoured in the breach than in the observance. The main structural

lines of a church should be clear and unbroken, except by such minor banding lines as would not disturb the general harmony. Any amount of sculptured enrichments is admissible and interesting in subsidiary features, details of furniture, &c., but all main lines of structure should be clearly and strongly marked. Similar remarks would apply to some of the ornamental features over the intersecting arches in the dome, which do not improve the general effect. Notwithstanding these remarks on such ornamentation as I think out of place, there is remarkable beauty of design exhibited in several details to which such objections do not in any sense apply."

The general effect of this is, as will be seen on referring to the illustrations published in our pages (January 9 and January 23 of this year), that Mr. Christian admires the design as a whole, but objects to the greater part of the detail, and thinks it all capable of improvement; and we cannot say we differ from him on either head of the decision.

In speaking of Mr. Brooks's design, after observing that it is entirely confined within the lines of the site, and makes no suggestion for future developments, Mr. Christian notes, as the practical advantages of the building, a large extent of free and open area on the floor, ample doorways, the extra space of the triforium gallery (the real utility of which, however, he thinks may have been exaggerated), a large choir, and good vestry accommodation. The only practical defect distinctly noted is the rather insufficient size and circular form of the staircases to the triforium gallery. In regard to general architectural treatment, the only point Mr. Christian strongly condemns is the cutting up of the western façade by showing the sloping lines of the side aisles, and thus destroying the breadth and continuity of the whole. Here we certainly agree with Mr. Christian, and perhaps Mr. Brooks will, on further consideration. It may be more "honest" to show the raking lines on the façade, but honesty of this kind may be pushed too far, and certainly the finer effect is produced by continuing a horizontal screen wall to bind the whole façade together.* As to the slight differences in design in the two western towers, the main lines of which balance entirely, we cannot see why Mr. Christian should even glance at it as a defect; even a greater difference in treatment would have been quite in harmony with the spirit of Gothic architecture. Mr. Christian also finds the central lantern tower "disappointing." The placing of the two western towers clear of the main structure, so as to secure a great width of façade (also a feature of Mr. Emerson's design) Mr. Christian justly praises, as also the architectural effect, apart from any utilitarian consideration, of the before-mentioned triforium gallery; and speaking generally of the architectural character of the design, he says:—

"On the northern elevation the most striking and prominent feature is the transept, the treatment of which, with its fine portals, produces what is really a most beautiful composition, stately in outline, solid in structural lines, and rich in detail,—a piece of work pleasant to look upon.

The aisles are simple, and may possibly be deemed severe, but their treatment is characteristic and good, and the clerestory is well proportioned.

The eastern front calls for no special observations, and what has been said about the north will in great measure apply also to the south, but there are also some important variations.

Viewed as a whole, the design of the exterior is undoubtedly one of noble proportions, and vigorous and masculine character; but, having regard to the site, I cannot but think that the general structure is excessive in height.

As regards the interior, this remark perhaps would not so strongly apply, but it can hardly be doubted that the great height of the triforium is not attained without some sacrifice in respect of general proportions.

Mr. Brooks is of opinion that the acoustic properties of his church would be good, which I think probable."

Mr. Christian quotes at some length from Messrs. Bodley & Garner's report, in regard to their complaint of insufficient space; dissenting, however, from their views in this respect. He regards the plan as open to considerable practical objection, arising out of

* This was one of the points debated in a recent serious controversy between two amateurs, Canon Venables and Lord Grimthorpe, in the *Times*, in which, as we observed at the time, Lord Grimthorpe was in the right, as he often is—on paper.

the planning of the piers of the central octagon, and the amount of clear view which the piers intercept. Mr. Christian proposes that the cardinal arches of the octagon should be made larger than the others (as in the ground-story plan under St. Paul's dome); this would do away with some part of the practical objection, but it would effectually spoil the architectural beauty of the octagonal crossing. In the main arcades also, Mr. Christian evidently thinks there is too large an area of pier for the voids, and proposes that the number of bays should be diminished and the arches widened. This is also in accordance with practical convenience, while adverse to effect and to the spirit of Gothic architecture. But it is obvious that the whole object of Messrs. Bodley & Garner's design is to produce a fine Mediaeval building, not a practically suitable one; and it is noticeable that they alone among the competitors make no recommendation of the acoustic qualities of their design. Speaking of it architecturally, Mr. Christian says—

"As regards architectural character, the great central lantern over the crossing is the principal feature of the design, and this would undoubtedly give a most noble and impressive massiveness to the whole exterior. I cannot, however, but think that if the lantern were crowned by a finely-outlined conical roof, covered with lead, the effect would be grander than that produced by the spire and upper lantern,* which are not suitable to the subject, are not necessary, and would detract from the general breadth and power of the whole composition. Even a roof of low pitch would be better than the spire, which seems to be out of place on such a structure.

The western front, its towers, and spires are not worthy of the subject, and, considering the depth and spaciousness of the porches, the approach to them is hardly compatible with the grand character of the structure within. The architects have adopted a somewhat elaborate style of detail, the disadvantages of which in Liverpool were pointed out in the last clause of the instructions to architects. This might be in some measure, but not wholly, modified without inconsistency with the general principles of the design.

The flanks of the cathedral show a noble range of clerestory windows, the effect of which would be undoubtedly beautiful, but would almost demand a large expenditure on painted glass.

Both the transepts and the eastern façade are capable of improvement, and the morning chapel is somewhat insignificant.

As regards the interior, inside as well as out, the central lantern is, of course, the principal, and a very noble feature, but the general proportions of structure are good, and the height not excessive. The narrowness of the four main arches and of the arches in the nave arcades in proportion to the piers is, however, very evident when considering the general internal elevation."

In regard to cost, Mr. Christian does not see that any of the designs need exceed the stipulated cost, 300,000*l.* We hardly think the contractor for any one of the designs would get very much out of that sum.

The latter part of the report sums up the general question, and we can best give an idea of Mr. Christian's views in some extracts from his own expression of them. After remarking that these designs must, after all, be regarded only as preliminary studies (what do the authors say to that?) he continues:—

"That any one design in its present state is entirely satisfactory I cannot say, and I think the detailed criticisms given already will sufficiently show; but there is a further and larger question which must be faced, and that is, whether in any one of the designs can be found the church of the future most suitable for the cathedral of Liverpool? That it should be a church of grand proportions and noble form would, I imagine, be the general verdict of all good citizens; that it should have a spacious interior, well suited for the worship and teaching of multitudes, most would desire; and that it should be, like the church of Sta. Croce, at Florence, at once a place for grand religious teaching and for beautiful memorials of truly worthy citizens, might be a dream well worthy of realisation, but of which none of the designs can be said to have completely solved the difficulties.

Mr. Emerson has evidently attached much importance to the embellishment of the city by the striking and massive external proportions of his building, and it can hardly be questioned, but that, if translated into stone, notwithstanding the proximity of St. George's Hall, his building would bold its own, and be a substantial addition to its architectural beauty. . . .

Mr. Brooks has put before you a powerful and in

many respects very beautiful design, in the style of which he is an acknowledged master, but, as a whole, not so striking externally as it would be beautiful within. It is not free from faults which, though easy of correction, almost make one mourn their existence, compensated though they be by so many excellences; but I cannot avoid the conviction that his building, as a whole, would be too lofty for its position. The height of the general mass is really great even for an ordinary site, but for one so circumstanced as yours it would, in my judgment, be too over-powering for the surroundings. . . .

The design of Messrs. Bodley & Garner may be said to be more thoroughly English in character than either of the other two, and would, on the whole, produce a very fine church, of which the central lantern would be a notable and magnificent feature. . . .

Messrs. Bodley & Garner have also sent a drawing showing the original design by Sir Christopher Wren for rebuilding St. Paul's adapted to this site. Notwithstanding the great intrinsic beauty of that design as exhibited in the model, the plan was not one adapted to the requirements of worship as now understood; and although, as recorded, he was very reluctant to adopt the existing arrangement, one cannot but rejoice at the final determination which has given to posterity in the existing cathedral so glorious a monument of his unrivalled skill.

That was a preliminary study, and we see the final result. . . .

This last strikes us as a singularly odd conclusion. In the first place, Wren reluctantly abandoned his first design for a plan which was forced upon him; in the second place, his first plan appears to be precisely suited for what he intended it for,—a church for modern congregational worship. After this, Mr. Christian concludes, as we have said, by his expressed preference for Mr. Emerson's design, though accompanied by the remark that he would have preferred an English Gothic design if there had been a thoroughly satisfactory one. Mr. Christian occupies so much space in remarking on the defects of detail in Mr. Emerson's design that the reason for his preference is not very clear in the report; we have no doubt it arose from a tacit feeling that the design, of the three, was the best suited to its situation and surroundings. We do not suppose it will suit the specially "Church" party at all; and of course the report has the force of a recommendation only. We, from the point of view of a "trade journal," as the *Church Times* obligingly calls us, concur in the opinion in favour of Mr. Emerson's design, for these three definite reasons:—(1) That it suits the surrounding buildings best; (2) that the plan is best fitted for congregational worship; (3) that it is the most original of the three. But we are obliged to confess that we go quite as far as Mr. Christian in the desire for a thorough reforming and refining of the detail; a reform which, in fact, to produce a satisfactory result, would have to be carried out almost to the point of re-designing the building, in all but its leading conception.

NOTES.

IT was not to be expected that the promoters of the Manchester Ship Canal scheme would allow the reverse experienced in July last to damp their ardour, and, after their failure to raise the required capital on that occasion, they adopted the very sensible plan of appointing a "consultative committee" to thoroughly examine the prospects of the undertaking. This committee, under the presidency of the late Mayor of Manchester (Alderman Goldschmidt), was quite independent of the board of directors, many of the members entering upon the inquiry with adverse rather than favourable opinions as to the commercial soundness and practicability of the project; but their report presented on the 9th inst. shows that they are now unanimously in its favour. Although the report is not based upon the statements in the prospectus, the committee find that the estimates for construction, maintenance, &c., given in the latter, were ample; and, without making very extravagant statements as to anticipated dividends, they set forth clearly their reasons for being thoroughly assured that it would prove a profitable undertaking and remunera-

tive investment. Their inquiry has apparently been most exhaustive, the objections to, and weak points in, the scheme being specially considered, and the result should reassure hesitating speculators. A significant feature of the report is the recommendation to re-constitute and strengthen the board of directors before again inviting subscriptions. There is no doubt that the floating of an enterprise of this nature depends almost as much upon the manner in which it is placed before the public as upon its intrinsic merit.

"OUR Empire of Rivers" is the title of a pamphlet lately issued,* with a view to show, first, the consequences of neglecting the natural waterways of this country, in their diminished capacity through silting, and then the necessity for taking adequate measures to enable them to perform the duties originally allotted to them, but for which they are growing yearly more inadequate. The writer argues that owing to their beds having been allowed to rise, they have in many instances ceased to perform their particular function of drainage, and that, consequently, water which used to be in constant motion by flowing off to the streams which feed the rivers, now remains stagnant, and becomes a breeding-ground for pestilential germs. Our rivers, he argues, are either nearly empty or else overflowing, and he proceeds to advocate the planting and preservation of forests at their sources, which will act as reservoirs for the rain, and from which there will be a gradual filtration into the river streams; in fact, the great lesson to be learned is that, if we are to have rivers and streams about London maintained in a natural condition, we must re-afforest the high lands, and replant the river banks throughout the entire empire. The writer considers that an appeal must be made to Government for a Forest Act, and avers the necessity for immediately establishing a Department with power over our woods and forests, hills and uplands, and rivers, similar to that in India and other countries, but with greater powers. There is a good deal of sensible writing in the pamphlet, and therefore it is decidedly worth perusal, though probably many will be disposed to call in question some of its deductions. The author is Robert T. Cooper, M.A., M.D., of the London Homoeopathic Hospital.

THE Commercial Museum movement appears to be making rapid strides in more than one place on the Continent, and particularly in Belgium, which, small as it is, has a truer appreciation of commercial progress than any other country. The museum at Liège is to be divided into two sections, the first embracing articles of import, with a statement in each case of their origin, their price at the port of shipment, cost of transport, customs' duties, and conditions of sale. The second section will be devoted to articles in demand for foreign markets, with all particulars as to packing, &c. A museum is also to be established at Charleroi. Dresden is acting with great energy in the matter, and its museum already contains samples of almost every Saxon industry, to which no fewer than 250 manufacturers have contributed. The articles are intended for export, and it is hoped that the shippers of Bremen and Hamburg will be induced to co-operate largely. The Buda-Pesth Museum lays itself out more for the East; and in connexion with its operations it publishes a journal giving all information as to prices, transport rates and customs' duties, together with lists of liquidations and insolvencies in other countries. Even in such out-of-the-way places as St. Sebastian in the North of Spain, and Bahia in Brazil, permanent commercial museums have been formed. In connexion with this subject, we may mention that the French have started a system of floating exhibitions. The *Sarthe* is fitting out at Marseilles, and the *Château Léprieux* and *Château de la Roche* at Bordeaux, with the object of exploiting the West Indies and the northern coasts of South America. It behoves us to make a note of these things, and, more than that, to act upon them.

* Published by Mr. Whiteley, Westbourne-grove.

* We certainly concur with Mr. Christian on this point.

It is not often that we should feel inclined to take Russia as our pattern in her internal economy, although we cannot help thinking that what she is now doing in land reclaiming might certainly be done with equal success in Ireland. The Russian Government is now, and has been for some time, engaged in draining the Pinsk marshes, a district larger than Ireland, impassable for the size and number of its bogs, and covered with an impenetrable forest of undergrowth and jungle. Up to the present some four million acres have been reclaimed, and the programme of the coming year includes the drainage of 300,000 acres by means of 120 miles of canals and dykes. Upwards of 600,000 acres of bog are now good meadow land, while two million acres of the jungle have been brought into cultivation. The engineers certainly have not been slack in their endeavours, for they have built 179 bridges, sunk 577 wells, and surveyed 20,000 square miles. The amount of bog in Ireland would, of course, be child's play to the Pinsk marshes, but somehow we are always confronted with bog as the chief source of Irish difficulties. If its annihilation will pay in Russia, it ought to do so in Ireland, nor should we forget that an undertaking of such magnitude would bring immediate and constant work from the very outset to half the able-bodied population in the country.

THE recent report by Mr. Binnie, the Waterworks Engineer to the Bradford Corporation, on waste of water, will somewhat astonish water-consumers, who trouble themselves little about the matter unless a very dry season makes its appearance, and there are signs of scarcity. Then there is a great outcry against waste, and naturally so; but no reflection is ever given to the fact that the waste against which we have to guard is a constantly recurring evil, and one that cannot easily be prevented. The water-supply in one of the districts in Bradford, with a population of 81,000, was at the rate of 22·47 gallons per head per day. Mr. Binnie considered this far too much, and came to the conclusion that there was waste; and he introduced the system of subdividing the district into several smaller ones, each provided with Deacon's self-recording meters, which register on a diagram from minute to minute the amount of water passing through them. By gradually narrowing the area of the sub-divisions, it became possible to find out the sub-division, the street, and even the house where waste occurred. By means of this inspection the daily supply of 22·47 gallons per head was brought down to 14·35. Even then there seemed to be a waste, according to the meters' diagrams, of 5·35 gallons per head,—so that when all this was checked, it was found that the Bradford consumers really had only a supply of 9 gallons per day, with a full and constant pressure, and this without the slightest complaint or feeling of scarcity. In one year, therefore, 472,510,000 gallons were saved, representing to the Bradford Corporation a sum of £12,800 per annum. Other provincial towns have followed the same system. The general employment of a meter system of water-supply we have long been convinced is what must be looked to in the future, as the best means of checking waste, avoiding disputes, and allowing free use of extra quantity to those who wish for it, without wasting it on those who do not.

WE have received a pamphlet on "The Right to Lateral Support from Land and Buildings," by Mr. G. G. Gray, barrister. It is a discussion of seventy odd pages on the cases of *Lemaître v. Davies*, which decided that there is a right of support by buildings to buildings, and *Angus v. Dalton*, which was a still better known decision on the law of support. *Lemaître v. Davies* was decided at the end of 1881, and has not been, and does not seem likely to be, overruled. The decision in that case must, therefore, be accepted as an accomplished fact. Mr. Gray's discussion is, therefore, altogether academic. It is interesting, but it does not convince us that the decision in *Lemaître v. Davies* was wrong. Mr. Gray's work is altogether a legal treatise, and our readers are

interested only with the result of the case discussed, and but little with the legal grounds on which it is based. Mr. Gray observes that *Lemaître v. Davies* "has attracted but slight and inadequate notice." Although this journal is not a legal one, the case was carefully criticised in our number of March 11, 1882.

UNDER the title of "The Vital Statistics of the City of Glasgow," the Medical Officer of Health, Mr. James B. Russell, M.D., has published an elaborate system of tables. Their interest, other than strictly local, is chiefly due to the light they throw on the arguments which have been so stoutly alleged by the opponents of the measure proposed from time to time for the purification of the Clyde, to the effect that "the health of the citizens had not suffered, and though the smell was very offensive at times, it was not deleterious." These words were used by a speaker at a public meeting held at Glasgow, to consider the question of the purification of the Clyde, on the 9th of October last. The death-rate of Glasgow for the last six years has ranged between 25·23 and 26·90 per thousand; the density of the population in 1885 being eighty-nine persons to an acre. Out of twenty-four statistical divisions of Glasgow and its districts, however, the death-rate ranges from 16·1, for Kelvinhaugh and Sandyford, with a population of forty-six persons per acre, to 41·8 for Bridge Gate and Wynds, with a population of 207 per acre. The name of the latter district is suggestive of proximity to the Clyde. But the sanitary condition of Glasgow bears witness to that general neglect of the main requisites of healthy cleanliness, of which the state of the River Clyde is but an outward and visible sign. The general healthiness of site and climate is shown by the low rate of 16·1 in the first-named district. Increased density of population is a usual cause of increased death-rate, and something may be due to differences of level; but it is difficult to avoid the conclusion that much of the differential pressure of 25·7 per 1,000 is due to causes preventable by ordinary cleanliness.

AMONGST the minor proposals which the Metropolitan Board of Works will introduce into Parliament in the course of next Session is one to give them further powers in respect of the widening of Elm-street along its southern side, from Gray's Inn-road to Mount Pleasant; and another to provide that for all purposes of drainage and sewerage the now detached portion of St. James, Clerkenwell parish at Muswell Hill, shall cease henceforth to form part of the metropolis as by statute defined.

IT is curious to notice the "fits and starts" sort of sanitary policy which some Local Boards and Vestries carry out. The Hammer-smith Vestry, shaking off a torpor which was, perhaps, due to some extent to its municipal connexion with Fulham, has issued at one sweep nearly fifty notices to owners, requiring them to provide a suitable supply of water, and suitable water-supply apparatus to closets upon premises, pursuant to the provisions of the Metropolitan Local Management Acts; and to nearly forty owners, requiring them to provide suitable dust-bins. The same authority has issued a public announcement that notice must be given to the surveyor before any drain for the drainage of any premises is covered in, and that in default proceedings will be taken against the delinquents. These seem patent powers under the Metropolitan Local Management Acts, but in Fulham and Hammersmith they have been so seldom exercised that members of these Vestries even doubted whether they had the power to do what they propose now to enforce with so much newly-awakened energy. It goes without saying that a Local Board or Vestry is responsible for much bad sanitary work if it is ignorant of or has not used the powers of supervision which lay in its hands; and some of the metropolitan as well as suburban sanitary authorities are by no means free from this sin.

RECENT advances in science and changes in the administration of sanitary laws have certainly increased the duties of the sanitary inspector. There is a vacancy for this post with the Twickenham Local Board, the salary being 100*l.* per annum, and it would appear from the list of duties formulated by a committee that the official has not only to know something of drains and nuisances, and the laws referring to them, but of the management and diseases of cattle. The duties are detailed as follow:—(1) To perform all that may be necessary under the Public Health Act, 1875, in that capacity; (2) Inspector under the Canal Boats Act; (3) Inspector under the Contagious Diseases (Animals) Act; (4) Inspector under the Petroleum Acts; (5) Inspector under the Food and Drugs Act as far as possible; (6) Inspector under the Factory and Workshop Act (Bakehouses); (7) also under the Towns Improvement Clauses, so far as they refer to slaughter-houses. The candidate will be preferred who has a certificate that he has passed an examination, the nature of which is not pointed out. The spread of education and a fuller recognition than hitherto on the part of the public of the importance of maintaining good sanitary surroundings, will undoubtedly demand more extensive knowledge and skill than have been ordinarily thought sufficient for the requirements of the office; and sanitary inspectors will be more than human if they do not think that increased remuneration should go along with increased duties.

IT is a somewhat curious circumstance that although the Local Government Board permits Vestries and Local Boards to add to their advertisements for tenders for works, "The lowest or any tender not necessarily accepted," it not infrequently requires explanation as to why the lowest tender has not been accepted, when such is the case. Of course, good grounds should be forthcoming when the lowest tender is not accepted, or the compulsory rule to advertise for tenders would be simply a farce, and the act would be manifestly unjust to those who had taken the trouble to send in estimates. The central Board has just refused to sanction a loan to a suburban Local Board for the making-up, kerbing, and channelling of some roads until it has inquired into the circumstances which induced the Local Board to accept a tender which was higher than three of those sent in. The subject is one of considerable importance to contractors, and the decision and observations of the central authority are looked forward to with interest. The work was tendered for in three contracts; and the aggregate tenders of the chosen firm amounted to 7,238*l.* There were six lower tenders for one contract, and three lower for each of the others. If the Local Board had taken the lowest tender for each contract, the aggregate would have amounted to 6,293*l.*; and the three rejected tenders of three firms would have amounted respectively to 7,025*l.*, 6,819*l.*, and 6,314*l.* The firm whose tender was accepted was, no doubt, one which commands confidence; but no remark was made that the other competing firms were inferior in this respect. Some of the members of the Local Board, however, asserted that they had done only what they would have done had the job been one for themselves, and what they considered served best the interests of the ratepayers; but this kind of proceeding causes, at all events, much loss and apparent injustice to contractors, from whom we have heard many complaints about it lately.

THE *Eastern, Australasian, and South African Journal of Commerce*, in an article entitled "The Conservation of Ancient Buildings," laments the disappearance, or threatened disappearance, of bits of Old London, such as Staple Inn, and asks, "Why not reproduce in Australian or other colonial cities the charming streets, inns, and nooks peculiar to Old London, Chester, and hundreds of British provincial towns, but constructed on the principles of modern sanitary science?" Our American friends, it may be added, seem

to have half adopted the idea, for a street somewhat similar to the "Old London" of recent exhibitions at Kensington is about to be built on a plot of land in New York. Mr. George H. Birch, F.S.A., from whose drawings and under whose superintendence the South Kensington reproductions were made,—and than whom, from his special knowledge of old buildings, no one is more qualified for the task,—has been retained as architect for the New York reproductions, and he sailed for New York last week.

WHEN it is remembered how many of the conveniences and necessities of modern every-day life depend on indiarubber or gutta-percha, the growing scarcity and consequent ever-increasing price of these materials is a fact of sufficiently serious import. It is therefore gratifying to learn, through the journal of the Royal Agricultural Society of British Guiana, that the exports of the juice of the bullet tree (*Mimusops balata*) are increasing. This juice is a milk-like secretion, and resembles gutta-percha in some respects and indiarubber in others. Dr. H. Muller had submitted a sample to an indiarubber manufacturer, who said that he treated it as a superior kind of gutta-percha; but it would appear that it is a distinct substance from gutta-percha, being somewhat softer at ordinary temperatures and not so rigid in the cold. It also has the advantage of not becoming brittle when exposed to light and air, whilst the properties of insulating for electricity are said to be equal to gutta-percha. Balata has been known for the last twenty-five years, but it is only recently that it has grown into commercial importance. In 1882 the quantity exported was 105,112 lb., the price in the English market being about 1s. 3d. per lb. The industry of collecting the gum appears to be carried on principally on the Canje river, which falls into the estuary of the Berbice river between the Amazon and the Orinoco. The bullet tree reaches at times to a height of 120 ft., and has a large, spreading head. The trunk is 60 ft. to 70 ft. long, and 4 ft. to 5 ft. in diameter. The majority of the trees are, however, much smaller than this. Over how great an area the tree flourishes does not appear to be definitely settled; at any rate, the collectors do not go more than a two days' journey from the settlements.

A WATER-METER, constructed on Frager's system by M. Charles Michel, is described in the *Bulletin de la Société d'Encouragement* for 1886. The meter acts on the positive principle of direct measurement, there being two vertical cylinders side by side, with reciprocating pistons which have no rods, being deep enough to be self-guiding. Each one is fitted with two discs of indiarubber in contact with each other, the edges of which are spread so as to form a packing to make the pistons watertight. The distribution of water is effected by means of a chamber which is separated from the cylinders by a suitable partition. There are to each cylinder three ports, and to effect the distribution there is a slide-valve, worked by means of a valve-rod passing through a stuffing-box, so that this part of the arrangement is somewhat similar to an ordinary steam-engine. The middle ports serve for discharge, whilst admission is effected through those at the ends: the latter, however, are not in contact with the cylinders immediately beneath them, but with the adjoining cylinders, so that each piston actuates the valve of its neighbour. The pistons have each a trunk, and from these the valve motion is taken. When the piston is near the end of its up-stroke it strikes the valve-rod, causing it to travel a distance varying, in different-sized meters, between $\frac{1}{2}$ in. and $1\frac{1}{2}$ in. When the piston has nearly completed its downward stroke a projection on the lower end of the valve-rod comes in contact with the trunk, and the valve is thus caused to descend. In this way each cycle of operations consists of four alternate movements of the pistons, and four cylinderfuls of water pass through the meter. A head of 29.37 in. suffices to work

the apparatus, and the record is made by a ratchet-wheel in the usual way.

SOME tests have been made of the pumping-engines of the Mulhausen Low-Service Water-works, which are not without interest. These engines were constructed by the Alsatian Society, and are of the compound horizontal condensing type, with receiver. The pumps are connected directly to the piston-rods. The cylinders are 18.7 in. and 26.6 in. in diameter, by 39.37 in. stroke. The pumps are 9 $\frac{1}{2}$ in. in diameter, and of the same stroke. The tests were made under the superintendence of Mr. Walther Meunier, when the following results were recorded. Working pressure in boiler, 97 lb. absolute; revolutions, 27.42; piston speed, 180 ft.; and I.H.P. 65.1. The steam consumed per I.H.P. per hour was 16.38 lb., and the pumps raised 1,001,320 gallons of water per minute to a height of 183.44 ft., showing a power in useful work done of 55.64 h.p., which would be equal to 19,196 lb. of steam per unit of useful work. The efficiency would therefore be 85.3 per cent. At a previous trial the efficiency of the engine was found to be 89.6 per cent., and the efficiency of the pumps 95.2 per cent. These details are abstracted from the "Proceedings of the Institution of Civil Engineers," vol. lxxvi., p. 81.

WE called attention last week [p. 834] to the important discovery of the Leonidaion inscription at Olympia. This week the *Philologische Wochenschrift* (No. 50) reports the finding of a beautiful archaic head, worked in very low relief. It belongs to the time just before Pheidias. The subject, if conjectured, is not yet reported. It was found just outside the recently-discovered street of tombs, so in all probability it belonged to a funeral stele.

MISS HARRISON'S lectures on the Myths of Attica as illustrated in Greek vase paintings, of which we gave a summary in our last, are to be redelivered before the Association for Higher Education at Oxford.

AT their weekly meeting, on Friday, December 3rd last, the Metropolitan Board of Works resolved to make the following changes in the nomenclature and numbering of certain well-known thoroughfares. Charles-street, Grosvenor-square, to be, henceforward, Carlos-street, W.; Rochester-row, St. Pancras, to be incorporated, for postal and other purposes, with Rochester-road; Bolton-row, St. George's, Hanover-square, to be numbered in continuation of Curzon-street, and to lose its distinctive style; Great Vine-street, St. James's, Westminster, to disappear into Warwick-street; and Heddon-court, in that same parish, to be numbered with and merged into Heddon-street.

WHILE discussion has been rife as to what to do with the old baths at Bath, some one seems not to know what to do with the new ones exactly, inasmuch as an unfortunate labourer, William Mortimer, was killed by the fall of an arch there a few days ago. The matter is very briefly reported in the *Bristol Times and Mirror* of the 10th, from which it appears that the jury gave the following verdict:—"We find that the deceased, William Mortimer, met his death accidentally through the falling of an arch at the New Baths, owing to the east wall of the building not being of sufficient strength or thickness to resist the thrust; and the jury are further of opinion that it would be unsafe to construct another arch on the same wall. We agree to exonerate the contractors from all blame." This seems in effect to be a verdict against the City Architect. We are informed that the arch was a half-brick ring of 10 ft. 6 in. span and a little more than 3 ft. rise, backed on the haunches with concrete to the upper floor level, and that a 1 ft. 6 in. wall against which it abutted was pushed out, and the arch fell. What weight was on the arch beyond the concrete we have not been able to learn. Such an arch could hardly have pushed out a well-built 18-in. wall if carried up so as to

give a considerable vertical load above the springing of the arch; but with a "green" wall only up to the springing or thereabouts, we could well understand it. Without more detailed information as to the facts we abstain from decisive comment; but it appears from a letter in a Bath paper subsequently that the architect, Major Davis, said that "he would build it the same way again." If this is true, and seeing that a man has been killed, we presume Major Davis considers the blame is with the contractors. Something certainly wants explaining about the matter.

THE ACADEMY PRIZE DRAWINGS.

THE Architectural Travelling Studentship at the Royal Academy, which is naturally the one to which we are bound to give the first mention, has been awarded to Mr. E. H. Sedding. The subject is a design for "an entrance to a public park, with lodges and colonnade on either side." It is a pity that the words "and colonnade" were included in the specified subject, as this rather ties down the competitors to a certain form of architecture, and some of them might otherwise have suggested something preferable to "a colonnade," or, at all events, less hackneyed. The prize design, however, whatever else it is, is certainly not "hackneyed"; it has decided faults and anomalies, but these are redeemed by a very distinctive originality, and we concur in the award of the prize for this reason. The peculiar feature of the design is that, instead of a colonnade converging up to a central entrance, the author puts a flat screen, in front of his composition, bringing the lodges near together with a central gateway between them, and behind this he places a large elliptical court, surrounded by a double colonnade, its larger axis at right angles to the front screen, and with two arches at the further extremity, forming the real and final débouchement upon the park. This is by no means the way to treat an entrance. There is no sense or meaning in interposing this enclosure between the apparent and the real entrance to the park. The two arches forming the inner gateway from the court into the park are very odd in design, being formed of massive piers, one on either side, connected by a light arch like a piece of cross wall or flying buttress treated in a decorative manner, instead of a solid arch of the same depth as the piers. The tops of these arches, as well as of that which spans the outer gateway, are designed in scrolls in a kind of clock-case manner, looking, in fact, very like wooden construction imitated in stone. All this is very much open to criticism, but it, at all events, shows the effort on the part of the designer to think for himself and to do something different from what has been done before; and for this let him have full credit. The design numbered 323, in which a semicircular colonnade sweeps up on either hand to the central entrance, is a much more correct and more effective way of planning an approach of the kind, but the details of the design are only what can be easily got out of books, and not the best even in that category. No. 324 is a little more original, but the author has spread out his design too much laterally, thus getting the lodges at the extremity of it a great way from the real entrance. The iron gate, with figures worked into it, is designed with spirit.

The first of two silver medals (second not awarded) for measured drawings of architecture, is awarded to Mr. G. T. McCombie for drawings of the Henry V. Chantry in Westminster Abbey, which are very well and carefully executed, and in which his only competitor by no means disputes the prize with him.

The silver medal for the perspective drawing in outline (architecture) was given to Mr. Ayling for a clever drawing of a circular staircase in St. Paul's Cathedral, including, however, a greater angle than the eye can take in, and, consequently, appearing forced and unreal. The designs for the 25 $\frac{1}{2}$ prize for a set of drawings illustrating an architectural design are not of much account, that by Mr. Russell, to which the prize is awarded, is the best; and the treatment of the centre part of the elevation (it is a design for a court-house for a county town), with the broad archway for the public entrance below, and the more decorative story above, is good, but the lantern seated on the roof is terribly heavy and out of proportion. The architectural designs generally for this and the remaining

architectural prizes are hardly worth commenting upon specially, and are certainly below the mark of what we should expect to see among Academy students.

In sculpture the models from the life were of a high standard, particularly the set of three, for which Mr. Pegram obtained the prize of 50*l*. The subject for this year's ideal group was the Brazen Serpent. The scale of the models, we presume, regulated by the examiners, is smaller than on many previous occasions; not an improvement, to our thinking, for small scale modelling tends (as obviously in some of the present examples) to mere rough sketching of features instead of real modelling. The group, by Mr. Venner, to which the first prize of 30*l*. was awarded, has the defect of not emphasising the subject; two men struggling in contorted attitudes are succumbing to the serpents, and the one figure, a kneeling woman, who is looking towards the healing symbol, is quite in the background of the group and might even be overlooked. The second prize, awarded to Mr. Frampton for another group of the same subject, seems also rather doubtful; the group is finely and expressively composed but rather marred by a degree of archaism, and certainly not very carefully modelled in detail. Among groups that tell the story well and forcibly were those numbered 299 and 296, the latter especially, which seem to indicate a study of Flaxman's style of grouping and arrangement of line in subjects of this class.

A silver medal for a line drawing in perspective, "open to sculptors and painters only," we are glad to note was taken by a lady (Miss Gayton); the sex are seldom good perspectivists, and, indeed, painters generally are so often deficient in the perspective of their architectural subjects that it is well their attention should be specially drawn to this. The subject of this perspective study is the staircase of the Academy, as seen from the entrance-hall, and Miss Gayton's treatment of it seems perfectly correct and satisfactory.

The subject for the Armitage prize for a study for a figure-picture is this year, "Balaam blessing Israel," a very good subject, was well treated by Mr. Sidney Paget, who has deservedly gained the first prize. The other designs showed mostly an intention to make something of the dramatic contrast between the action of Balaam and that of the disappointed Barak, but in a curiously naive way mostly, and it was hardly surprising to find that the second prize was not awarded.

In the life-size cartoon studies of draped figures the prize was given to a very effective study of Moses, standing in a monitory attitude in front of the Brazen Serpent, by Mr. Bell, the figure being draped in one white garment, with a dark mantle depending from the extended arm, and half covering it. This is a fine cartoon, and the arrangement of the drapery seems really to help the expression of the figure, as drapery should. Of the designs for decoration for a public room, only two can be said to be decorative at all in the strict sense, 89 (to which the prize was awarded) and 92; the rest are merely pictures. No. 89, by Mr. Draper, is a bright composition of figures, illustrating "Spring" (the subject given), but the full-size cartoon of the central figure, a girl in long drapery, is rather uninteresting, and the face coarse in style. Of the others, 88, a ploughing scene, is a very pleasant picture in itself, and the cartoon of the ploughman good; and in 95 the cartoon of the lying goddess of spring is very good, perhaps the best thing in this set, but the composition generally is far too misty, and full of clouds, &c., to be suitable for decorative effect on a large scale.

The award of the Creswick prize puzzles as it has done before. The subject is "A Harbour at Low Tide," and the prize is given to Mr. A. T. Foster for a painting certainly showing some very good work in detail, but which is less than any of the others an illustration of the subject, which the author has really shirked, putting some craft in the foreground and looking up country for the rest of his picture. That by Mr. Rooke (honourable mention) is certainly a more genuine and effective treatment of the subject given; No. 11 may be referred to also as a painting with artistic feeling; and No. 5, by Mr. Carill (honourable mention), only wants some more force and reality of texture and local colour to be a very successful rendering of the subject. The prize for a copy of an oil painting was not largely competed for, and

went to Mr. J. D. Penrose, for a copy of a Richard Wilson. The copies, hung in conjunction with the original, were all very faithful in form and balance, but not one showed any resemblance to the tone of the original.

The following is the

List of Prizes and Prize Winners.

Landscap Painting, subject, "A Harbour at Low Tide," Creswick Prize, awarded to Arthur John Foster; *Praising Accesit*, Arthur Trevelthick Nowell; Hon. mentions, Bernard Rooke and Steven Briggs Carill.
Painting of a Figure from the Life, Silver medal, 1st, awarded to Henry Barrett Carpenter; 2nd, George Goodwin Kilburne.

Painting of a Head from the Life, Silver medal, 1st, awarded to John William Ferrin; 2nd, Fred. Henry Alex. Parker.

Copy of an Oil Painting, Portrait of Moliere (from the Dulwich Gallery), Silver Medal, 1st, awarded to Jas. Doyle Penrose; 2nd, Lancelot Ang. Pownall.

Copy of a Landscape, Italian Scene, by R. Wilson, R.A., Silver medal, awarded to Will. Geo. Wilson.

Cartoon of a Draped Figure, subject, "Moses with the Brazen Serpent," Silver medal and prize (25*l*.), awarded to Robert Anning Bell.

Design in Monochrome for a Figure Picture, subject, "Balaam blessing the Children of Israel," Armitage prizes, 1st (3*l*.) and Bronze medal, awarded to Sydney Paget; 2nd (10*l*.), not awarded.

Design for the Decoration of a Portion of a Public Building, subject, "Spring Time," Prize (40*l*.), awarded to Herbert Jas. Draper.

Drawing of a Figure from the Life, Silver medal, 1st, awarded to Alfred Ansell; 2nd, Fred. Sam. Beaumont.

Set of Six Drawings of a Figure from the Life, 1st Prize (50*l*.), awarded to Albert Starling; 2nd (25*l*.), Alfred Ansell; 3rd (15*l*.), Chas. Will. Bartlett; 4th (10*l*.), Geo. H. Sydney Cooper.

Drawing of a Head from the Life, Silver medal, 1st, awarded to Helen Sarah Squire; 2nd, Florence Helena Burgess.

Draw of a Statue or Group, Silver medal, 1st, not awarded; 2nd, Harold Plantagenet Mostyn.

Drawing of a Statue or Group, Prize (10*l*.), awarded to Alice Maria Dicker.

Perspective Drawing in Outline (open to Painters and Sculptors only), subject, The Staircase leading to the Exhibition Galleries, as seen from the Entrance Hall of the Academy, Silver medal, awarded to Anna Maria Gayton.

Model of a Design, subject, "The Brazen Serpent," 1st Prize (30*l*.), awarded to Will. Hy. Totterdale Venner; 2nd (10*l*.), Geo. Jas. Frampton.

Set of Three Studies of a Figure from the Life, 1st Prize (50*l*.), awarded to Henry Alf. Pegram; 2nd (25*l*.), Will. Goscombe John.

Model of a Figure from the Life, Silver medal, 1st, awarded to Will. Goscombe John; 2nd, Arthur George Walker.

Restoration of a Mutilated Antique Statue, The Torso (in the Royal Academy), Silver medal, awarded to John Rhind.

Model of a Statue or Group, Silver medal, 1st, not awarded; 2nd, John Rollins.

Model of a Statue or Group, Prize (10*l*.), awarded to Henry Chas. Fehr.

Design in Architecture, subject, Entrance to a Public Park, with Park-keeper's Lodge and Colonnade on either side, Travelling Studentship (50*l*.), awarded to Edmund Harold Seddon.

Set of Architectural Drawings, subject, The Chantry of Henry V. in Westminster Abbey, Silver medal, 1st, awarded to Geo. Thos. McCombie; 2nd, not awarded.

Set of Architectural Designs (Upper school), Prize (25*l*.), awarded to Sam. Bridgman Russell.

Set of Drawings of an Architectural Design (Lower School), Prize (10*l*.), awarded to Collis Campbell Wilson; Hon. mention, Charles Edward Mallow.

Perspective Drawing in Outline (open to Architects only), subject, The Staircase to the Library in St. Paul's Cathedral, Silver medal, awarded to Robert Stephen Ayling.

The Landseer Scholarships in Painting and Sculpture, of 40*l*. a year each, tenable for two years, given for the best work done in the examination for passing into the Second Term of Studentship, have been awarded:—In Painting, to Bernard Rooke and Henry Barrett Carpenter; in Sculpture, to Arthur George Walker and William Henry Totterdale Venner.

TESTS FOR BUILDING MATERIALS.

WITH a view to the simplification of the researches incidental to determining the relative merits of building materials, various technical bodies on the Continent have of late propounded and discussed schemes for the application of more or less uniform tests in such cases. These proposals have been framed with special reference to particular destructive influences to which the substances in question are liable to be exposed, amongst which may be specially noticed the action of soluble salts, the effects of frost, the influences of heat, air, rain, changes of temperature, &c., and, finally, the results of fire.

The presence of soluble salts is detected (according to Dr. Seger's proposal, submitted in 1885 to the Munich Commission) by the evaporation of a solution in a pulverised condition of the substances under investigation. These salts, it has since been remarked, may have existed in the clay from which the bricks, &c., have been made, or in the water used for softening, while it is also considered possible

* Disqualified, owing to having received the same Medal in 1883.

† Disqualified, owing to having received the same Prize in 1885.

‡ Disqualified, owing to having received the same Medal in 1884.

for them to have been introduced during the process of baking, by the presence of sulphuric or muriatic acid. It is thought more reliable to make these tests upon samples extracted from the internal portions of bricks, as the expulsion of the salts in question from such portions is more difficult than from nearer the surface. These salts are principally sulphates and metallic chlorides, the former being by far the most injurious. Tests for carbonate of lime, pyrites, specular stone, &c., are made upon the clay, as baking destroys these substances.

Porosity and resistance to frost have likewise given rise to exhaustive discussion; Dr. Seger's proposed tests including the capillary absorption of water during twenty-four hours, followed by total immersion. The specific gravity has to be defined, so as to afford a basis for calculating the proportion between the space of the pores and that occupied by the solid portion. The use of an ice-machine has been recommended as a substitute for immersion in a cold mixture, by reason of the large bulk to be tested, and in order to save time. A period of four hours at a temperature of 5° Fah. has been found sufficient to freeze the bricks thoroughly. The repetition of the freezing process ten times has been deemed sufficient, the subsequent application of tests for pressure being accompanied by similar tests of bricks which have not been previously subjected to the trials of freezing. The *Thomandustrie Zeitung* remarks, however, that to obtain in this way results of a definite character as to resistance against frost, it would be necessary to make more numerous tests than might generally be practicable or convenient.

The statements of Herr Bauschinger regarding the proposals of a Sub-Commission of the Munich Conference include detailed recommendations as to uniformity of size in samples of stone to be tested; the lateral length being about 22 in., on account of the difficulty attending the application of severe tests to larger samples. Comparative information should, it is considered, be furnished as to the quarries, and even the parts of them, from which the samples originate. The degree of dryness is understood to be that of constant weight. Gradual immersion in water is recommended to prevent the action of various influences which would result from sudden immersion, distilled water of 59° Fah. being used. The samples when saturated with water should be placed in a closed metal vessel in a liquid or mixture, kept during the four hours' trial at 5° to 14° Fah. The water is again applied when the process of freezing is over. The thawing takes place in air at 68° Fah. Regarding the effects of sun, rain, air, and temperature in general, it is admitted that experiments of a reliable character are not easily carried out, and hence it is suggested that the appearances which have actually been noticed should be recorded in a comprehensive form, as a basis for more detailed consideration of the subject.

It would seem that tests of resistance to fire have only of late formed part of the trials made at German testing establishments, this arrangement having doubtless been prompted by the action of the Berlin police in limiting the employment of granite supports. Comparative tests of Saxon granite have shown the following results as to pressure, the samples experimented upon being 2.36 inches in length and in width, the surface exposed to pressure being thus about 5.67 square inches:—

1. Air-dried, average of 10 trials...	15,287
2. Saturated with water, average of 10 trials	15,200
3. Frozen in the air (from 5 trials)	14,444
4. Frozen under water (from 5 trials)	15,014
5. After 8 hours exposure to fire	9,525

Herr Frangenheim, in the *Deutsche Bauzeitung*, remarks that these tests are deficient in practical value, from the fact that the sudden cooling of the heated stone which takes place in consequence of the application of water at fires is not represented in the experiments described, the importance of such a test for the stone used in staircases being specially advocated. His own trials have shown the rapid destructibility of basalt-lava stone (possibly by the expansion of the air in the crevices, &c.) under the circumstances indicated. He has also remarked that many descriptions of stone were injured by fire at the edges, while the internal

portions remained intact. Only in one instance (a sandstone with siliceous mortar) the sample withstood the influence of fire, even at the edges.

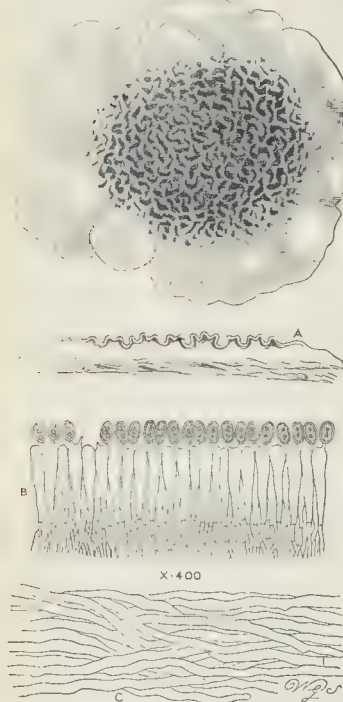
It has, however, been remarked that these tests (carried out at the instance of private individuals or official bodies) do not fulfil all requirements, and it is therefore suggested that the principal quarries should be inspected, with a view to samples of their products being examined and grouped together, with the assistance of the present testing establishments; central and local exhibitions bringing the facts thus arrived at within the reach of those whom they most interest. As an instance of the practical advantages to be derived from a more accurate knowledge of the properties of building materials, it is stated that German roofing slates are now considered fully equal to those of English origin, although some years ago it was officially stated that the latter were indispensable to the German building industry.

THE DRY ROT FUNGUS.

MERULIUS LACHRYMANS.

WE are indebted to the *Gardener's Chronicle* for the accompanying illustrations of the structure of this disagreeable form of vegetation, and from the same journal we extract the following remarks, which may be of interest to architects and builders who have to deal with it:—

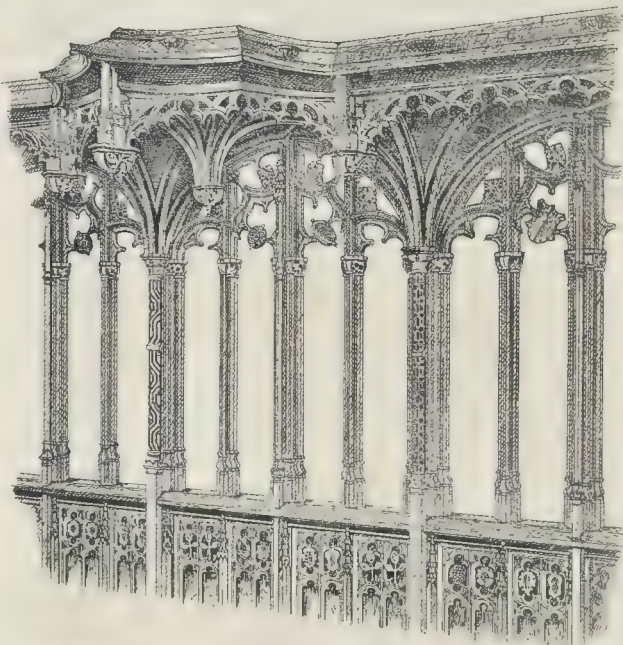
The dry-rot fungus is one of the most widespread and destructive of all fungi. It is especially common and well known on the squared timber of ill-ventilated buildings, and from dressed wood it will quickly spread to walls, whether built of stone, brick, or concrete. It will often grow through the mortar of a thick wall, and perfect itself on the bricks both outside



Merulius lachrymans (Deduct).

- A. View and section of part of fungus (natural size).
B. Wrinkled portion, magnified 400 diameters.
C. Interwoven tubes forming fleshy portion, similarly magnified.

and inside. We have seen it growing on damp concrete between the girders of iron fire-proof floors, and seen it spread from wood on to plate-glass, and perfect itself on the latter substance whilst drawing its nourishment from the wood. In wine-cellar it will spread from the wood-work and walls to the bins and even to the corks of wine-bottles. The mycelium of the



Red Screen, Lullington Church, Kent. From a drawing by Mr. Herbert Baker.

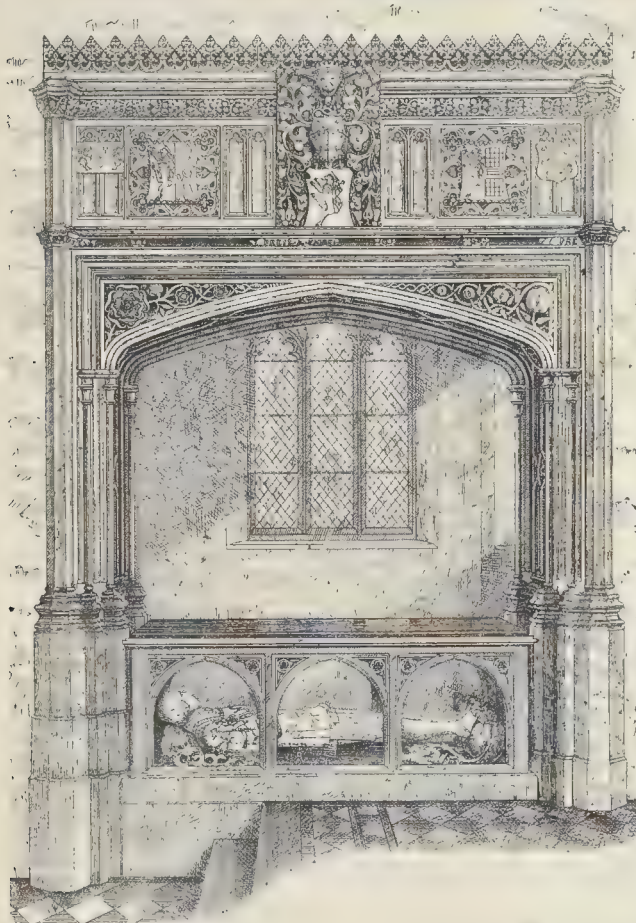
fungus will luxuriate between the cork and the neck of the bottle; a slight attack of this sort is said to make the wine "corky."

The dry-rot fungus prefers the squared unpainted wood of coniferous trees as a substratum on which to luxuriate, but we have seen it on polished mahogany, and it will spread from other woods to teak, and destroy tank-built ships. It is not uncommon on the fallen timber of pine woods, but, like some other plants, it has long been peculiarly associated with man and his dwellings. It destroys churches, houses, ships, bridges. It destroys sleepers, telegraph-poles, and many other objects. It must not be assumed, however, that the true dry-rot fungus is the sole depredator. There are twelve British species of *Merulius*, inclusive of *M. lachrymans*, and several of these appear at times in our houses. We have seen *M. corium* almost as destructive as *M. lachrymans*. In addition to the dry-rot fungi, it is by no means uncommon to find buildings destroyed by different species of polyporus, lentinus, and other fungi.

Merulius was so named by Fries on account of the shallow pores or wrinkles of the spore-producing surface, and *lachrymans* on account of the drops of moisture, like tears, which stand the fruiting surface of the fungus when growing in full vigour.

The upper part of the accompanying illustration shows a small plant of a dry-rot fungus; the circumference is white or livid in colour, and thick and fleshy. The whole plant is fleshy, and almost meaty when cut. The odour is very strong and mushroom-like. The livid rim consists of transparent interwoven fungus tubes and cells as illustrated enlarged 400 diameters at C; tubes of this nature and size also form the entire base of the fungus. The fungus cells or tubes break down the substance of the wood upon which they grow and transport the juices of the wood to the fungus for nourishment. The central part of the surface of the *merulius* is rich reddish-brown in colour and indented with coarse shallow pores or wrinkles, as illustrated in the upper figure. A reddish livid juice is exuded from all parts of this fungus; this juice stains every object with which it comes in contact. A section of the wrinkled surface is shown natural size at A. Every part of the reddish wrinkled surface produces spores, the same portion distils drops of moisture chiefly derived from the wood upon which the fungus grows. By breaking down the

substance of the wood and extracting its juices the timber is ultimately left in a state little better than dry sawdust or powder; hence the popular name of "dry rot," a curious name for a naturally wet or "weeping" fungus. If a very small fragment is cut from the wrinkled surface of an example of *Merulius lachrymans*, and a very thin transparent slice is then removed from the exposed surface and examined with a microscope, it will be seen, if enlarged 400 diameters, as at B. The coarse transparent tubes of the base of the fungus become much narrower as they gradually grow up towards the brown wrinkled surface, and in the latter position they support tall colourless cells or bladders as shown; each tall bladder throws out four minute horns or spore-supporters at its apex, and on each horn an oval spore of rich brown colour is borne, as illustrated. When the ripe spores fall from their supports on to damp wood in close confined air they germinate and throw out fine mycelial tubes, the tubes penetrate the sweating wood and soon produce a perfect dry-rot fungus by drawing from the wood the material necessary for the life and well-being of the fungus. The fungus continues to grow till the supporting timber is completely exhausted and reduced to tinder or dust; the fungus itself now perishes, but not before it has produced myriads of spores which have probably been carried away by currents of air to destroy other damp wood or wood in damp places. The dry-rot fungus will under favourable conditions attain a very large size; its dimensions appear, in fact, to be only limited by the size of the object or material on which it grows; we have seen huge thick growths, like large pancakes, a yard or more in diameter. As the growth of the fungus is as rapid as it is exhaustive, it follows that when dry rot once gets a footing in an ill-ventilated building the work of destruction is rapid and complete. Floors rot, roofs fall, galleries collapse, and window-sashes turn to powder and drop out. As the air of the infested building is full of dry-rot spores it is useless to replace old wood with new, for new wood merely supplies fresh food for the fungus. Sometimes improved ventilation is beneficial, but it is impossible to really cure dry rot, and almost if not quite impossible to stop its progress when once well started, as the fungus is always ready to invade various other materials in addition to wood. To keep well clear of dry-rot its attacks should be prevented.



The Tomb of Sir John Peché, Lullingstone Church, Kent. -From a Drawing by Mr. Herbert Baker.

ROOD SCREEN AND MONUMENT, LULLINGSTONE CHURCH, KENT.

THE monument and rood-screen from Lullingstone Church, Kent, here illustrated, were specially referred to in our pages a few weeks since, in a review of the last number of the *Archæologia Cantiana*, page 755, ante. The illustrations are reduced from drawings by Mr. Herbert Baker.

WEST LONDON SCHOOL OF ART

THE annual presentation of medals, prizes, and certificates to the students of the West London School of Art took place at the school, Great Titchfield-street, last week, there being a very large muster of the students and their friends. The walls were covered with a large number of the works executed by the students during the past year.

Mr. G. A. Thrupp occupied the chair, and opened the proceedings by expressing his regret that Mr. P. H. Calderon, R.A., who had shown great interest in the work of the students, and who had promised to distribute the prizes, was suffering from illness, and was unable to attend. He then called upon Mr. G. G. Simpson, the Head-Master, to read the annual report.

The report stated that in no previous year of its existence has the school attained anything like the success of the past year, in prizes, examinations, and grant in aid. 812 students attended the classes,—119 in the morning, and 193 in the evening. The school fees

amounted to 834l. 14s. 4d. The claim of the school upon the Government for payment on results, in aid of the school, is 447l. 17s. 3d. In the Second Grade or elementary examinations in freehand and model drawing, geometry, and perspective, twelve students obtained full certificates for passing in all four subjects; twenty-one students gained the mark Excellent, and sixty papers were marked Pass, making a total of eighty-one successes, and being a percentage of nearly twenty-six against twenty-three for last year. In the Third Grade or advanced examinations in drawing in chalk from the living model, the antique, ornament and geometrical models, in painting from still life and ornament, in designing figure and ornamental composition, in questions on the elements and principles of ornament, in perspective (theory and practice), in anatomy of the human figure, in elementary architecture, and in outline drawing from casts of ornament, eleven students gained Excellent, 63 Good, and 18 Fair, making a total of 92 successes. Seven students, Georgina Barber, Edwin Holder, Elizabeth Laker, Emily Mitchell, Mary P. Parry, John W. Parsons, Arthur Balliol Salmon, were successful in obtaining this certificate,—more than double the number recorded in any previous year. The total number of works sent in to the Science and Art Department by all the schools in the kingdom (227) for examination this year was 324,815. The students of the West London School contributed about a hundredth part of that quantity, and received one-twenty-seventh of the entire number of prizes given. In the National Art Competition the percentage of awards was the same as in

1884, viz., 4½ per cent. It is the highest percentage obtained by this school. This year it is made up as follows:—One gold medal, one silver medal, four bronze medals, and eight Queen's prizes of books. The percentage of Third-Grade prizes gained by the students is very much in advance of any former year; the highest previous record being in 1884, when 14 per cent. of the students gained prizes, as against 18½ per cent. this year, fifty-eight prizes being awarded. Five students,—Minnie Aumonier, Charles J. L. de Beaupré, Agnes Guest, Florence Hannam, and William H. Woodall,—were awarded Government Free Studentships for the excellence of their year's work. These studentships are tenable for one year. Two students,—H. B. Matthews and Alfred C. Weatherstone,—gained each a National Scholarship of the value of 52l. a year, and tenable for two years. These scholarships were created by the Government "to enable advanced students, who may have given evidence of special aptitude for design, to prosecute their studies in the Training School and South Kensington Museum." The Travelling Studentship of the Painters' Company, of the value of 50l., was this year awarded to C. J. L. de Beaupré, for the colored decoration of a vestibule.

Mr. Thrupp, prior to distributing the prizes, delivered an interesting address to the students, in which he pointed out that art schools were established in 1837 more especially for furthering the artistic education of those engaged in manufactures, or who looked forward to entering pursuits where the knowledge of painting and drawing would be of importance. Their object was to educate the artist by instructing him in the technical part of his work by training the eye to clearly and correctly see, and the hand to execute that which the eye saw in due proportion and symmetry. He regretted, however, that advantage had not been taken of them in the metropolis as they had hoped by those classes for whom they originated and supported these schools, viz., those by whom artistic works were and are actually designed and manufactured. There was one quality necessary to the designer,—imagination,—which could not be secured, and could only be partially assisted, by the course of study pursued there. A true artist must create, not simply copy. In France, where the artistic education of the workman commenced much earlier than in this country, clay statuettes and graceful groups in bronze, truly artistic in character, were produced; and why should not such work be produced here, instead of being chiefly imported? Were our workmen trained to the decoration of ceilings and walls in a manner equal to foreigners? If not, was it because our artists confined themselves to the execution of paintings to be hung upon walls? Mr. Thrupp concluded by advising the students to avail themselves to the utmost of the advantage of the libraries in that institution and at South Kensington; and then proceeded to distribute the prizes, which included the following:—Bronze medal, for tempera paintings of figures from the antique, awarded to Henry E. Tidmarsh; bronze medal, for water-colour painting of drapery arranged on the antique figure, to Leonard F. Wyburd; Queen's prize, for design for a wall-paper, to George Fayers; book prize, for excellence in advanced perspective, to William H. Woodall; prize for building construction (advanced stage), to Charles Bryant.

Votes of thanks to the Head-Master and his assistants, to the Chairman, and to Mr. C. A. Hindley, the hon. sec., terminated the proceedings.

Surveyorship, Willesden.—At a meeting of the Willesden Local Board on the 14th inst., it was unanimously agreed that the salary of Mr. O. Claude Robson, Surveyor of the Board, be increased from 500l. to 700l. per annum.

New "Salvation Army Barracks" were opened last Monday at Tunbridge Wells. Seating accommodation is provided for 900 persons. The total cost, including 200l. for extra foundations which had to be put in, owing to the nature of the ground, to a depth of 23 ft., was 1,500l. The site, costing 300l., was given to the "Army" by the Misses Wells, of Tunbridge Wells. The front elevation, we are informed, "is designed in the Jacobean style, with a modern feeling." Mr. F. J. Cozhead, of Leytonstone, Essex, was the builder, and the architect was Mr. E. J. Sherwood, of 101, Queen Victoria-street.

Illustrations.

SKETCHES IN TEWKESBURY ABBEY.

THESE two illustrations, reproduced from pencil sketches by Mr. E. W. Paul, represent two tombs in Tewkesbury Abbey Church. Of their history we believe nothing is known. They are given here as examples, in the first place, of very good sketching, and as interesting specimens of a certain type of monument, in two late and closely-connected phases of Gothic style.

WESLEYAN CHAPEL, &c., CORPORATION-STREET, BIRMINGHAM.

We give an illustration of this building, the design for which, by Messrs. Osborn & Reading, was selected in a limited competition. The buildings include on the ground-floor fronting Corporation-street two large shops, with basements under, and a smaller shop with basement in the Lower Priory. The inclination in the adjoining streets admits of a level entrance from Dalton-street to the basement of these shops. The principal entrance to the chapel premises is in the centre of the Corporation-street front. The general disposition of the buildings is sufficiently shown by the plans. The chapel will accommodate 800 persons.

The whole of the first floor and staircases are constructed with fire-proof materials. Separate staircases are provided for the hall, so that it may be used independently, one at the corner of Dalton-street and Lower Priory and the other from Dalton-street. The materials used in the elevations are Darley Dale stone on the ground or shop storey, with red brick facings and Corsham Down stone in the upper storeys, the high-pitched roofs being covered with red tiles. The work is being carried out by the contractor, Mr. John Bowen, under the direction of the architects.

RESIDENCE, HAMPSHIRE.

This house is now in course of erection in the Chislett-road.

The exterior walling is executed in picked red facings, with Bracknell rubbers, the stonework throughout being Portland. Broseley tiles are used for the roof.

The builder is Mr. Mansbridge, Kilburn, and the architect is Mr. Banister Fletcher.

CONGREGATIONAL CHURCH, GEORGE-LANE, WOODFORD.

This church occupies a good site in George-lane, not far from the station of that name on the Great Eastern Railway.

The plan consists of nave and aisles, apsidal choir, and transepts. At the principal front is the tower entrance, large vestibule and retiring-room, while at the opposite end of the church is the organ-chamber, class-room, vestries, heating-chamber, and other accommodation. The church is seated for 604 persons on the ground area, exclusive of end gallery.

Externally the walls are built of Kentish rag, in closely jointed and level random courses, with dressings in Bath stone. The roofs are covered with red Broseley tiles.

In the interior stone is largely used. The pillars of the arcade have their bases to 3 ft. above floor of Portland stone in one piece; the shafts are of Mansfield stone, each in one piece, 5 ft. 6 in. long, which (as they are on the natural bed) required to be cut from blocks of unusual size. The capitals and large springers of the arches are of Portland stone, and the remaining voussoirs of the arches of Bath stone. The windows of nave and clearstory are of two lights; of transepts, four lights; and over the front entrance, of five lights. The moulded strings, corbellings, &c., are of Bath stone. There is a good deal of carving both internally and externally, the execution of which was entrusted to Mr. Samuel Allen. The roof of the centre aisle is continued of the same height through the nave and choir, and its general effect and construction are shown on our drawing. The choir, which is raised two steps above the nave, and the vestibule, are paved with encaustic tiles, while the passages are laid with wood blocks. The pewing, pulpit, choir seats, screens, &c., are of pitch pine, and outside doors of oak.

The work has been satisfactorily carried out by Mr. James Morter, builder, of Stratford, from the designs and under the superintendence

of Mr. Thomas Arnold, A.R.I.B.A., of Basinghall-street, E.C.

The contract for the entire building, including boundary-wall, but exclusive of belfry of tower, and spire, amounts to 5,113.

ADDITIONS TO "SHERWOOD,"
TUNBRIDGE WELLS.

The accompanying illustration is from a pen-and-ink drawing by Mr. Frank Baggeley, and shows the new wing, entrance-hall, and tower to Sherwood, Tunbridge Wells. The work was carried out for the late Sir William Siemens, F.R.S., by Messrs. Willacomb & Oakley, builders, of Tunbridge Wells, from designs by Mr. Lewis P. Grace, architect, of Nottingham-place, London.

DESIGN FOR MISSION CHURCH AT
MOSBOROUGH.

This illustration represents a drawing of a proposed mission church at Mosborough, Derbyshire, submitted by Mr. J. D. Webster, of Sheffield, in a recent competition.

SURVEYORS' INSTITUTION.
THE TITHES QUESTION.

This subject has engaged the attention of the Surveyors' Institution at its last two meetings. At the meeting held on the 22nd ult., Mr. J. Willis Bund, Associate, read a paper on "Extraordinary Tithe," in which he criticised the mode of redeeming it which was afforded by the Extraordinary Tithes Redemption Act, 1886, a measure which, he said, was "rushed" through Parliament on the eve of a general election, to satisfy a local grievance, without the full significance of the change which it would bring about being present to the minds of the legislators.

At the meeting held on the 6th inst., Mr. W. J. Beadel, M.P., President, in the chair, Mr. E. Ryde, past-President, read a paper entitled "The Tithe Question; with Suggestions for the Redemption of the Rent Charge." After giving an interesting account of the historical and legislative phases of the question, and showing that the popular prejudice against the payment of tithe rent-charge was deep-seated and widespread, he referred to the proposals which he had made on the subject a few years ago,* when he hinted that the tithe rent-charge should be redeemed, and stated that the landowners would have to pay twenty-five years' purchase for it; that they would have to borrow the purchase-money from the Government at 4 per cent. interest and would have to continue the payment of the interest for a period of about forty years, when it would cease. His present proposals did not much depart from those suggestions, and during the last five years he had canvassed the views of men eminently well qualified to influence public opinion, and he saw no difficulty in adjusting every difference of opinion which had been communicated to him. Having enumerated and replied to the principal objections which had been urged against his proposals, he gave, in conclusion, the following outline of the scheme of redemption which he proposed:—

"The total value of the tithe rent charge, as commuted and apportioned, is, in round figures, 4,000,000l. per annum and upwards. I cannot deal with actual figures, because small redemptions have taken place from time to time, which may have reduced the amount to the round figure of 4,000,000l. Of this round figure about three-fifths, or 2,400,000l., is in the possession of parochial incumbents, the remaining two-fifths being in the hands of improPRIATORS.

It is proposed, in the first place, to reduce this 4,000,000l. to 3,800,000l. by deducting from it five per cent. for the cost of collecting. In the next place it is proposed to take from it 400,000l., being the difference, in round figures, between the value of the rent-charge in 1886, and the commuted rent-charge in 1836. This is done on the supposition that the average price of corn for any seven years in the future will not approximate more closely to the average price of the years 1828 to 1835, upon which the rent-charge was originally based, than 90 per cent. There is great fear that the average price will be less than that figure, but in a measure which can only be regarded as a com-

* In his Opening Addresses as President of the Institution, 1880-81.

promise on all hands, it would be quite fair to deal with the rent-charge at 90 per cent., of the original amount. This brings the total rent-charge to 3,400,000l., and it is very reasonable to assume that the rates and taxes will take off the odd 400,000l., and leave a net round figure of 3,000,000l. per annum as the approximate measure of the rent-charge to be dealt with.

It is proposed to redeem this 3,000,000l. at the price of twenty years' purchase, or 60,000,000l., but it is proposed to borrow the sum of 75,000,000l. (being the amount of twenty-five years' purchase). The balance of 15,000,000l. is to go to make up the augmentations to the income of the parochial incumbents, and it will be seen that the 15,000,000l., spread over the three-fifths of the rent-charge, will make an additional eight and one-third years' purchase. The interest on the 75,000,000l., at 3 per cent., will amount to 2,250,000l. a year. There will therefore be a surplus of 75,000l. a year to be applied as a sinking fund to recoup the principal. This, at 3 per cent., will overtake the principal in forty-seven years. It may here be added that if from any cause there should be occasion to raise additional capital, it will be easy to do so by slightly extending the period of the loan. The difference in the amount accumulated by a sinking fund of 1l. per annum for forty-seven years and fifty years is as much as 12.8 per cent. The amount which in forty-seven years will accumulate to 100l., accumulates in fifty years to 112.8s. The difference in value to a landowner in present money between freeing his estate in forty-seven years and in fifty years is practically inappreciable.

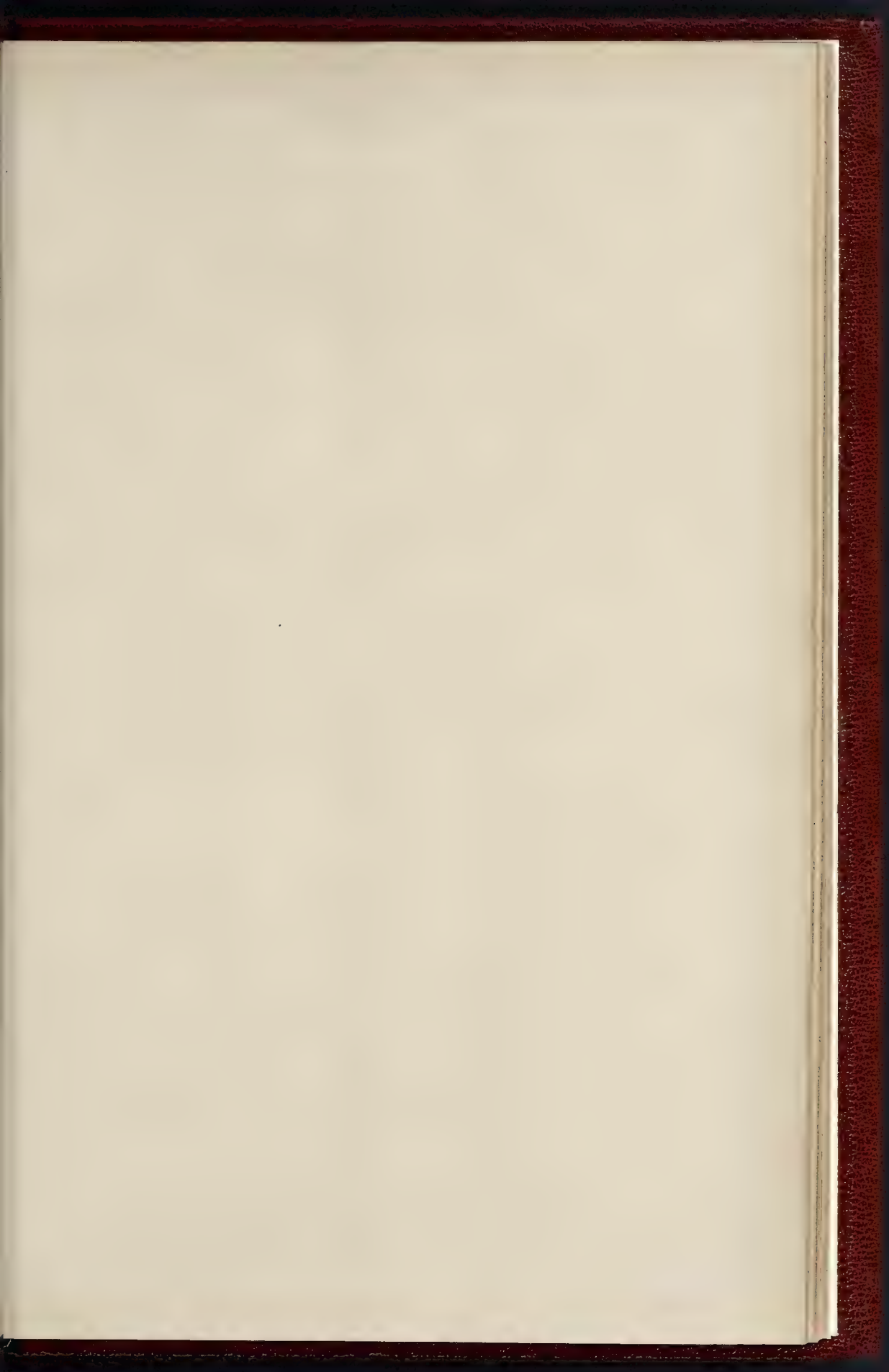
I scarcely dare to suggest the mode upon which the new stock should be created. I would, of course, make it a condition that the purchase-money to the tithe-owner should be paid in that stock, so that the whole of the obligation of the Government would be to provide for the issue of the stock.

It will, of course, be understood that in this paper all reference to the Extraordinary Tithe Redemption Act, 1886 (49 and 50 Vic., cap. 54), has been avoided for the reason that a paper on that Act, written by Mr. Willis Bund, is to be discussed with the present paper. It may be that much of the rent-charge to be created under that Act in lieu of extraordinary tithes will be redeemed voluntarily. But it is well to add that if any general redemption should take place on the lines of this paper, the extraordinary rent-charge should be included."

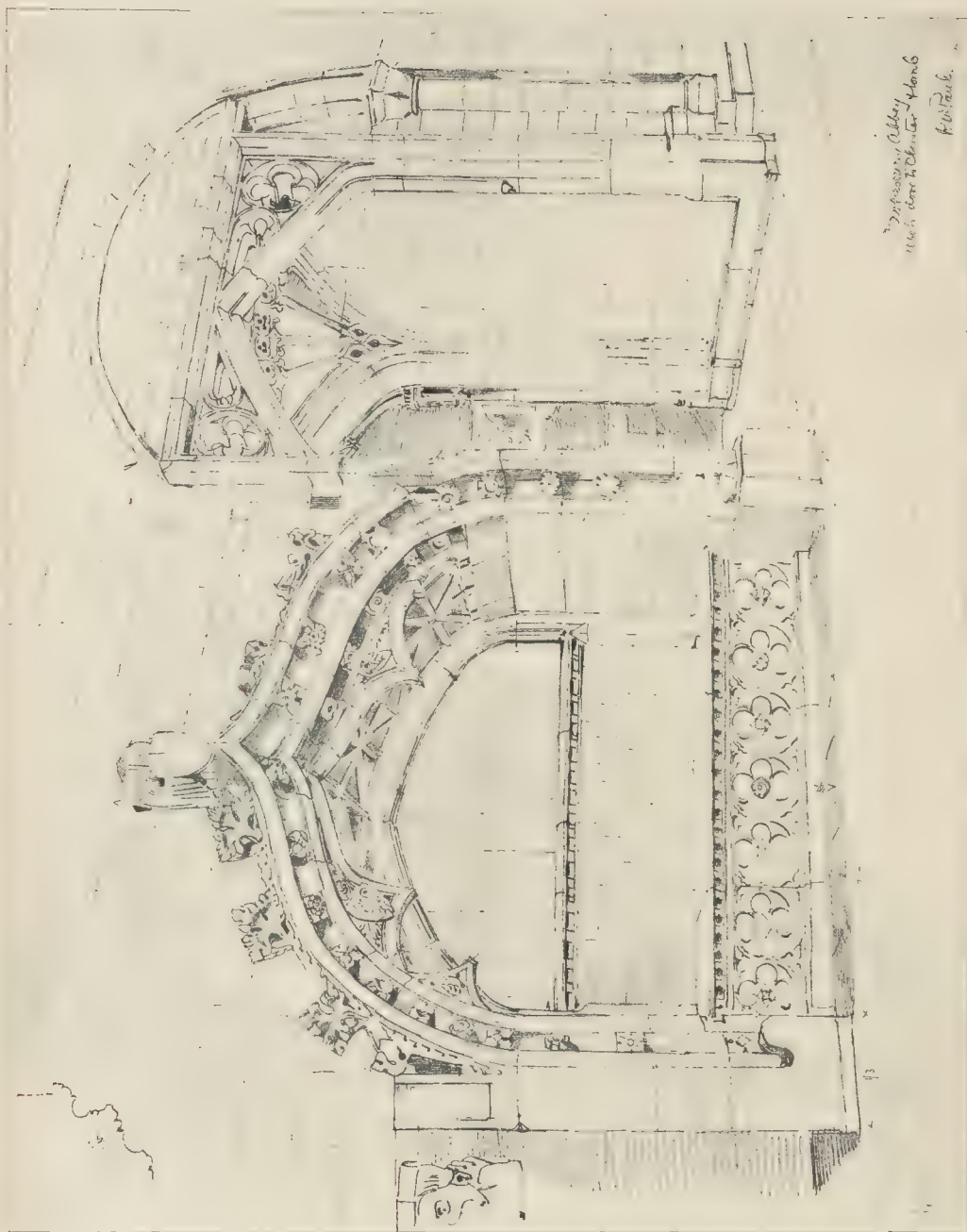
In the discussion which followed Messrs. A. J. Burrows, C. K. Bedells, J. Henry Sabin, J. Waterman, W. J. Harris, J. W. Kemsley, F. Powell, and E. Ballard took part, and it was resolved, on the motion of Mr. C. Oakley, to adjourn the further discussion of the papers to the next meeting.

The Queen's Park Estate, Harold Wood.

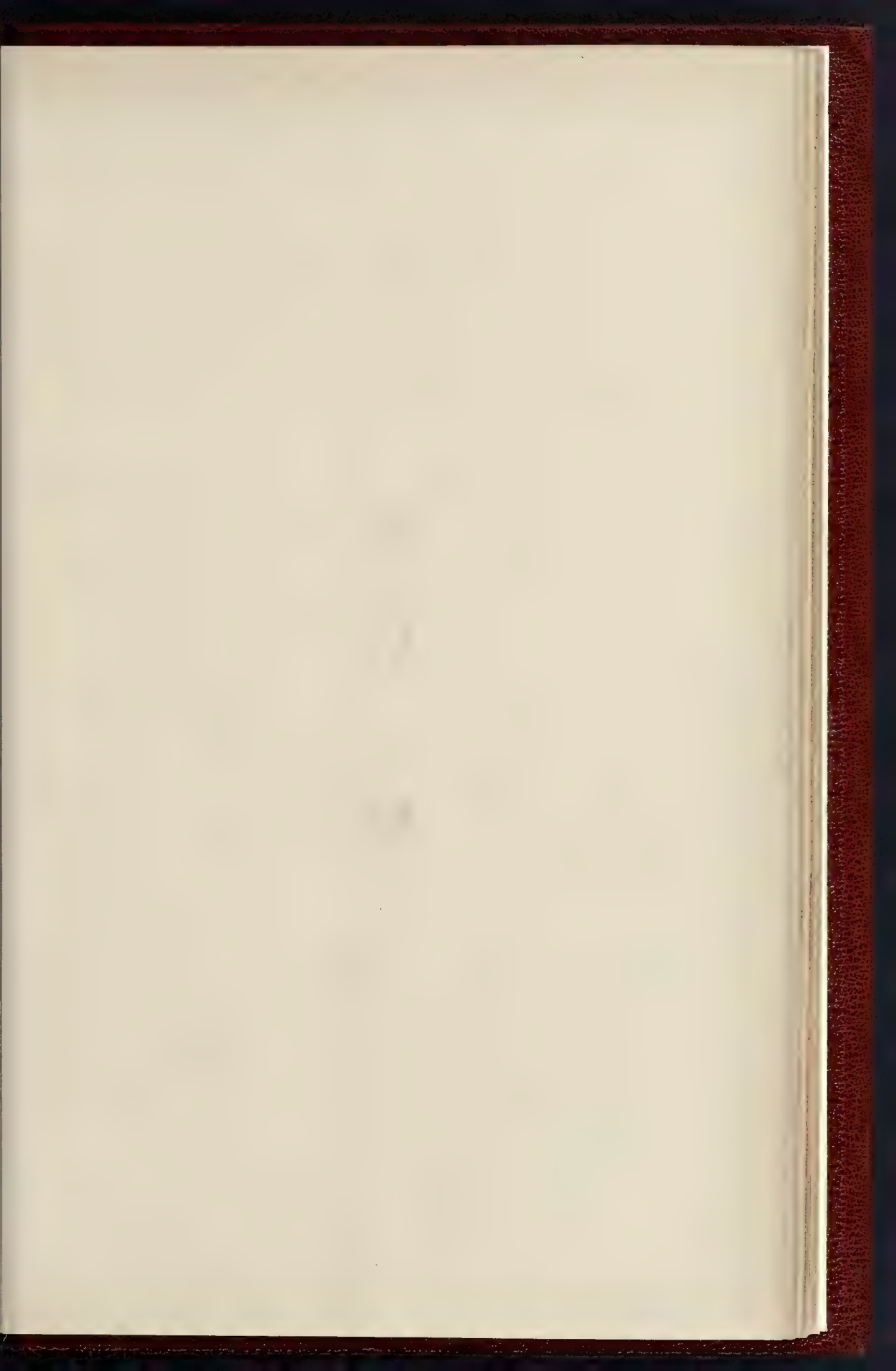
Last week Messrs. Baker & Sons offered for sale, at the Princess Alice Hotel, Romford-road, Forest-gate, the first portion of the Queen's Park Estate, Harold Wood. The estate, which adjoins the Harold Wood station of the Great Eastern Railway, has recently been laid out for building purposes, the principal thoroughfare being Queen's Park-road, which intersects the centre of the estate. The number of plots submitted on Wednesday was 122. Nearly all of them have frontages of 15 ft. and 16 ft. each, with depths varying from 60 ft. to 100 ft. The property offered included a large hotel plot at the eastern boundary of the estate, and several shop plots in the Broadway, one of the thoroughfares on the estate, forming a continuation of the main highway to Brentwood. Before offering the several plots Mr. Baker observed that there was no reserve upon them. The sale then commenced, and the first lot, having a frontage of 15 ft. to the Queen's Park-road, and a return frontage of 60 ft., was sold for 7l., the auctioneer remarking that this was not the value of agricultural land. All the other plots were sold at prices ranging from 7l. to 8l. 10s. each, with the exception of a number of shop plots, which realised from 10l. to 13l. each, and the hotel plot, which, with two other plots sold with it, realised 78l. The general opinion in the room appeared to be that the property had been sold much below its real value, and the auctioneer observed that it was a proof of the depreciated value of landed property at the present time.



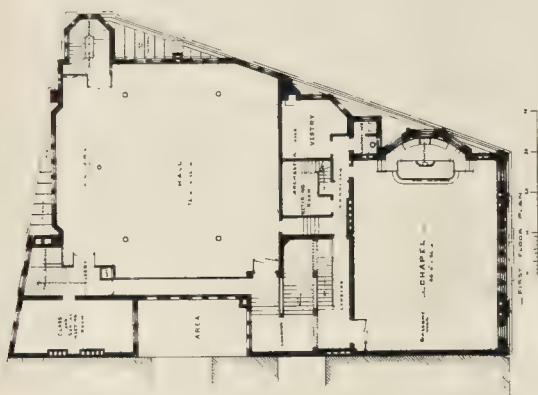
THE BUILDER, DECEMBER 18, 1886



Professor, Albany
1886, don't forget to send
H. P. R.

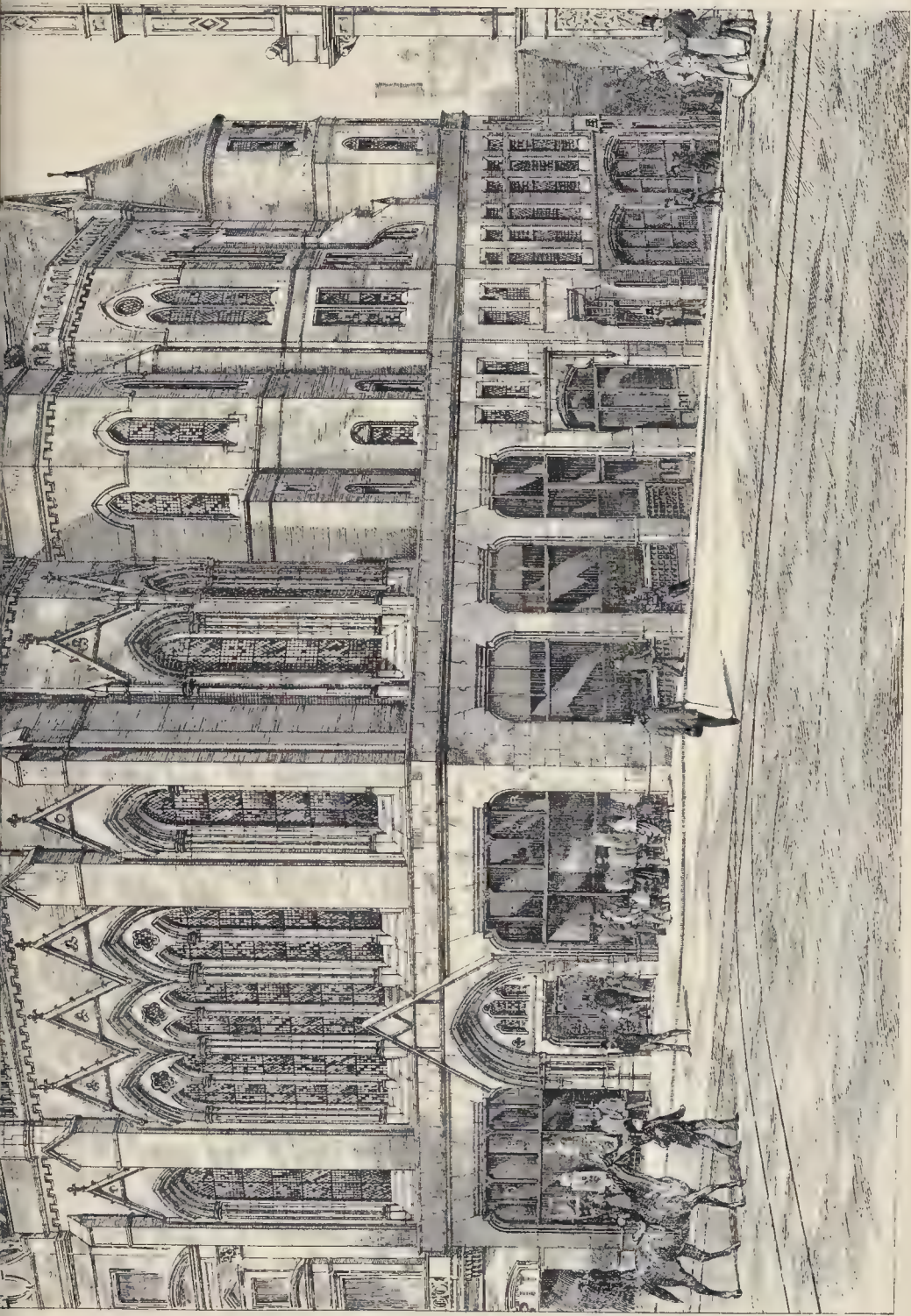


THE BUILDER, DECEMBER 18, 1886.

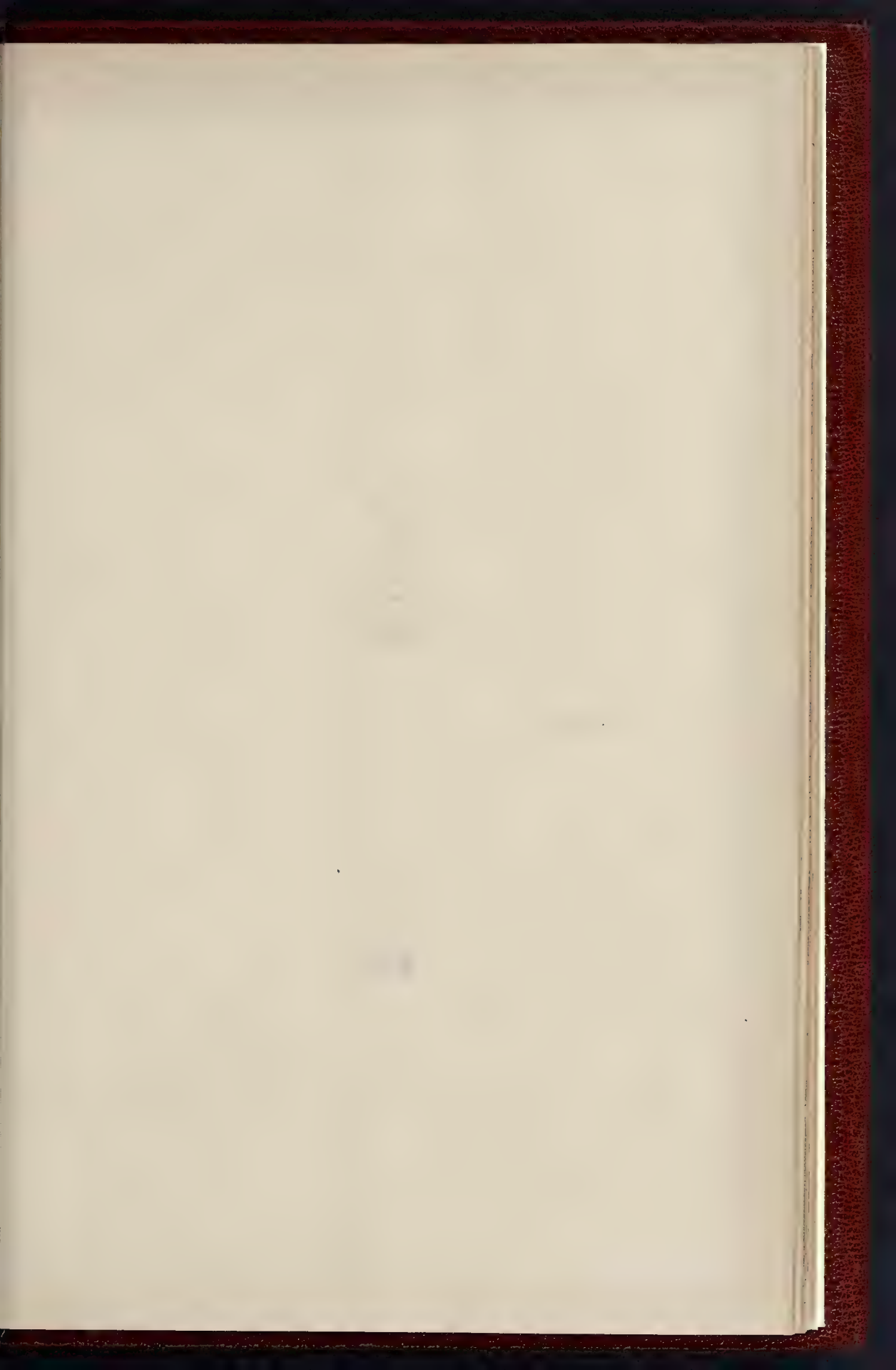


GROUND PLAN

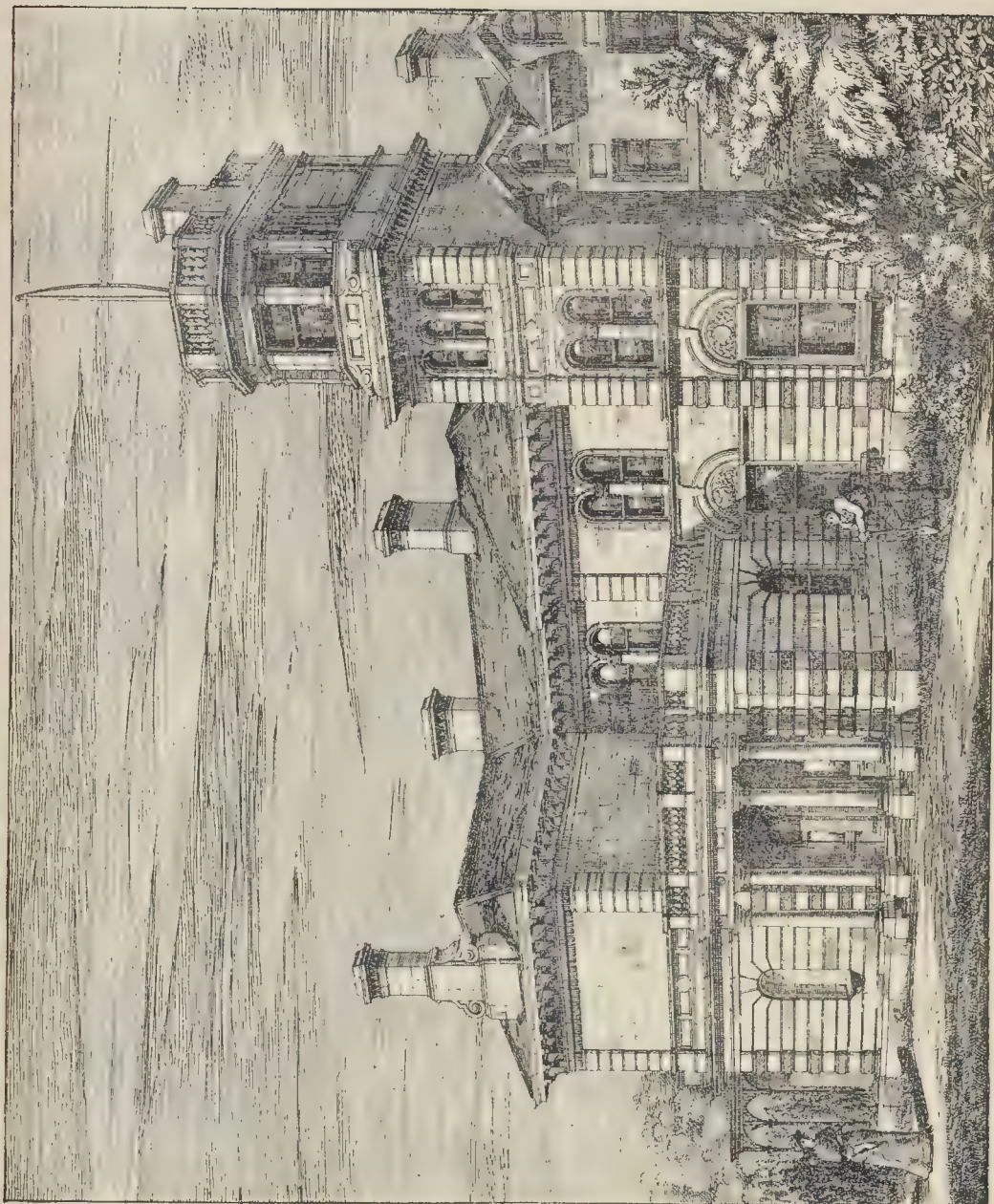




WESLEYAN CHAPEL SCHOOLS AND PREMISES, BIRMINGHAM.—MESSRS. OSBOENE & READING, ARCHITECTS.



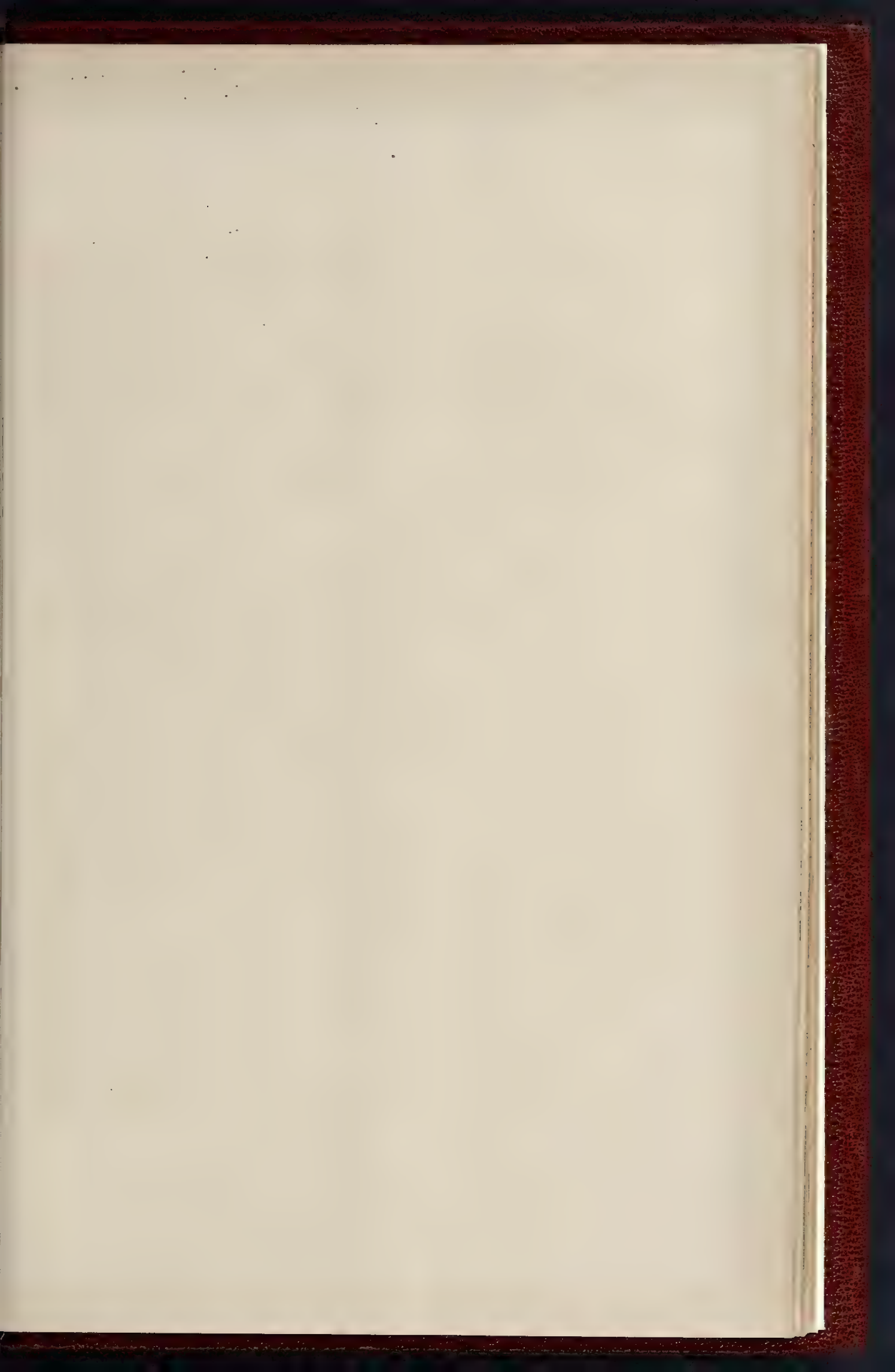
THE BUILDER, DECEMBER 18, 1886.

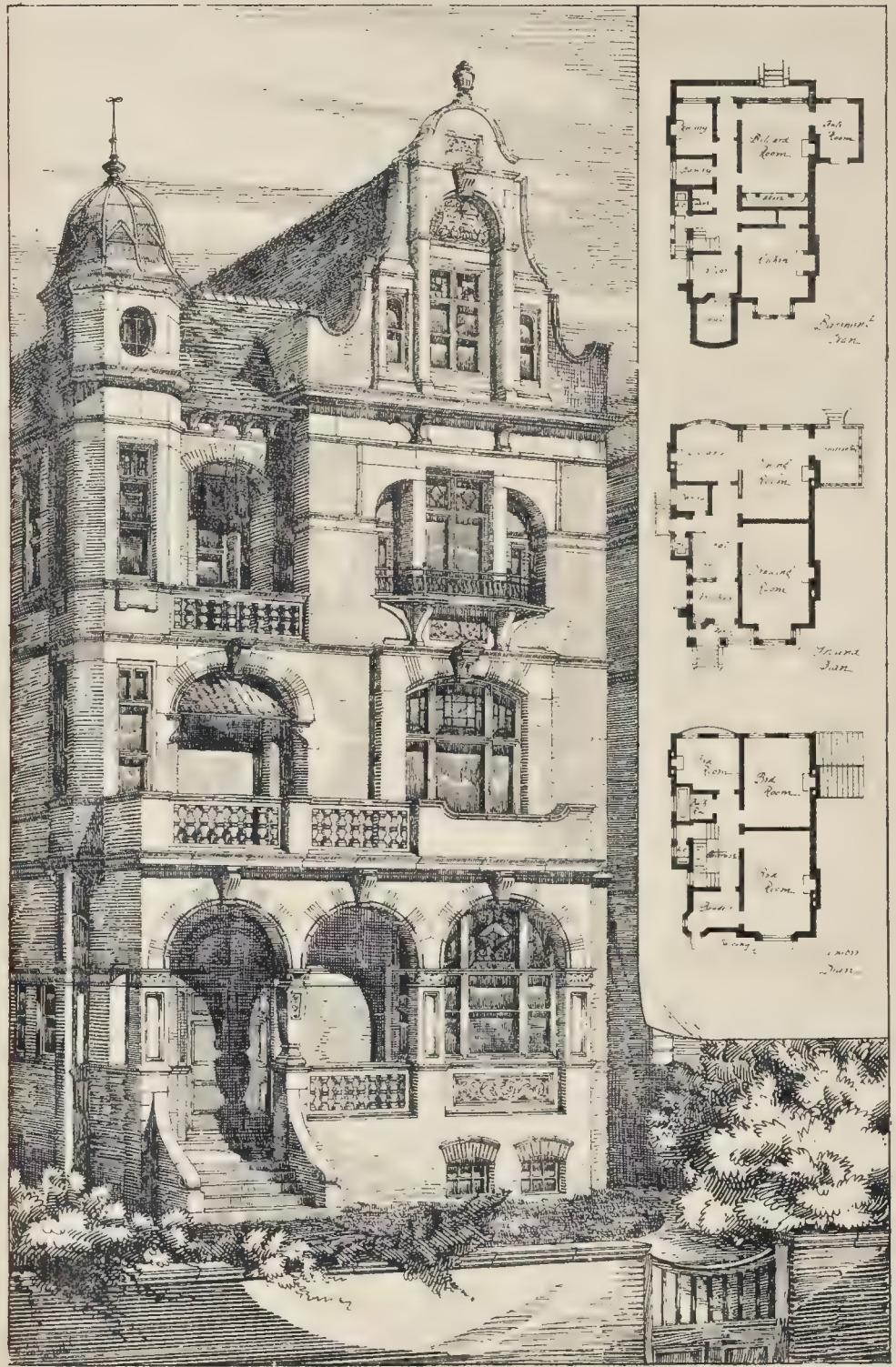


F. Z. B. del.

ADDENDUM TO SHEPHERD, TINDRIDGE, WELLS, & CO. Y. & C.

NEW YORK: PUBLISHED BY THE CHARTER COMPANY, 1886.



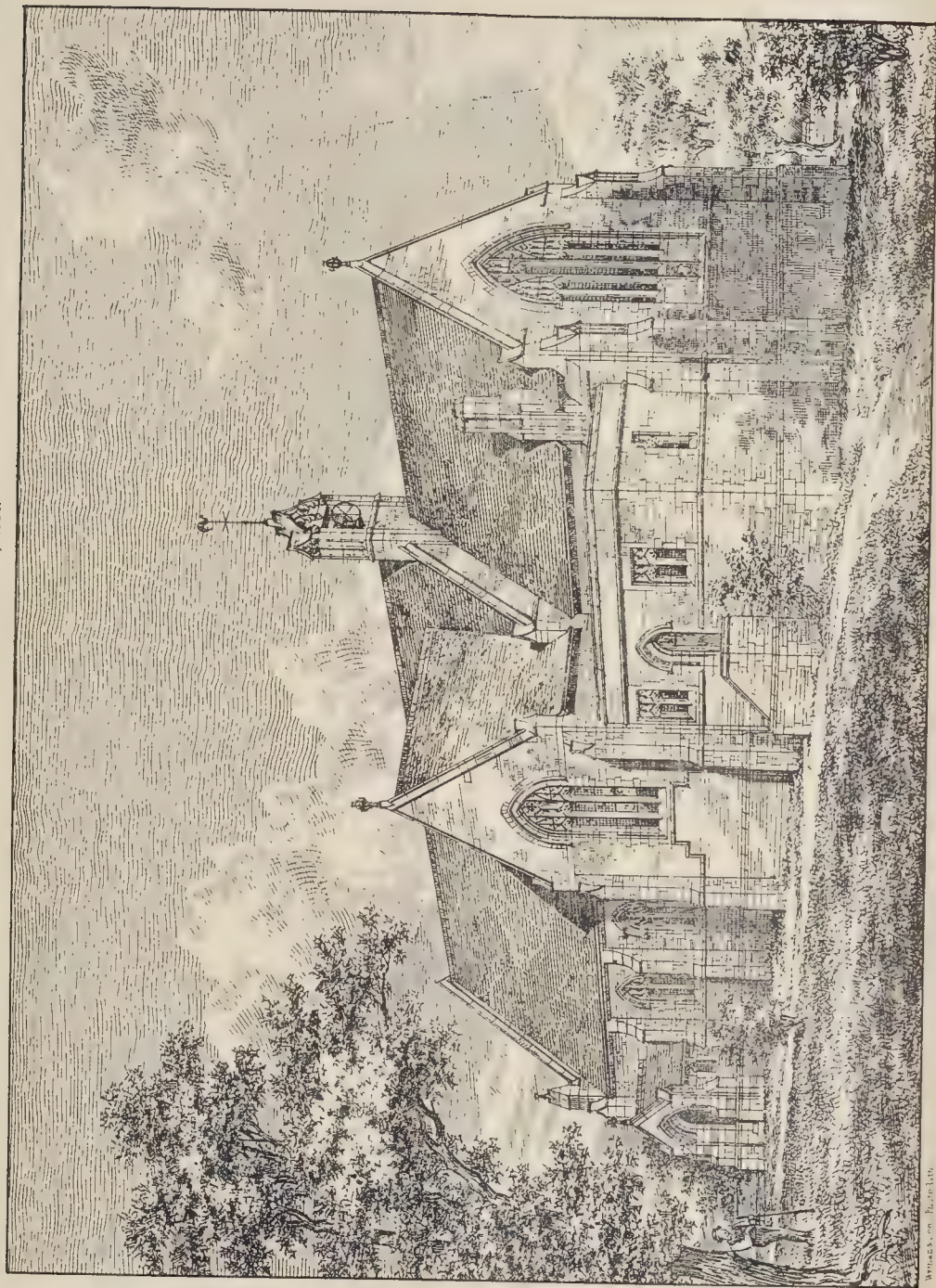


HOUSE AT HAMPSTEAD.—MR. BANISTER FLETCHER, F.R.I.B.A., ARCHITECT.



CONGREGATIONAL CHURCH, WOODFORD.—MR. THOMAS ARNOLD, A.R.I.B.A., ARCHITECT.

THE BUILDER, DECEMBER 19, 1886.



MISSION CHURCH, MOSBOROUGH.—Vide Table D. W. H. W. 1886.



A SKETCH IN TEWKESBURY ABBEY, BY MR. ROWLAND W. PAUL.

HOUSE DRAINAGE IN LONDON.

On the 4th inst. a paper was read before a well-attended meeting of the Association of Public Sanitary Inspectors at the rooms, Adam-street, Adelphi, by Mr. W. Hearne (Paddington), on the subject of "House Drains"; Mr. Jerram, C.E., presiding.

The lecturer, believing it to be as important for the inspector to be equally conversant with the laws under which he works as with the principles of his work itself, opened by quoting some of the chief clauses in the Metropolitan Local Management Act (1855) and the Metropolitan Local Management Act (1862), which deal with house drainage in London. The powers under these Acts appeared to be as full as those given later to other urban districts by the Public Health Act (1875), and it was not easy at first to see why, the clauses in each Act being similar, we could not deal with the subject as effectively within the Metropolis as outside. Some local authorities in London required such modern improvements as interceptors, ventilators, and improved forms of water-closets, and insisted on the right of supervision throughout, but others went no further than to prescribe stoneware pipes for the drains, without carrying the supervision beyond the sewer connexion. The greatest difficulties appeared to arise from the confused opinions generally held as to the existing law and as to the powers of the local authorities. Only last year an important Vestry held that it had not the power to compel a supply of water to be laid on to closets. The two Acts referred to showed clearly that the legislation had given ample powers to the local authorities of London, and he questioned whether greater powers would now be given. The cry for more legislation was calculated to retard instead of to advance the work, and if only half as much energy were used in calling the attention of the people to its duties under existing statutes progress would be more real. The apathy of the householders and the fear of increased cost were the two great difficulties to be removed. With properly framed regulations the cost of effective supervision seldom exceed $1\frac{1}{2}$ per cent. on the cost of buildings, and in many cases it would cost less to do the work properly than badly. Apathy was not so easy to overcome. Nothing short of death or illness in the family through bad drainage could rouse the average householder to a sense of importance of proper sanitary arrangements. The advantage of giving to local authorities full powers over new house drains could not be over-estimated. In the case of the entire absence of a drain or a water-closet there was not much room for dispute; but when it was a question as to the form of a closet, the jointing of pipes, or the provision of inlet and outlet shafts, it must be admitted that in the absence of regulations or uniformity of practice they had no power to reject appliances or stay the execution of work even when done upon principles condemned by all competent authorities years ago. Stanford's joints and others of the potted class were often devoid of the advantages looked for from their increased cost by the ignorance displayed in the jointing or laying. Good workmen trained in drain-laying were sometimes to be met with, but their number was small; and many an employer, with every desire to employ competent labour, could not obtain it. The lecturer, in conclusion, referred with approval to the action of the Plumbers' Company in endeavouring to secure good all-round work in the trade it represents, and suggested that if the Bricklayers' and Tylers' Company were to take similar action it would be doing a work which rightly belonged to it, whether it had or had not equal chances of success.

In the discussion which followed the reading of the paper, a large number of members took part, including Mr. S. C. Legg (Hon. Sec.), and Mr. E. Tidman, C.E., who, having been furnished with an abstract of Mr. Hearne's paper, had prepared written criticisms in reply.

Mr. Legg, who proposed the vote of thanks, pointed out the paralysing influence upon the efforts of all metropolitan inspectors of the total lack of "unity of administration" within its great area. The construction of new drains and the reconstruction of existing drains were, strange as it might appear, placed under the supervision of two totally distinct departments, and between the two it often happened that drains most carelessly constructed were covered up out of

sight before they could be examined, either on account of a division of responsibility, or because there was no officer definitely directed to see to them; or, perhaps, because an officer who might be charged with the duty had too large a district to supervise. He regretted, on this account, that a measure which would have placed the supervision of all sanitary arrangements, whether for new houses or old ones, in the hand of the district inspector, had never become law. He referred to the suggested "Dwelling Houses Inspection Bill."

The resolution was seconded by Mr. Boulter (Bexley), and supported by Mr. Alexander (Shoreditch), and other inspectors.

Mr. E. Tidman, C.E., said it had always struck him as curious that London, the fountain-head of all legislation, should retain its old unreformed sanitary regulations, while others of a much more progressive character were in force in the provinces. He would like to see the "Model By-Laws" of the Local Government Board adopted in their entirety, with modifications such as recent sanitation had suggested, but he thought some improvement was possible without radical alterations in the existing laws. As surveyor to a Sanitary Association, it had been the speaker's duty to report on the drainage of a villa in the S.E. suburbs, in which there existed at least one dangerous feature, although it had been approved by the Surveyor to the Local Board. There was in the front garden an inlet ventilator, and at the back an outlet ventilator, a soil-pipe carried up the external wall. The smoke test showed, by the issue from the inlet ventilator of a strong volume of smoke, that children playing in the front garden would have under their noses the very sewer gas from which it had been the object of the ventilators to protect them. After some negotiation, he obtained the necessary consent for the indispensable alterations to be made, but was informed by the surveyor that in his district alone there were over 2,000 similar inlets. He got constructed nearer to the house a disconnecting syphon, and carried up the inlet to a point above the top of the highest window, but still 10 ft. lower than the orifice of the outlet-pipe, obtaining thereby a circulation of fresh air through the entire system, by which the sewer gases were carried off. He adopted the principle throughout, where drains had to be constructed or re-arranged under his inspection. The speaker was of opinion that not a foot of drain-pipe should be permitted to be covered up until inspected and approved by a competent and properly-paid officer. He agreed in the main in Mr. Hearne's views in regard to drainage plans, and he considered it essential that all sink and other connexions with house-drains should deliver over trapped gullies fixed outside where possible; that inlet and outlet air shafts should be provided to all house drains, the inlet never being less than 10 ft. above the ground-level; that no water-closet service pipe should ever connect directly with a cistern of drinking-water; and that flushing tanks, and for house drains, a syphon with an inspection-chamber, should be provided. Mr. Tidman concluded by reading an article from the *Builder* of Sept. 18th last on "The Sanitary Condition of Chiswick," in which the important benefits accruing from efficient sanitary arrangements for the house were strikingly shown in a report of a house-to-house inspection recently made in Chiswick by Mr. Ramsden, Surveyor to the Local Board. The speaker thought they were doing much to educate the people, through the medium of their own publications, and the reports with which they were favoured by the public press when they met, as on that occasion, for the mutual communication of their experiences.

Messrs. Rains (St. George's, East), Dee (Wandsworth), Middleweek (Kensington), and Fairchild, having detailed their experiences, the chairman, Mr. Jerram, wound up the discussion, and Mr. Hearne having replied, a vote of thanks was unanimously accorded to him.

The Late Mr. Vulliamy.—At this week's meeting of the Metropolitan Board of Works, the Works and General Purposes Committee will present a report recommending that the amount to be paid to the representatives of the late Superintendent Architect, for services rendered, at the request of the Board, after the date of his resignation, and in respect of superannuation allowance, be 500l.

THE SOCIETY OF ENGINEERS.

The thirty-second annual general meeting of the Society of Engineers was held on Monday evening last, in the reading-room of the society, Westminster-chambers. The chair was occupied by Mr. Perry F. Nursey, President.

The following gentlemen were balloted for and duly elected as the Council and officers for the ensuing year, viz.:—As President, Professor Henry Robinson; as Vice-Presidents, Mr. A. T. Walmisley, Mr. Arthur F. Phillips and Mr. M. Ogle Tarbotton; as Ordinary Members of Council, Messrs. J. B. Baillie, E. W. Peregrine Birch, W. Barns Kinsey, W. Schönheyder, Henry Adams, W. Newby Colam, Robert Harris, and Wm. Andrew Valon, the four latter gentlemen being new members of Council; as Honorary Secretary and Treasurer, Mr. Alfred Williams; and as Auditor, Mr. Alfred Lass.

The Victorian Engineers' Association having resolved "That all members of the Society of Engineers visiting Melbourne, on the presentation of letters of introduction from their secretary, shall be elected Honorary Members of the Association for six months," the following resolutions were passed unanimously:—

"That the Society of Engineers, being desirous of reciprocating the friendly action of the Victorian Engineers' Association, and not being able, under its rules, to elect Visitors as Honorary Members, hereby offers to Members of the Association visiting England, and duly introduced, a cordial invitation to attend all meetings and visits of the Society, and to enjoy all the privileges of membership (except voting and 'Transactions'), for six months."

"That the Secretary be instructed to forward a copy of the above resolution to the Victorian Engineers' Association."

The President announced that after the 25th of December the Society's Offices and Reading Rooms would be at 9, Victoria Chambers, S.W., and the proceedings were terminated by a general vote of thanks to the Council and officers for 1886, which was duly acknowledged by the chairman.

The annual dinner of the Society took place on Wednesday evening last, at the Guildhall Tavern, Gresham-street, Mr. Perry Fairfax Nursey, President, in the chair.

In proposing the toast of the evening, "Success to the Society," the chairman said that it was formed in 1854, and though a small body at first, they had added to their numbers year by year, until for some time past they had become thoroughly representative of the profession. Their society covered a very wide area, embracing not civil, mechanical, and electrical engineers alone, but every branch of engineering science and practice. They read papers and discussed them in a way which was not quite known in some institutions of a cognate character. They also visited during their vacation the chief engineering works of interest of the year, and under the presidency of Mr. Jabez Church they had inaugurated lectures for the junior members of the society. Another institution had done them the honour to imitate them in that respect, and had been enabled to carry on more perfectly than they could do the educational system which they had inaugurated and hoped to establish. They had endeavoured to constitute themselves an educational body, and they had hoped, in conjunction with the Institution of Civil Engineers, to have provided an examining and certificating body for the profession, but, unfortunately, the negotiations fell through, and they were left to themselves, but nevertheless they pursued their work steadily year by year.

Mr. Alfred Williams, honorary secretary and treasurer, responded, and observed that the society had affiliated itself to local societies of engineers in Victoria and New Zealand.

Mr. Charles Gandon proposed the toast of "The President," which was duly honoured.

The health of Professor Henry Robinson, the President-Elect, the Vice-Presidents, coupled with the name of Mr. Arthur T. Walmisley, and other toasts, followed.

New Buildings at the City End of the Thames Embankment.—Last week the new Guildhall School of Music was opened by the Lord Mayor; and this week the new buildings of Sion College were opened by H.R.H. the Prince of Wales. Of the first-named building (Sir Horace Jones, architect) we gave a view and plans in the *Builder* for Sept. 5, 1885; while of Sion College (Mr. A. W. Blomfield, M.A., architect) we gave a view some few years ago.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The third ordinary meeting of the current session was held at Queen's College on Tuesday evening, December 14th. Mr. F. B. Osborn (President) was in the chair. Mr. W. H. Bidlake, M.A. (Cantab), and Mr. E. J. Hickin, were nominated for membership. Mr. H. Thornhill Timmins was elected a member of the Association. A paper was read by Mr. Alfred Reading on "Venetian Architecture." The lecture was illustrated with some very fine lantern views. A vote of thanks, proposed by Mr. Victor Scruton (hon. sec.) and seconded by Mr. T. W. F. Newton, was accorded to Mr. Reading for his very interesting paper, and after a response from that gentleman the meeting terminated.

Liverpool Architectural Society.—At the meeting of this Society on Monday evening last, Mr. G. E. Grayson, President, in the chair, a paper was read by Mr. J. M. Hay entitled "The Liverpool Cathedral: What! Something More about it?" Mr. Hay, as reported in the *Liverpool Daily Post*, touched upon the questions of style, site, the proper position of the buildings on that site, and then dwelt at considerable length on the mixture or combination of styles as shown in the design submitted by his firm.* Amongst other buildings he adduced St. George's Hall, one of the noblest architectural productions of the nineteenth century as a case in point, for there, while in the interior, with its vaulted ceiling and round arches, the style was Roman, there was nothing of that outside, but the pure Greek ordonnance. The rise and progress of Gothic art was to be found in the cathedrals of France, and England, and Germany. Its course for three centuries was the most glorious in architectural history. But that course was run, and could not be run again. We could no more revive the Gothic glories of Christendom than we could the classic glories of Athens. There was much in both styles that must live, for the good could not die, but only by recasting it in modern thought, and not by slavishly reproducing the lineaments of a bygone age. He pointed out as a defect in all our cathedrals the obstruction caused by the heavy piers which supported the vaulting at the main intersection, the solitary exception being that at Ely, where Alan de Walsingham tried to remedy the defect, and therein showed that he had some glimmering light of what the dome was destined to achieve in the future service of Christian art. Nothing further was accomplished till Sir Christopher Wren picked up the pencil which had fallen from his fingers at Ely, and at St. Paul's carried the application of the dome another stage forward. The design submitted by his firm might be faulty in many respects, but if the Liverpool Cathedral was to be a true exponent of the most advanced thought of the present day, it must be conceived somewhat in the manner of those lines, and not a mere travesty of the dead letter of the past; and from the complex nature of the Christian faith the material edifice could not be truly representative unless by a homogeneous combination of styles. As to purity of design, there was no such thing, in the strict sense of the word, in modern architecture. It was impossible, unless the architect closed his eyes to much that was noblest and best around him. It was impossible as long as three principles of construction were in daily use,—often all three of them present in the one building at one and the same time. It was impossible, because any style that was merely pure and simple could not meet all the exigencies and requirements of modern life. The pre-Raphaelite recipe of selecting nothing, rejecting nothing, was of no service to the architect, for the art of design was pre-eminently one of selecting and rejecting, of refining and combining, and by thus obtaining the best of the best, ensuring the survival of the fittest.—In the course of the discussion which followed, Mr. Mercer said he would refrain from expressing any violent thoughts on Messrs Hay's design, which, according to the present feeling that existed among the bulk of architects, was an absurd combination. Although he differed very widely with Mr. Hay in reference to the design, he was glad to propose a vote of thanks

to that gentleman for the paper which he had contributed. Mr. Crofts seconded, and Mr. Goldstraw supported the motion, which was cordially adopted.—Mr. Richard Owens was elected a fellow of the society, and Messrs. T. G. Williams and J. A. Berrington professional associates.

Edinburgh Architectural Association.—The fourth volume (or No. 1 of New Series) of the Sketch-book of this Association is now complete, and will shortly be ready for issue. The committee have decided to offer prizes for measured drawings, which will require to be lodged in the autumn of 1887. Meetings of the Class for the Study of Design and Construction are being held on Thursday evenings,—alternating with the ordinary meetings of the Association. Among the subjects to be treated are "A Club House for a Provincial Town"; "Strains and Strengths of Material"; "Art Societies' Rooms," &c. A first prize of 2l. 2s., and a second of 1l. 1s. are offered by the President to student-members for Designs for Working Men's Dwellings. The Association appears, therefore, to be doing good work.

Glasgow Architectural Association.—The ordinary monthly meeting was held on the 7th inst.,—the President, Mr. W. H. McNab, in the chair,—when a paper was read by Mr. William J. Anderson on "Evolution in Architecture." Its object was to show that, as the same law of development which works in every simple natural process enters into the sphere of work and thought, the varying forms of architectural features and styles may be regarded as resulting from its action,—being, in the first place, adaptations to meet some necessity developed in the surrounding conditions. An attempt was made to analyse the process in its relation to architecture, and to specify the factors that go to compose it. Development in architecture was understood to be influenced, not so much by the development in the human mind of the matters directly related to the science and art of architecture, as by that of the surrounding conditions generally,—its environment,—which was, throughout, the most potent factor in the process. Evolution being in no sphere a steady progression, in the sense of improvement, there is at times deterioration, its operations going on in cycles, the several periods of these cycles,—corresponding to periods of styles in architecture,—having certain characteristic tendencies. Regard was paid specially to the early and adaptive periods in styles,—the periods distinctively of constructive evolution,—as in the twelfth century. The greater part of the essay was devoted to a consideration of the column or pier-shaft and the buttress as typical instances, their several histories being traced from their origin, and an attempt was made to assign the causes combining to produce the successive phases of their development. A discussion ensued, opened by Mr. Boston, and carried on by Messrs. Thomson, Scott, Baldie, Mr. Gibbon, and the Chairman.

COPYRIGHT.

COX AND ANOTHER v. PARDON & SONS AND THE GENERAL PUBLISHING COMPANY.

AN application was made before Mr. Justice Stirling on Thursday last, on behalf of the plaintiffs, the proprietors of the *Builder*, for an injunction to restrain Messrs. Pardon & Sons, as the printers, and the General Publishing Company, as the publishers, of the *Brick, Tile, and Builders' Gazette*, from printing or publishing or selling any number of such last-named periodical containing any article, essay, note, or other matter copied or colourably altered from the *Builder*, or from otherwise infringing the plaintiffs' copyright.

Mr. Hadley, who appeared on behalf of the plaintiffs, stated that the defendants had not only caused extracts from the *Builder* from time to time to be inserted in the *Brick, Tile, and Builders' Gazette*, coupled with a notification that such extracts were taken from the *Builder*, but that they had repeatedly caused to be inserted, verbatim, articles from the *Builder* without any notification whatever as to the source from which such articles had been derived, and as though the same were original matter of the *Brick, Tile, and Builders' Gazette*.

The facts of the case having been proved, his Lordship granted an interim injunction as asked for by the plaintiffs.

Appointment of a Diocesan Surveyor.

Mr. E. W. Farebrother, F.R.I.B.A., of Grimsby, has been elected a Diocesan Surveyor for the county of Lincoln.

LIGHT AND AIR.

HARRIS V. BROOKS.

IN the Chancery Division of the High Court of Justice, the case of *Harris v. Brooks* was heard last week before Mr. Justice Kekewich.

Mr. Barber, Q.C., appeared for the plaintiff; and Mr. Cooper Willis, Q.C., for the defendant.

The case arose out of the rebuilding of the defendant's premises in Ship Tavern-passage, Leadenhall Market. It appeared that the original intention of the defendant was to have carried the new front wall of his premises 13 ft. higher than the old line, and as the plaintiff (who is the proprietor of the Swan Tavern, in Ship Tavern-passage) could not obtain any definite undertaking from the defendant that this proposed increase in height would be reduced so as not to injure the plaintiff's rights of light, he applied for and obtained an injunction. The defendant subsequently completed his building, finishing the front wall 2 ft. 4 in. above the old line, and substituting a curb roof for the originally-intended upper story. There was also another point raised in the pleadings with respect to the obstruction of light to an attic window of the plaintiff's premises, in front of which the defendant had raised the roof of his new building, leaving only a "hopper" or small area round the building.

The hearing of the case lasted nearly four days. The defendant sought to show that the plaintiff had not been justified in applying for the injunction in the face of certain letters which he had previously received from the defendant's architect (Mr. E. B. L'Anson) and solicitors. He also contended that the attic window was not an ancient light, alleging that it had formerly been fitted with shutters, which, when the attic was not in use, had been closed, and that, therefore, there had been no continuous user or enjoyment within the meaning of the Act.

A number of witnesses were called to support and refute these statements, and the evidence was somewhat conflicting. As to the damage which the light in the plaintiff's premises had or had not sustained by the raising of the front wall of the defendant's premises, several professional witnesses were called. Mr. Seth Payne and Mr. Sextus Dyball on behalf of the plaintiff, and Mr. E. L'Anson, F.R.I.B.A., Mr. E. B. L'Anson, Mr. E. A. Grining, and Mr. Curtis on behalf of the defendant. Mr. Payne and Mr. Dyball stated it as their opinion that, taking into consideration the narrowness of the passage and the height of the buildings on either side, the raising of the front wall of the defendant's premises must result in a loss of skyline, and a consequent diminution of light to the bar of the plaintiff's premises, also that the light to the attic window had been seriously obstructed. Messrs. L'Anson, Grining, and Curtis, on the other hand, maintained that the bar depended for light to a great extent upon skylights, and that the raising of the opposite premises could in no way affect the light, which could only be derived in a vertical direction. As an example of the difference of opinion which is frequently so apparent among professional witnesses, Mr. Grining stated that he considered that had the defendant raised his wall 150 ft. above the old line the plaintiff's light would not have been materially injured.

Mr. Justice Kekewich, in giving judgment for the plaintiff, with costs, stated that with regard to the attic window, the plaintiff had fully made out his case as to its being an ancient light within the meaning of the Act; further, that he considered the light had been affected by the roof of the defendant's new building, and in this respect he awarded 15l. damages to the plaintiff, to defray the cost of providing additional light to the attic to compensate for that of which it had been deprived. As to the injunction, the learned judge stated that no amount of expert evidence would tend to convince him that the projected raising of the front wall of the defendant's premises would not have damaged the light enjoyed by the plaintiff's bar, and that therefore the plaintiff was perfectly justified in applying for the injunction, notwithstanding the letters which he at the time received from defendant's architect and solicitors, informing him that his rights would be respected, as these letters gave no drawing or undertaking showing to what height it was intended the defendant's building should be carried up.

A DISPUTE AS TO STONE-CUTTING MACHINES.

HALL v. BURKE.

This case, which was reported in the *Builder* for March 27 last, p. 489, has recently been before the Court of Appeal. The facts are briefly these.—Early in the present year, Messrs. Hall & Co., engineers, of Burley, near Leeds, brought an action against Messrs. Burke & Co., mosaic manufacturers and marble merchants, of Newmarket-street, London, and of Paris and Venice, for the value of certain machines supplied to the defendants' order. The defendants,—or, more correctly, the defendant,—is well known as the manufacturer of mosaic tesserae, produced by a special process from a combination of granite or marble and certain other materials. For the purposes of this work he ordered from the

* For view, plan, and description, see *Builder* for Oct. 9th last; and for block-plan, showing relative positions of this proposed building and St. George's Hall, see *Builder* for Jan. 23rd last, p. 182.

plaintiffs three horizontal machines on the pendulum principle, from drawings and plans supplied by himself. The machines were in due course delivered, but, on the question of payment arising, considerable conflict ensued between the parties, and an action at law followed. The defendant demurred to paying for one or two of the machines, on the ground of alleged defects in construction, which led to a failure to work. From the plaintiffs' case it seemed that they had understood that the machines were intended for cutting ordinary building stone, and they contended, first, that saw-frames for marble-cutting ought to be made stronger than those for building-stone; and next, that the crank and not the pendulum principle should have been adopted. And, further, they argued that however that might be, as they had worked, not upon their own designs, but upon plans and drawings furnished by the defendant, they were simply his agents, and were not responsible for the failure, the work having been skillfully executed. Besides the claim for the machines, the plaintiffs also claimed an amount for certain extra work which they said had been imposed upon them during the construction of the machines. On the other hand, Mr. Burke made a counter claim for 3,000, or 4,000, on the plea of loss through the inefficient machinery supplied. The plaintiffs' claim amounted to between 800, and 900. The trial, in the first instance, occupied ten or eleven days, during which several eminent experts were examined on each side, and eventually Mr. Justice Grantham decided that the plaintiffs had only acted as the defendants' engineers or servants, inasmuch as he supplied the drawings, and introduced a sand-box and other arrangements of his own design; that the breakage was largely due to the cramping of the details rendered necessary by the limited space for the machine in Paris; and that the defendant had adopted the wrong principle. On all these grounds he decided against the counter claim, and pronounced for the plaintiffs' claim, slightly reduced.

Against this judgment Mr. Burke appealed, and after a further trial of five or six days the decision of the higher Court has just been delivered. Mr. Burke conducted his own case, and the Court complimented him upon the skill and ability he displayed. The Master of the Rolls described the various forms of contract in such matters. First there was the contract under which a manufacturer simply made machines to the order and on the plans of the customer, and accepted no responsibility beyond putting in proper work. Then there was the contract under which a manufacturer undertook to supply a machine for a specified purpose, and upon his own design and invention, and such a contract implied a guarantee that the machine should be fit and proper for the purpose. Again, there might be an agreement between the parties that each would do his best, and they should try jointly to procure the machine required, and in that case there would be no implied guarantee. In the case now under consideration there was, however, a contract in writing, under which the plaintiffs were to make a machine as stated in the letters, and in the view of the Court the usual guarantee to make a fit and suitable machine was thereby implied. Thus the question of liability for the failure of the Paris machine was decided against the plaintiffs, and the previous decision reversed. Then with regard to the point of additional charges for extra work, it was true that the defendant had during the construction made certain suggestions, in the form of orders, and the plaintiffs had acquiesced in their right in declining to adopt these suggestions, except on the condition of being exempt from the guarantee, and being paid for the extra work. That would have constituted a new contract, but that was not done in this instance, and the conclusions at which the Court arrived were these. It was clear from the evidence that the Paris machine had broken down, and as the manufacturers had adopted the defendant's suggestions, the plea that his sand-box had caused the failure would not stand. The plaintiffs were therefore responsible. It was held by the plaintiffs that the defendant had kept the machine so long in Paris that he must be taken to have accepted the machine in its condition at that time, but the Court did not take that view, but decided that the plaintiffs having failed with their machine, they must take it back, and also repay to Mr. Burke the cost of carriage to Paris, the machine delivered not having been according to contract. As to the other two machines which were not taken to Paris, with regard to one, the Court could find no substantial defects in it, and the defendant must accept it; and as to the other, he had kept it an unreasonable time, and must, therefore, be held to have accepted that also. The plaintiffs having succeeded in the greater part of their claim, they were entitled to the general costs of the action; but both parties having done wrong, the Court ordered that the costs of the Paris machine, about 102, plus the cost of carriage, but he also to pay the general costs, and his own costs on the appeal.

EMBATTLED GABLES.

Sir,—Your correspondent, "A. H.," in your issue of the 4th inst. [p. 826], asks a question as to the origin of embattled gables, such as were shown in my little sketch of St. Jans Gasthuis, which you reproduced on p. 768.

The form is very common in the Low Countries, though not peculiar to them, as examples, varying in style and design, may be seen in most European countries, and I think it can hardly be attributed to Spanish influences, but is rather a development of the embattled parapet. There is a house at Tournai, illustrated in "Gwill's Encyclopædia," p. 243, which shows a combination of the embattled wall and stepped gable, and many walls of Venetian palaces are finished with small brick gables or pinnacles bearing a great resemblance to the roof gables of Holland. This, however, is only fanciful, and a careful examination of Dutch work would seem to point to the common-sense reason, that the stepped gable was used so frequently because it was easier to arrange the bricks in regular breaks than to chamfer each one to the line of the roof angle; and in cases where, for ornament or some other reason, it was thought necessary to bring the gable nearer the triangular form, the spaces at the set-off were filled in with scroll-work or figures.

The brick-coped gable is pretty common, taking the rake of the roof as the first set-off, and it usually has a solid piece of brickwork at the apex corresponding to the upper "merlon" of a regular embattled gable. This would seem to be a more modern form than the other, though I have no accurate information on this point.

Beyond the reasons given above, there are artistic advantages in the use of this embattled form which the old Dutch builders were fully alive to, as this, more than any other kind of gable, helps to preserve that horizontal so characteristic of the North Holland buildings. The strings dividing the wall space are repeated in the gable and returned on the steps, which are usually from 7½ in. to 9 in. thick.

F. T. W. GOLDSMITH.

CHIMNEY-SHAFT FOR "DESTRUCTOR."

Sir,—Will you kindly allow me to ask readers of your journal if any of them will give me particulars of the size to build a chimney-shaft to carry off the fumes from a "Destructor furnace" for burning town refuse?

Perhaps the Messrs. Bancroft, who are authorities on the subject of tall chimney construction, would favour me with some information respecting these shafts.

C. I.

PROVINCIAL NEWS.

Beckhill-on-Sea. The sewerage works for Bexhill-on-Sea were commenced in the early part of March last, the tender of Mr. James Hayward, contractor, of Eastbourne, amounting to 5,477, being accepted. They have recently been completed at a cost of 5,581, which is within the engineer's estimate. The whole of the work has been carried out from the plans and under the superintendence of Mr. H. Bertram Nichols, Assoc. M. Inst. C.E., whose scheme was selected by the Local Board as being the best and most suitable for their district, out of several candidates who competed for the appointment last year. The total expenditure by the Board has amounted to about 7,500, which includes engineering charges, compensation, and use of main outfall sewer, &c. The work has been carried out within the specified time. The duties of clerk of works was undertaken by Mr. J. Downsbrough, of Bexhill. The scheme embraces Bexhill and the village of Sidley, and has been designed upon the separate system, the bulk of the rainfall being allowed to pass away through the existing channels. Manholes are constructed at every change of lateral deviation, the whole of the sewers being in straight lines with even gradients, having manholes, lampholes, or ventilators at every change of vertical deviation. The length of the sewers is about five miles 1,000 yards, the greater portion being of stone-ware pipes 9 in., 12 in., 15 in., and 18 in. in diameter. A considerable length are of "Hassall's patent safety pipes," this joint being used for the steep gradients, and where it has been necessary to ensure a safe and watertight joint. The remainder of the pipes are of Doulton's London manufacture. The ventilation is effected by numerous openings in the roadway, in connexion with the manholes and lampholes, having dirt-boxes combined with the covers, numbering 115 permanent openings on the whole system. A slight drop is allowed at each manhole, and flap valves are inserted, breaking the sewers into short lengths, whereby each section ventilates itself. By this means the sewer air is prevented from rising into

the higher portions of the district, which are additionally ventilated by cast-iron shafts carried up above the houses, surmounted with Gibb's weatherproof extractors. Sliding disc flushing-valves are placed in the manholes for the purpose of flushing the sewers with the ordinary flow of the sewage. In addition to this, automatic flushing-tanks are placed at the dead ends of the sewers, fitted with Doulton's annular syphon, capable of discharging about 600 gallons at each flush. An interesting feature in the scheme is the construction of a large flushing-tank on the main sewer in connexion with a stream, having a capacity of about 1,600 gallons, which is capable of discharging its contents in the short space of a minute and a half. The tank is fitted with valve-chamber, penstock, and overflow, and has a 9-in. outlet to the main sewer. The main outfall sewer is ovate in section, 2 ft. 6 in. by 1 ft. 8 in., and connects on to the main sewer along the new esplanade, constructed by Earl de la Warr, for the Bexhill estate, passing into outfall tanks, and from thence out to sea in cast-iron pipes.

Edgbaston (Birmingham).—The new Vestry-hall and offices for the parish of Edgbaston are now ready for occupation. The new premises, situate at the corner of New Bridge-street and Enfield-place, Islington-row, have been built in consequence of the Midland Railway Company having acquired the old Vestry-hall in Enfield-place, which they have since converted into offices for the Five Ways Railway-station. The new buildings are in the Early Elizabethan style, adapted to modern requirements. The architects are Messrs. Osborn & Reading, of Ecnawett's-hill. The elevations are of red brick, with red Beggars' Well stone dressings. The contractor is Mr. John Bowen, of Balsall Heath.

CHURCH-BUILDING NEWS.

Newby-in-Cleveland.—A Church of England School and Mission Church at the village of Newby-in-Cleveland, in the parish of Stokesley, was opened last week. The drawings for the building, which were prepared by Mr. John W. Alexander, Diocesan Surveyor for York, have been approved by the Education Department. The brickwork, slating, &c., was executed by Mr. Adam White, of Guisborough; the joinery work by Mr. John Harbottle, of Great Ayton; and the plumbing and painting by Mr. Jonathan Rowlands, of Yarm.

Swansea.—Llanvnewydd Church, Penclawdd, was reopened for divine service by the Ven. Archdeacon James on the 9th inst. The building has been thoroughly restored, the stone spire taken entirely down and rebuilt, it having been found to be in a dangerous state of decay; the belfry windows and stonework of the tower replaced, the entrance archway fitted with an oak door, the whole of the windows reglazed with cathedral glass, and the walls and ceiling re-plastered and coloured. The walls outside are carefully pointed in Aberthaw mortar; the church heated by Mr. Porritt's system; and an eagle lectern placed in the chancel. The work has been executed by Messrs. Thomas Watkins & Jenkins, of Swansea, from the designs and under the superintendence of Mr. J. Buckley Wilson.

Witnell.—The Church of St. Paul was reopened on the 5th inst., after internal alterations. The old box pews at the eastern end of the church have been replaced with new open benches. A new reading-desk has been provided, and the existing pulpit reduced in height. The aisles are paved with polished flags. At the west end of the building an interior porch has been erected. The contractor was Mr. J. Pearson, of Manchester, and the architect Mr. Henry Ross, of Accrington.

STAINED GLASS.

Morhanger (near Bedford).—A Munich stained-glass window has just been erected in the Church of Morhanger, near Bedford. It represents "The Angel at the Tomb," and a brass underneath records the fact that it is in memory of Mr. H. Thornton. This is the third window in the church executed by the same artists, Messrs. Mayer & Co.

Paddington.—New stonework and a very large stained glass window have been put up at the west end of St. John's Church, Oxford-square, Paddington. The window illustrates the life of

Joseph, in six subjects, arranged in the following order:—1. Joseph sold by his Brethren. 2. Joseph interpreting Pharaoh's Dream. 3. Joseph accuses his Brethren of being Spies. 4. Joseph maketh himself known to his Brethren. 5. Joseph meeteth his Father Jacob. 6. Jacob blessing the Sons of Joseph. This window is erected by the parishioners and friends to the memory of Mr. John Bonhote, Mary Bonhote, and Cecil Moore, late curate of the parish. The new stonework was designed by Mr. A. W. Blomfield, and Messrs. Heaton, Butler, & Bayne designed and executed the glass at their studios in Garrick-street.

The Student's Column.

STONE QUARRIES.—XXV.

SANDSTONES (continued).

WITH the exception of some large and important quarries to the north and north-east of Beaumaris, and a few scattered workings here and there, in carboniferous beds, limestones are not raised in Wales. But sandstones are, and in some instances have found their way into the London market. One of the principal of these is that obtained from the

Quercella quarry, near Bridgend, in Glamorganshire. The first historical record of the quarrying of this stone dates from the time of Elizabeth; and, although the material is now extensively raised, it is interesting to note that the old quarry has not apparently been disturbed since that time, the newer workings having been commenced on the slope of a hill running down to the river Ogmore, and 200 yards or more distant from the old quarry. On a recent visit, curiosity tempted us to go into the latter, where we found large trees had grown in a clay soil which had fallen from the upper part of the working. The old blocks of stone were covered with moss, in spite of the fact that the stone had not sufficiently decayed to afford a good hold to the roots!

The new quarry may be described as a trench about 300 ft. long, 60 ft. broad, and 40 ft. deep, in the Millstone Grit formation. The stone is raised from the bottom and put into trucks by means of a steam travelling gantry, which runs on ways supported by massive beams of timber, parallel to the face of the quarry. A siding from the Great Western Railway contributes materially to the ready transport of the stone. Of the latter there are six kinds, all having more or less a greenish tint. There are only three beds, known respectively as "grey," "green," and "white," specially worked for building purposes, and of these the green and white are decidedly the superior, being used for dressings both inside and out, pulpits, &c., the grey supplying good steps and landings. The stone known as the "top rock" is used for shoddies, quoins, and wall-stones. One bed is known as the "grindstone rock," from the fact that those implements are made therefrom, whilst another is called the "holystone bed."

Microscopically, the stone from the green bed is less compact than that from the white, whilst both show that, in addition to having a considerable proportion of silica disseminated throughout the grains of sand, the stone is highly compressed. Occasionally small siliceous concretions appear, but as they are firmly fixed in the surrounding material they do not detract in the slightest from the durability of the stone. Neither are these bodies sufficiently numerous to deserve more than a passing notice. Unquestionably the stone is very durable, and this fact should commend it to the notice of those who are seeking desirable materials with which to construct edifices in the metropolitan area.

Mr. David Kirkaldy's experiments show that two 6-inch cubes of the white and green stones respectively crushed at 546·4 and 438·4 tons per square foot.

It may be seen in the Colonial Institute, Northumberland-avenue; Llandaff Cathedral, Carmarthen Asylum and Gaol, Neath Post Office, All Saints' Church, Torquay; Brecon Church, &c.

New Quay Quarry.—This quarry is near Llandysul, Cardiganshire, and the general appearance of the stone raised is very similar to that of the lastly-described quarry, with the addition of a little mica. It is found in the Lower Silurian formation. A microscopic examination shows that the stone is derived principally from the disintegration of granitic

rocks, the three minerals essentially constituting these latter,—quartz, felspar, and mica,—all being present. This accounts, in some measure, for the very high percentage of alumina in the stone (9·70), though we are inclined to think that some of this chemical has also been introduced from an extraneous source, more especially as we find that the chemical analysis was made on a surface stone, which hardly does the material credit. The proportion of silica (87·25) is, of course, correspondingly low. The stone, however, is very compact,—a quality due to great compression, and this places it in the front rank of the sandstones used for building purposes. Mr. Kirkaldy's experiments show that the resistance to thrusting stress on four 6-in. cubes was 730·2, 729·7, 681·0, and 671·9 tons per square foot.

It has been used principally in the neighbourhood, a fine example being in the new Infirmary at Aberystwyth, whilst it has also been selected for rebuilding the University College of Wales, at the same place.

The *Milverton quarry*, Pen-y-gelli, Denbighshire, supplies a greenish-brown stone for ashlar, to Liverpool, Chester, &c.

Sandstones are raised extensively for buildings in Scotland, chiefly from beds of old red sandstone and Carboniferous age. Everybody is familiar with the celebrated flags and stones from Dundee and Arbroath, in Forfarshire, as most large cities, especially Edinburgh, Glasgow, and London, have been built and paved with them to some extent. It is the Arbroath stone, however, which forms such excellent inside pavements, the Dundee being used mostly for ashlar and the like. The flagstones from Caithness need no introduction, their durability and strength being well known. The largest quarries are in the vicinity of Thurso.

The following Carboniferous sandstones are most valuable, the buildings in Edinburgh and Glasgow being largely constructed of them.

Craigleith Quarries.—These are situated quite close to Edinburgh, and the whitish-grey stone obtained from them is one of the best, and most durable in the United Kingdom, as everybody admits. The stone is fine-grained, and the quarries show a vertical face of about 240 ft. to 260 ft. All this, however, is not workable stone. The freestone runs in beds from a few inches to 10 ft. or 12 ft. in thickness, and these are often parted by shales. It will be obvious that all the stone cannot be of precisely the same character.

The chemical analysis shows a very high percentage of silica (98·3), and the microscope clearly demonstrates the existence of much of this chemical between the siliceous grains, so that the stone has a tendency to become splintery. Small pieces of mica are present.

It has been largely used in London and examples may be seen in Southwark Bridge. Many public and private buildings in Edinburgh are made of it, amongst which we may mention the Law Courts, Royal Exchange, "National Monument," and the University. It has also been exported to the Continent.

Other Carboniferous sandstone quarries are at Binnie, near Uphall, Linlithgowshire, where the stone is light brown or grey, and has been used in the New Club House, Princes-street, Edinburgh, and the Bank at Greenock. *Giffneuch*, near Glasgow, the stone being pale grey, fine-grained, easy to work and much used in that city and the neighbourhood; its weathering qualities are variable. *Hunter's Hill*, also near Glasgow, and very similar in appearance to that from Giffneuch. *Humbie*, near Edinburgh, where there are three kinds of stone, different shades of grey; the top bed is darkest. It is fine-grained, occasionally micaceous, and yields large blocks, suitable for fine ashlar. It has been used in Dundas Castle, additions to the Royal Institution, Edinburgh, and in the Royal Exchange, Glasgow. There are also numerous quarries to the northward of Paisley, near Dunmore, Stirlingshire, and near Perth.

The Triassic or New Red Sandstone series of Scotland produces some good material. There are several large quarries in the vicinity of Annan, in Dumfriesshire, the most celebrated of which are the

Corsehill Quarries.—The prevailing colour of the stone is a dark red, but some of the beds are bright pink. It is a fine-grained sandstone, the general thickness of the beds being from 12 in. to 30 in., but occasionally up to 4 ft. The stone runs very large so that practically any length and breadth can be obtained. It is easily worked and of uniform texture and

appearance. Railway sidings are made into all the quarries, thus enabling the material to be sent away with expedition. A large staff of masons are employed in working the rock.

The particles of the stone appear to be bound together partly by compression and partly by silica and peroxide of iron. The chemical analysis shows silica 95·24, alumina only '56, peroxide of iron 1·28, carbonate of lime 1·40, carbonate of magnesia 1·23, &c. Its specific gravity is 2·26, and the amount of water it absorbs is 6·25 per cent. The results of experiments to show the resistance to thrusting stress of three 6-in. cubes give 613·0, 513·1, 372·7 tons per square foot, before the stone was crushed.

Corsehill stone is being largely used in many parts of the kingdom for ordinary house-building purposes, bridges, and docks. It has been used in the following edifices:—Liberal Club and Free Library, Belfast; National Picture Gallery, Edinburgh; James Street Station, Liverpool; Hand-in-Hand Insurance Office, Queen Victoria-street; St. James's Hall, Piccadilly, London; and the principal buildings in Annan, including the parish church, built in the seventeenth century. At least 5,000 or 6,000 tons are annually exported to the United States. A large part of the interior of the Capitol Building at Albany and several public edifices in New York have also been constructed with it.

There are several other Triassic sandstone quarries in Dumfriesshire, all of which produce a somewhat similar stone, and greatly contribute to the pleasant appearance of neighbouring towns.

The northern and southern parts of Ireland produce good building sandstones, of approximately the same geological age as those we have mentioned in Scotland. The Old Red Sandstone affords fine-grained flagstones and tiles in the counties of Cork and Kerry, and it is in the upper part of this formation that some of the oldest known plants (*Paleozoic Heterospora*) have been obtained. Speaking generally, the sandstones are brown or reddish, and are very durable, some in buildings of high antiquity being in good preservation at the present day. The sandstones of carboniferous age are largely worked. A large portion of Belfast is built of a fine-grained white freestone from Cookstown, the excellence of which is apparent in the larger edifices in that city. There is abundant good material in county Antrim, near Ballycastle, close to the sea; and we must here again point out the lack of energy on the part of those who might develop a large industry in stone in this part of Ireland. Its proximity to the sea, and other natural qualifications, are present to enable the stone to be easily shipped and sent to any port in the kingdom.

The Carlow flags are of a dark-blue and grey colour, rather micaceous, and are sent to Dublin by canal. The upper part of the Trias, although so arenaceous in the western part of Antrim, does not, as a rule, furnish good building stones; but in the lower part they appear to be harder and more durable, whilst the stone is decidedly handsome, as may be seen in Belfast, Newtownards, and the neighbourhood. The prevailing tints are reddish-brown, yellow, and light-grey.

* * With reference to our remarks on the *Park Spring Quarries*, near Farnley, Leeds, p. 862, ante, the formation in which they occur is not the Jurassic (though it has been supposed to be so formerly), but the Carboniferous.

Books.

La Necropole de Myrina: Fouilles exécutées au Nom de l'Ecole Française d'Athènes. Par E. POTTIER, S. REINACH, et A. VERRIER. Texte et Notices par E. POTTIER et S. REINACH. Ernest Thorin, éditeur.

THIS is the first volume of the long-projected work on the excavations at Myrina. Some specimens of the remarkable terra-cottas discovered there,—terra-cottas which threaten to eclipse in interest those of Tanagra,—are, as we noted some months back, exposed in the Campana room of the Louvre. A few more have been published in the *Bulletin* of the French School at Athens, but now for the first time the whole material, with ample commentary, is laid before the public. Myrina, up to

the date of these excavations, has been to most people nothing but a name. Happily the site of the ancient city (now known as Kala-Bassary) belonged to a gentleman of rare culture and liberality, M. Aristides-bey Baltazzi, whose name should be handed down in all honour to posterity. He offered to the French Government the privilege of excavating the necropolis known to exist on his property. The French school was not slow to avail itself of the offer. Three skilled archaeologists, M. Veyries, M. Pottier, and M. Reinach were sent out to direct the work. M. Veyries died before it was completed. The present book is the result of the investigations of his two collaborators. Their object they define to have been threefold,—(1) to determine the ancient site of Myrina; (2) to explore methodically the whole of the Greek necropolis, and observe carefully the shape of the tombs, the manner of burial, and, if possible, to determine the chronology of the whole; (3) to investigate the specialities of terra-cottas fabricated in Asia Minor and contrast their characteristics with those found in Greece proper.

The third object is one of such general interest that we shortly summarise the results. M. Reinach and M. Pottier, with over six hundred specimens before them, had a task more interesting than difficult. They summarise their conclusions, with that admirable lucidity which characterises French work, under five heads. (1) The Myrina terra-cottas show a number of types of great antiquity, originating, no doubt, in religious tradition and perpetuated long after the skill of the coroplast was equal to more finished work; instances of this are the seated Demeter figures. (2) In general the style of the terra-cottas shows the influence of the so-called "Hellenistic," i.e., Post-Alexandrian, art. Noticeably we have a very small head, elongated limbs, realism in treatment of hair, all of which point back to the influence of Lysippos. (3) The Asia Minor coroplasts had an evident liking for the reproduction of motives popular in statuary, e.g., we have a number of small reproductions of the Aphrodite of Knidos by Praxiteles, again of an Aphrodite Anadyomene wringing her hair; a crouching Aphrodite, the draped Aphrodite possibly of Cos, usually known as the Venus Genetrix. This tendency adds, of course, greatly to the value and interest of the Myrina find. (4) Besides the general Hellenistic influence the Myrina terra-cottas show the more immediate and distinct action of the schools of Tralles and Rhodes, especially in their love of complicated groups and sensational gestures. (5) It is noticeable that we have distinct evidence to the effect that coroplasts at Myrina borrowed their motives, nay more, their actual moulds, from their predecessors at Tauraga. Such are the general propositions established; their justice is fully borne out by the examples given in the plates, fifty in the text and fifty full-page heliographs. To these is added an excellent topographical map.

Order from Chaos: a Treatise on Land Tenure. By WILLIAM PILLING. London: Chapman & Hall, Limited. 1886.

It is as well that on his title-page Mr. Pilling should explain what is the subject of his work, for, certainly, the chief title might refer to geology, or any other science, as much as to land tenure. The book contains,—to put it briefly,—a draft of an Act of Parliament to put our land laws as the author thinks they should be. Most people are agreed that some improvements are needed. The main difficulty is, how we are to carry out the required reforms. Mr. Pilling's draft will not help us much: it is altogether too loose a compilation. For example, as regards county land offices, in his eighth article he begins by saying: "The administration of the law shall in each county be under the supervision of the Lord Lieutenant." It would be curious to see how such a loose rule would work in practice,—as a matter of fact, it may mean anything or nothing.

Proposed Restoration of Dunblane Cathedral. The *Elgin Courier* reports that at a recent meeting of the heritors of the parish of Dunblane, a handsome offer was made on behalf of one of their number to restore the nave of the cathedral to a place of worship. This offer was made on the condition that the heritors contribute a certain sum to assist in the restoration. It is stated that "£40,000 would be required to restore the cathedral effectively."

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,363, Ventilators, Shutters, &c. E. Clarke.

This apparatus is chiefly designed for use in opening and closing lights and ventilators as used in greenhouses. The power required is applied in a direct line, and the frames are thus held securely at any angle without the intervention of levers. A threaded spindle passes through a nut, and when the winch-handle actuating the same is revolved the spindle is lifted or lowered. A swivel-bearing is employed which accommodates itself to the various angles, the rod or spindle always being in a direct line with the frame of the light or ventilator.

186, Flushing Cisterns. O. Elphick.

These improvements relate to that class of apparatus in which the discharge of water from flushing cisterns is effected by means of a syphon put into action by the discharge into it of water from a cylinder contained within the cistern. The syphon is here formed by carrying the discharge-pipe up within the cistern to a level above the top of the tank, and by surrounding this upward prolongation of the discharge-pipe with another pipe of larger diameter but closed at the top, with openings into it at the bottom for the passage of water. A pipe is led from the closed top of the outer syphon-pipe to the bottom of a cylinder contained within the cistern. The cylinder is fitted with a piston coupled to a lever in connection with the pull-up mechanism of the closet to be flushed. Normally the piston is held up by the lever to the top of the cylinder, and as the cistern fills with water the cylinder can also fill through the openings in its sides just below the piston. When the piston is forced downwards it forces water from the cylinder to the closed top of the outer syphon-pipe, which is then discharged in a direct downward direction into the open mouth of the inner syphon-pipe, starting the syphon and causing the remainder of the water to be sucked up between the inner and outer syphon tubes and discharged through the inner one, which forms the descending limb of the syphon.

215, Window Fasteners. C. Horner.

This is a screw fastener worked by means of a milled head into a socket fixed on the upper sash.

364, Sash-Fasteners. J. T. Hyde.

This is a lock fastener. The improvement consists chiefly in the form of the plate, which is made with a tightening catch for the movable arm of the fastener. When pushed quite home the arm can be locked in position with a key.

1,988, Discharge-Connexions for Baths, &c. John Shanks.

The discharge orifice in the bottom of the vessel is provided with a flanged metal grating, and the mouth of the discharge-pipe below is brought up to it on the underside, and then fastened with a screw. It is claimed that in the case of earthenware baths, &c., this method of fastening is less liable to cause breakage.

11,875, Automatic Flushing Apparatus. J. Tonge.

The improvements which are the subject of this invention are designed to discharge water into the openings or spaces devoted to be cleansed at regular periods, which periods may be adjusted as required; this is effected by the use of a double vessel, which is alternately filled and emptied by the flow of water.

12,539, Decoration of Girders. E. C. Allam.

According to this invention, the exposed surfaces of wrought-iron girders are decorated by impressing thereon in the process of rolling a raised pattern, so that they may be used for fascias or friezes in buildings. When, for instance, a shop-front fascia, with a name, has to be introduced, a projection is rolled on the flanges so as to allow for the insertion of a metal panel, or the letters, bronze, cast-iron, brass, &c., may be affixed to the web of the girder.

10,965, Hammers, &c. C. J. Grellner.

This invention consists of improvements in the method of fastening the heads to the handles by means of a wedge in which a nail is driven and deflected by a groove in the wedge in such a manner that it turns outward into the wood of the handle, thus giving an additional security.

11,690, Indicating Locks. E. Banfield.

The object of this invention is to provide a simple, cheap, and reliable means of showing on the outside of an apartment or compartment when the same is engaged. The apparatus consists of a disc, a cover plate, a guide plate with stops, and a crank handle pivoted with knob. The disc is attached to the key on the outside of door, and has the word "Engaged," or some other suitable term, upon it. The cover plate is fixed over this, having an opening through which the word on disc is brought to view when in position. The crank handle is attached to the key on the inside of the door, and when the handle is turned to fasten the door, the disc on the outside exhibits the word thereon, and when turned to unfasten the door, the word is hidden by the cover plate. The guide plate with stops is fixed under the crank-handle to keep it in position.

12,950, Shutter Hinges. B. C. Anderson.

This hinge holds the shutters in an open position engaging automatically, and is so formed as to be braced and sustained efficiently against the great force liable to be impressed on it in severe gales. The chief detail is in a peculiarly-formed dog and a pivot for connecting it, so that it may rise or sink to be engaged or disengaged.

13,088, Securing Chimney Pots. E. Marlaud.

According to this invention, a frame is made of cast iron, about 3 in. in depth, with an angular top, and forming a band or cap around the top of the chimney, which, when fixed, binds the brickwork together, and prevents the bricks or chimney pots from getting loose.

13,182, Soldering Fluid. T. Garton.

This fluid is designed to obviate the formation of "after rust," and is produced by an admixture of several fluid ingredients in specific proportion, notably chloride of zinc and spirits of ammonia.

13,260, Perspective Drawing Apparatus. R. E. Creasey.

By means of this little apparatus it is claimed that the different parts of an object to be drawn in perspective may be reduced to the same scale, and also that the scale may be readily altered. It is a what resembles in outward form a small winding tape-measure, with a spindle at the top on which gradations are marked, and there is also a sliding nut. A small button at the end of the marked tape or string is held in the mouth while the nut and spindle are adjusted to the object it is desired to draw. When this is accomplished, the scale is found, and the instrument may be applied in the same way to the different parts of the building to be sketched, and the distances set off on paper.

13,021, Fireproof Shutters for Stairways. H. Dale.

This invention relates to the construction of an apparatus designed to prevent the spreading of fire from floor to floor, and consists of a corrugated iron shutter that is housed or boxed beneath the stairs leading to the floor above that in connexion with which the shutter is arranged, the said shutter being so constructed and mounted that it can be readily withdrawn from its housing and drawn to a position to cover the well or opening formed for the stairway.

NEW APPLICATIONS FOR PATENTS.

Nov. 26.—14,414, W. Smith and others, Hinges for Step Ladders.—15,419, J. Hodges, Mortise and Rim Locks.—15,446, C. Steer and J. Stubbs, Norfolk Latches.—15,466, C. Appleby, Heating Chambers or Closets.—15,473, J. Winkler, Press for Moulding Building Blocks.

Nov. 27.—15,493, J. Shanks, Lavatory Basins. Nov. 29.—15,543, J. Fisher, Latch for Doors, Windows, &c.—15,546, A. Henderson, Syphon Trap Closet/Pans.—15,552, H. Lowden, Tiles for Roofing, &c.—15,553, W. Frost, Locks.—15,570, W. White, Flushing Cisterns.

Nov. 30.—15,584, P. Walker, Ventilators.—15,603, F. Baker, Door and Window Fasteners.—15,607, G. & M. Stowe, Bolt for Doors, Windows, &c.—15,609, G. Courtier, Drain Traps.—15,620, S. Timings, Closing Springs for Doors, &c.—15,622, J. Staw, Cooking Ranges.

Dec. 1.—15,678, H. Sulley, Glazed Pavement Lights.—15,714, W. Pirschel and B. Kirchner, Process for the Treatment of Wood.—15,729, A. Williams, Portable Dustbin.

Dec. 2.—15,759, R. D. Ridder and W. Bennett, Heating Houses, Public Buildings, &c.—15,769, M. Crofton, Attaching Sash-lines to Frames.—15,779, W. Wrigthorpe, Bakers' Ovens.

Dec. 3.—15,803, A. Yates, Apparatus for Driving Saw Machinery.—15,815, G. Martin, Holdfasts for Pipes, &c.

Dec. 4.—15,875, J. Coppard, Preventing the Rattling or Jamming of Windows and Doors.—15,904, R. Davison and W. Creed, Wood Block Flooring.

Dec. 6.—15,925, S. Rogers, Fittings to Check the Rattling of Window-sashes.—15,948, H. Haddon, Alarms for Doors.—15,962, S. and S. R. Chadwood, Locks.—15,965, C. Dobbs, Slag Block Paving.—Dec. 7.—15,983, G. Courtier, Kitchen Ranges.—15,988, H. Dunnall and F. Smith, Tiles.—15,998, J. Bryant, Alarms for Doors and Windows.—16,007, J. Dedden, Fastening Window-sashes.

Dec. 8.—16,071, W. Meats, Joints for Earthenware Sanitary Pipes.—16,083, W. S. Soudy, Combined Mite-cutter, Shoot, and Cramp.

Dec. 9.—16,105, J. Craig, Ventilator.—16,115 W. Matthews and Others, Grabs and Excavators.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,914, W. Whitehead and A. Emley, Heating Houses, Buildings, &c.—13,150, H. Pike, Sanitary Dustbin.—13,431, C. Smith, Slides or Plates for Door-chains.—13,440, J. Parr and T. Kendrick, Sash Fasteners.—13,451, J. Clark, Door Fasteners.—13,555, J. Horrocks, Ventilation of Buildings.—13,647, A. Stove, Automatic Catch or Fastener for Doors, Windows, &c.—13,662, W. Popplewell, Clamping Devices.—14,010, J. Fenby, Stop Joint or Hinge.—14,015, W. Bagshaw, Plain and Corrugated Sheet-iron Roofs.—14,124, C. Turner, Tubular Springs for Doors.—14,128, P. Walker, Ventilating

Apparatus.—14,223, J. Tall, Concrete Wall Construction.—14,627, H. Dodd, Flushing Apparatus.—14,668, J. Watson, Ventilators.—14,922, J. West, Water-closets.—12,227, J. Goodwin, Window-sash Fastener.—12,338, J. Wood, Ventilator for Windows.—14,126, D. Wilkins, Chimney and Ventilating Shaft Tops.—14,384, S. Robson, Ventilation of Rooms.—14,442, A. Henderson, Fixing Door-knobs to Spindles.—12,463, F. Prouvay, Saws.—13,695, G. Hattersley, Imitation Tiled Surfaces for Hearths, &c.—14,045, W. Cranville, Electric Bells and Indicators.—14,054, F. Mori and R. Westley, Paint Brushes.—14,146, W. Bevan, Sash Fastener.—14,168, L. Dove and J. Bush, Sash Fasteners.—14,305, H. Wilkes, Window or Sash Fasteners.—14,491, R. Henry, Sash-line Fasteners.—14,692, E. Cowper, Locks, Latches, and Bolts.—15,017, M. Syer, Siphon Water Waste Preventers.—15,024, W. Sudbury and W. Spreadbury, Chimney Tops and Ventilators.—14,386, T. Rees, Metal Tiles.—14,469, H. & A. Foster, Band-saw Frames.—14,470, H. & A. Foster, Saving Machinery.—14,637, F. Worsner, Fastener for French Windows, French Windows, Doors, &c.—14,837, H. Bromhead, Skylight or Fan-light Opener.—15,012, H. Macevoy and Others, Portland Cement.

COMPLETE SPECIFICATIONS ACCEPTED.
Open to Opposition for Two Months.

15,820, E. Pither, Door-shield or Finger-plate.—833, S. Phillips and S. Wise, Indicator Lock.—1,243, A. Fould and P. Genreau, Retractory Bricks, Tiles, &c.—1,372, J. Watson and H. Moorwood, Dog Grates, Reproaches, &c.—3,115, G. Kyles Self-locking and Burglar-proof Coal Plate.—7,726, J. Horrocks, Trapping and Ventilating Water-closets, and Drains connected therewith.—10,829, C. Dobbs, Scotia Paving Blocks.—1,282, J. O'Callaghan, Securing Door Handles or Knobs to Spindles.—7,599, W. Pitt, Traveller Cranes.—1,496, T. Cramp-ton, Electric Bells.—1,654, A. Gold, Hinges.—2,073, G. Lazenby, Kilns.—5,373, J. Grant, Tension Apparatus.—13,879, J. Grant, Combined Latches and Locks.—15,235, W. Macrone, Checking the Time of Arrival of Workmen.—1,862, R. Hunter and J. Turnbull, Kitchen Ranges.—1,913, E. Shorland, Chimney and Ventilating Cows.—5,942, F. Stent, Door Spring.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

DECEMBER 6.
By SALTER, REX, & CO.
Kentish Town—3 and 5, Cathcart-street, 35 years, ground-rent 111. 4440
By WEATHERALL & GREEN.
New Cross-road—Nos. 177, 479, and 481, term 40 years, ground-rent 361. 1,296
Ground-rent of 191, a year for 39 years. 235
Bloomsbury—64, Marchmont-street, 14 years, ground-rent 131. 138. 300
Bethnal Green—17, Nottingham-street, 32 years, ground-rent 51. 130
Nos. 10, 11, and 12, Waterloo-terrace, 34 years, ground-rent 161. 340
DECEMBER 7.
By A. RICHARDS.
Shoreditch—A fourth share in 2 to 10 (odd), Ebor-street, 14 years, ground-rent, 171. 10. 345
Tottenham—2 to 8, and 7 to 12, Union-row, 31 years, ground-rent 246. 210
By TUNNICLIFFE & MARTIN.
Piccadilly—38, Great Windmill-street, freehold. 1,080
Haverstock-hill—23, Crossland-road, 70 years, ground-rent 81. 500
Chalk Farm—6, Hawley-street, 44 years, ground-rent 61. 350
By WILKINSON & SON.
West Brighton—3, Second avenue, and 8, Victoria-mews, freehold. 5,500
DECEMBER 8.
By RICHWORTH & STEVENS.
Hammersmith—7, Starch-green-road, 55 years, ground-rent 51. 440
By C. A. RICHARDS.
Moffingham—Ground-rents of 741, reversion in 79 years. 1,410
By J. BAKER & SON.
Kilburn—6, St. Julian's-road, 78 years, ground-rent 101. 330
Nos. 33, 35 to 41, St. Julian's-road, 78 years, ground-rent 801. 2,385
DECEMBER 9.
By MILETT, BOOKER, & CO.
Hyde Park 21, Camille-square, and stabling, 48 years, ground-rent 311. 10s. 3,310
By NEWSON & HARDING.
Holloway—33, Arthur-road, 50 years, ground-rent 61. 6s. 370
By KLENCK & CO.
Marylebone—40, Charles-street. 105
Battersea 68 and 69, Orrell-street, 91 years, ground-rent 121. 630
By C. C. & T. MOORE.
Whitechapel-road—No. 48, term 125 years, ground-rent 41. 630
Streatham 11 to 15 (even), Albert-road, 65 years, ground-rent 181. 440
Mile End—6 and 10, Frederick-place, 16 years, ground-rent 61. 265
By C. H. WHITE.
Weybridge, Baker-street—Two freehold houses and shops. 820
By E. STIMSON.
Denmark-hill—Ground-rent 801, reversion in 69 years. 1,900

Walworth—137 and 141, East-street, freehold. £1,400
Ground-rent of 161, a year, term 59 years. 240
Kennington—39, Edward-street, 87 years, ground-rent, 41. 10s. 410

MEETINGS.

SATURDAY, DECEMBER 18.

Crystal Palace School of Engineering—Award of Certificates, 1 p.m.

MONDAY, DECEMBER 20.

Royal Institute of British Architects.—Mr. W. Brindley, on "Marble: its Uses as Suggested by the Past." 8 p.m.
Society of Arts (Reading Lectures).—Mr. Lewis F. Day on "The Principles and Practice of Ornamental Design." IV. 8 p.m.

TUESDAY, DECEMBER 21.

Institution of Civil Engineers.—Professor Alex. B. W. Kennedy, on "The Use and Equipment of Engineering Laboratories." 8 p.m.

Statistical Society.—Mr. L. F. R. Price on "Sliding Scales and other Methods of Wage Arrangements in the North of England." 7 45 p.m.

Miscellaneous.

Endowed Schools, Caerleon, Mon.—In answer to advertisements, eighteen sets of designs from various parts of England were submitted for the above, from which the plans of Mr. E. A. Lansdowne, architect, Newport, were selected and unanimously decided upon, subject to consideration of his estimate of the cost of execution.

Draycott Drainage.—The Shardlow Rural Sanitary Authority have instructed Mr. W. H. Radford, Assoc. M. Inst. C.E., sanitary engineer, Nottingham, to prepare a sewerage scheme for the district of Draycott. This hitherto rural village appears likely to increase rapidly in population. A large factory is in course of erection, and new streets are being set out; therefore it is urgently necessary to provide some proper method of sewage disposal for the old and new populations. The surrounding country is very flat, being chiefly meadows on the banks of the river Derwent.

Fires through Lightning in Denmark. The yearly destruction of property in Denmark caused by lightning is very great. Thus it appears from the report recently issued by the insurance companies in Denmark that during the year April, 1885-86, no less than 115 fires were caused by lightning, the damages paid in respect of the same being nearly a quarter of a million sterling. This is due to the almost total absence of lightning conductors on country houses and farms where, in many instances, the roofs are of straw. So serious has this matter become, that some of the insurance companies propose that either a considerable reduction in premium shall be allowed on buildings provided with conductors, or that the companies shall fix them at their own expense. It is calculated that all country dwellings in Denmark might be provided at a cost of about 300,000l.

The London Tramway Company's New Depot at Clapham.—The London Tramway Company have just completed a large and commodious new depot in High-street, Clapham, for the accommodation of the horses and cars engaged in those districts of the company's traffic which are situate between Clapham and Westminster, Blackfriars, the Borough, and Old Kent-road. The depot has been constructed on a site on the south-east side of High-street, close to the company's Clapham terminus, an old mansion and grounds, occupying an area of between four and five acres, having been purchased by the company for that purpose. Upon the central portion of the site two ranges of stabling have been erected on the north and south sides, stretching eastward to a length of about 400 ft., with a roadway 60 ft. or 70 ft. in width dividing each range of stabling. There are twenty-four stables, each stable having accommodation for twenty horses, or 480 horses in all. The roadway between them forms a spacious carriage-shed, along which four lines of rails have been laid down. The company's cars will be stored in this shed at the close of each day's traffic, there being standing-room for between seventy and eighty cars. The shed is covered in by an ornamental glass roof, supported on light iron principals and girders, the contractors for the roof being Messrs. Morton & Co. Beyond the stables and carriage shed, at the extreme east end of the depot, a shoeing-forge has been erected, together with veterinary surgeon's offices and apartments, and a number of loose boxes for horses when under medical treatment. At the north-west corner of the depot, immediately to the left of the entrance from High-street, two blocks

of buildings have been erected, one of which contains the manager's and inspector's offices, and the other a mess room for the drivers, conductors, and other servants in the employ of the Company at the depot. That portion of the site having its frontage to High-street, extending to a depth of between 50 ft. and 60 ft., has been re-sold or leased by the Company for building purposes, and a range of houses and shops is now in course of erection thereon, the entrance to the depot being in the centre. The works at the depot have been carried out under the superintendence of the Company's engineer and surveyor and by their own workmen.

The New Roof at the King's Cross Railway Station.—The re-erection of the roof to the western portion of the Great Northern Railway Company's King's Cross Station, now in progress, will extend over a considerable period, but the arrangements are such that the traffic will in no way be interfered with. The massive travelling stage which has been erected contains about 14,000 cubic feet of timber and 240 tons of iron. The lower portion of the stage consists of immense balks of timber, bolted and riveted together, and resting on a series of wheels running on metals. These timbers form the base of the structure, and support four iron girders, each upwards of 100 ft. in span. The working stage has been erected on these girders, and rises in three tiers to a height of between 80 ft. and 90 ft., being carried up to about 12 ft. below the top of the present arched roof, upwards of 100 ft. high, which is to be replaced by a new roof of similar design, but constructed of iron and glass instead of wood and glass. The first section of the work is now being proceeded with. Messrs. A. Handyside & Co., bridge and roof builders, of Derby and London, are the contractors for the works, which are being executed under the superintendence of the company's engineer-in-chief. It will be remembered by many of our readers that the roof over the eastern half of the station was reconstructed some years ago. The original roof (of which the western half is now being removed) was remarkable from the fact that the semicircular roof principals were built up of lamina or layers of boards clamped together. There were no tie-rods. The result was a very light and open roof, which, although it has not fulfilled all the expectations of its designer (Mr. Lewis Cubitt), has yet stood very well, it being now thirty-four years since it was put up. Illustrations of it, showing its construction, were given in the Builder for Oct. 2, 1882.

The Action of Water on Metal Pipes.—The interminable question of the action of water on metal pipes has been occupying the attention of Mr. Lory. From investigations made by this gentleman at Grenoble, and quoted in the *Transactions of the Institution of Civil Engineers*, it would appear that water containing organic matter in solution attacks iron pipes very speedily. He has made many analyses of water conveyed in iron pipes, and also of water known to have attacked pipes in a manner which led to the formation of what are described as "scabs, or carbuncles of oxide of iron." These scabs have been found to consist mainly of hydrated oxide of iron, and contained 5 to 10 per cent. of organic matter. If from this it may be concluded that the destructive action is due to the presence of organic matter the fact may afford some explanation of the reason why, in some instances, cast-iron pipes resist corrosion, although in other cases, as at Grenoble, they become speedily covered with rust-carbuncles. The manner in which soft water may influence lead pipes has been considered in a report issued by Dr. White, Medical Officer of Health of Sheffield, in which are quoted some experiments conducted at the Hygienic Institute of Pesth. Water, after having passed through a pipe 39 metres in length, was found to contain from 0.085 to 4.7 milligrams per litre of lead, the latter percentage only occurring after the water had remained in the pipe for one month. These experiments are briefly referred to in the *Transactions of the Institution of Civil Engineers*, vol. lxxxv., p. 64, where information is sought concerning the protection afforded by covering the pipes internally with a coating of magnetic oxide and the results of any experiments bearing upon this question. In Germany, Switzerland, and other places, galvanised iron piping is used for water conveyance without hesitation, while in Austria this material is forbidden by law.

Sale of a Building Estate at Ilford.

The second portion of the Oaklands Park Estate at Ilford was offered for sale on Monday last, at the Angel Hotel, Ilford, by Messrs. Baker & Sons. The estate is situated about ten minutes' walk from the Ilford Station of the Great Eastern Railway, having its principal frontage to the main high road to Romford, and extending northwards to the boundary of the Great Eastern goods depot. A new road between 40 ft. and 50 ft. wide, designated Oaklands Park Avenue, has been constructed through the centre of the estate. Upwards of fifty houses and shops have already been erected at the western end of the estate. The number of plots offered on Monday was seventy-five, of which twenty-four were shop plots facing the main high road. There was a very numerous attendance. The auctioneer, in alluding to the advantages possessed by the estate for building purposes, pointed out that in addition to railway communication with the City, the present tramway terminus was only a mile distant, and that very shortly a line of trams would pass the estate. The several plots have frontages of 15 ft. and 17 ft. each, with depths varying from 40 ft. to 60 ft., and at the east end of the estate a plot having a frontage of 57 ft. to the main road, and containing an area of about 6,000 ft., is reserved for the erection of a large hotel. There was a close competition for the several lots submitted, all of which were sold, the plots for the erection of private houses being disposed of at prices ranging from 10*l.* to 15*l.* each, whilst the shop plots facing the main road realised 23*l.* and 26*l.* each.

Gas versus Electric Light.—According to a Vienna Journal, the *Electro-Techniker*, a discovery of great importance as regards the future of lighting by gas has recently been made by Dr. Auer of Vienna, viz. an incandescent gas light said to be as brilliant and pleasant as the electric light and still 50 per cent. cheaper than ordinary gas. It is generally known that when the electric light, through Edison's celebrated discovery, began to be used in earnest, gas engineers did their utmost to introduce improvements into the system of gas-lighting. Among these was the Siemens gas-generating lamp, which is, however, only suitable for the lighting of large rooms, and the hydrogen gas incandescent lamp invented by the Swedish engineer, Herr Fahnehjelm. Dr. Auer's invention is based on the same principle as the latter, viz., to bring a solid incombustible body to white heat. But instead of, as Fahnehjelm, using magnesia needles, Dr. Auer employs a cylinder with perforated sides, the composition of which is kept strictly secret. The gas flame enclosed in the cylinder and over the whole is placed on another gas cylinder. By the heat of the gas flame the incombustible body emits a dazzling white light, which is quite steady, and which is said to excel the electric light in brilliancy. As regards the economical side, Dr. Auer's gas-light consumes only 57 to 75 litres of gas per hour when producing a light equal to between twenty and thirty normal candles, whereas the burners now generally in use consume from 150 to 220 litres per hour in producing a light equal to from eleven to sixteen normal candles. The incombustible cylinder costs very little, and lasts from 600 to 1,000 hours, whilst it may be replaced in a couple of minutes. Gas of inferior quality may also be used, even hydrogen gas, which is four or five times cheaper than coal gas. It seems, therefore, that the Auer incandescent gas-light may become a dangerous rival of the electric light.

PRICES CURRENT OF MATERIALS.

TIMBER.		£. s. d.	£. s. d.
Greenheart, B.G.	ton	6 10 0	7 0 0
Teak, E.I.	load	9 0 0	14 0 0
Sequoia, U.S.	foot cube	0 2 4	0 2 7
Ash, Canada	load	3 0 0	4 0 0
Birch	do	2 5 0	3 0 0
Elm	do	3 10 0	4 0 0
Fir, Dantsic, &c.	do	1 10 0	4 0 0
Oak	do	2 10 0	4 0 0
Canada	do	3 0 0	6 0 0
Pine, Canada red	do	2 0 0	3 10 0
do yellow	do	2 5 0	4 0 0
Lath, Dantsic	fathom	3 0 0	5 0 0
St. Petersburg	do	4 0 0	5 10 0
Wainscot, Riga	log	2 15 0	4 0 0
Odessa, crown	do	3 5 0	3 7 6
Deals, Finland, 2nd and 1st, std. 100	do	7 0 0	8 0 0
4th and 3rd	do	6 0 0	6 10 0
Riga	do	5 10 0	7 0 0
St. Petersburg, 1st yellow	do	8 10 0	14 0 0
2nd	do	7 0 0	10 0 0
white	do	7 0 0	10 0 0
Swedish	do	6 0 0	15 0 0
White Sea	do	7 0 0	17 0 0
Canada, Pine, 1st	do	17 0 0	26 0 0
2nd	do	11 0 0	17 0 0
3rd, &c.	do	6 0 0	8 0 0
Spruce, 1st	do	8 0 0	11 0 0
2nd	do	5 0 0	7 10 0
New Brunswick, &c.	do	5 0 0	7 0 0
Battens, all kinds	do	4 0 0	12 0 0
Flooring Board, sq. 1 in. Pre-			
pared, first	do	0 9 0	0 13 0
Second	do	0 7 6	0 8 0
Other qualities	do	0 5 0	0 7 0
Cedar, Cuba	foot	0 0 3	0 0 34
Honduras, &c.	do	0 2 0	0 0 34
Australian	do	0 2 0	0 0 3
Mahogany, Cuba	do	0 0 4	0 0 7
St. Domingo, cargo average	do	0 0 4	0 0 7
Mexican	do	0 0 4	0 0 8 1/2
Tobacco	do	0 0 4	0 0 8
Honduras	do	0 0 4	0 0 6
Maple, Bird's-eye	do	0 0 6	0 0 8
Rose, Bir	ton	7 0 0	10 0 0
Baba	do	6 0 0	10 0 0
Boy, Turkey	do	6 0 0	17 0 0
Satin, St. Domingo	foot	0 0 6	0 0 10
Porto Rico	do	0 0 7	0 0 1
Walnut, Italian	do	0 0 4	0 0 5

METALS.

Iron—Bar, Welsh, in London	ton	4 7 8	4 16 0
do do in Wales	do	4 2 6	4 7 6
Staffordshire, London	do	5 10 0	6 0 0
Sheets, single, in London	do	6 15 0	8 10 0
Hoops	do	6 0 0	7 0 0
Nail-roads	do	5 15 0	6 10 0
COPPER.			
British, cake and ingot	ton	43 0 0	44 0 0
Best selected	do	44 0 0	45 0 0
Sheets, strong	do	41 0 0	42 0 0
Chili, bars	do	39 0 0	39 10 0
YELLOW METAL.			
Pig, Spanish	ton	12 16 0	0 0 0
English, common brands	do	13 0 0	0 0 0
Sheet, English	do	13 17 6	14 0 0
SPELTEN.			
Silesian, special	ton	14 10 0	14 12 6
Ordinary brands	do	14 7 6	14 10 0
TIN.			
Straits	ton	101 0 0	0 0 0
Australian	do	101 5 0	0 0 0
English ingots	do	105 0 0	0 0 0

OILS.

Limeoil	ton	20 0 0	20 5 0
Cocunut, Coch	do	37 10 0	0 0 0
Ceylon	do	26 10 0	0 0 0
Palm, Lagos	do	24 0 0	24 10 0
Repressed, English pale	do	22 10 0	0 0 0
do brown	do	21 0 0	0 0 0
Cottonseed, refined	do	18 10 0	19 10 0
Tallow and Oleine	do	25 0 0	45 0 0
Lubricating, U.S.	do	8 0 0	10 0 0
do refined	do	8 0 0	13 0 0
TURPENTINE.			
American, in casks	cwt.	1 8 0	0 0 0
TAR.			
Stockholm	barrel	0 15 0	0 15 6
Stockholm	do	0 10 6	0 11 6

CONTRACTS.

Epitome of Advertisements in this Number.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Broken Granite and Flints	Southend Local Board.	F. H. Tulloch	Dec. 21st	i.
Stores and Materials	Nottingham Corporation	A. Brown	Dec. 23rd	ii.
Work and Materials	St. Martin-in-the-fields	H. Jaques	do	iii.
Outfall Sewerage, &c., Works	Barnet R. S. A.	W. H. Mansbridge	Dec. 20th	ii.
Enlargement of Sorting Office, Bow, E.	Com. of H. M. Works	Official	Dec. 31st	ii.
Cut and Wrought Iron for Bridge	Sheffield Corporation	Robt Davidson	do	ii.
Earthware Sewer Pipes, &c.	Belfast Town Council	J. C. Breiland	Jan. 4th	ii.
Stores and Materials	Liverpool Corporation	Official	Jan. 7th	ii.
Steel School, Aberlery	Aberystwyth School Bd.	W. D. Biesley	Jan. 8th	ii.
Pipe-laying, &c.	St. Helen's Corporation	D. M. F. Giam	Jan. 11th	ii.
Reconstruction of Workhouse	Great Western Ry. Co.	Official	do	ii.
Opening out Tunnel, &c.	do	do	do	ii.
Reconstruction of Workhouse	Lambeth Guardians	T. W. Aldwinckle	Jan. 12th	iii.
Engine Shed, Newhaven Harbour	L. B. and S. C. Ry. Co.	F. D. Benister	Jan. 17th	iii.
Granite Carriages, &c.	Met. Board of Works.	Official	Jan. 21st	ii.
Completion of Ten Houses, Forest Gate	do	James F. Wesley	Not stated	ii.

TENDERS.

ABERCAIRNE.—For the erection of a Public Hall and offices, at Abercairne, Monmouthshire. Mr. Geo. Rosser, Newport, architect, Mon.—
Thos. Williams & Son, Newbridge, near Newport, Mon. (accepted) ... £1,215 0 0

BERMONDSEY.—For the erection of six houses, and alterations and additions to one house and drying-shed, Paulin and Maltby streets, for Mr. William J. Perrin. Mr. Edward Croose, architect, Bermondsey-square.—
J. Bullers £2,070 0 0
J. & J. Greenwood 2,044 0 0
B. Wells 1,984 0 0
Spencer & Co. 1,917 0 0
F. Higgs 1,910 0 0
G. Potton 1,905 14 7
W. & H. Castle 1,854 0 0
W. F. Russell 1,822 0 0
J. Almond 1,800 0 0
A. White & Co. 1,727 0 0
[Architect's estimate, 1,801, 3s. 7d.]
* Accepted. Tender sent in error, 1,427*l.*

BURGESS HILL (Sussex).—For construction of about 1,700 lineal yards of pipe sewers, and various works in connection therewith, for the Burgess Hill Local Board.—
Rowland & Son £599 0 0
W. Langridge 985 0 0
W. Bryant 985 0 0
J. Parsons & Son 911 8 0
J. Longley 915 0 0
J. Harrison 881 0 0
W. Cunliffe, Dorking (accepted) 844 15 0

DARENT (Kent).—For painting, distemping, and other works, at the Asylum for Imbeciles, Darent, near Dartford, Kent, for the Managers of the Metropolitan Asylum District, under the superintendence of Messrs. A. & C. Harston, architects, Leadenhall-street. Quantities not supplied.
W. Wythe, Dalston £1,771 5 0
W. Andrews, East Margate 1,324 3 8
H. Fullager, Kingsland 1,188 8 0
G. F. Wrenham, Blackheath 1,097 13 9
T. Wilder, Gravesend 969 0 0
C. Willmott, Hackney 881 0 0
Robson, Snodgrass 827 0 0
Proctor, Woolwich 827 0 0
Church & Co., Coleman-street 780 0 0
A. Wheel, Dover 780 0 0
A. Gee, Stafford 760 0 0
Lilley, Pall-mall 767 0 0
Dudley, New Southgate 661 15 0
Vigor & Co., Poplar 650 0 0
T. A. Bone, Regent's Park 609 0 0
W. F. Hadlow, Dover (accepted) 600 0 0

FARNBOROUGH.—For villa residence in Alexander-road, Farnborough, for Mr. H. W. Bolton. Mr. S. Friend, architect, Aldershot.—
A. J. Batchelor £1,233 0 0
W. Garland 1,176 0 0
W. Hughes 876 0 0
Seabright & Son (accepted) 870 0 0
E. Kemp, Frimley (accepted) 823 0 0

HAMPSTEAD.—For the construction of brick and pipe sewers, laying down new granite curbs and York stone footways, and executing other works in connection therewith, for the purpose of the High-street, &c., Hampstead, Improvement, for the Metropolitan Board of Works. Sir J. B. Saunderson, engineer.—
G. Kingston £10,300 0 0
Hinde, Morrish, & Co. 9,600 0 0
Church & Co. 8,480 0 0
C. Killingback 7,880 0 0
G. O. Rutty 7,880 0 0
Telchur & Co. 7,550 0 0
J. Mowlem & Co. 7,500 0 0
Nowell & Robson 6,773 0 0
S. & E. Bentley 6,740 0 0
G. Felton 6,675 0 0
* Accepted, subject to inquiries.

HARLOW (Essex).—For building new Wesleyan Chapel, at Burnt Mill, near Harlow. Mr. Charles Bell, architect, Dashwood House, New Broad-street.—
Hunt, Hoddesdon £190 0 0
Nicholls, Harlow 385 0 0
Burton & Son, Sawbridgeworth 375 0 0
W. Cornwall, Bishop's Stortford 365 0 0
* Accepted.

ILKESTON.—For one pair of villa residences, for Mr. Charles Woollecroft. Mr. George Haslam, architect, Ilkerton.—
W. Haynes, Ilkerton £1,436 17 0
J. H. Nicklin, Ilkerton 1,416 0 0
F. Shaw, Ilkerton 1,326 0 0
R. F. Brown, Stanley-common 1,320 0 0
* Accepted.

ISLINGTON.—For alterations to the Milford Haven public-house, Caledonian-road, for Mr. H. Gerlach. Mr. R. A. Lewcock, architect.—
J. Walker (accepted) £300 0 0

KENSINGTON.—For completing Nos. 73, 75, 77, 79, 81, 83, 85, 87, 89, and 91, Courneval-road, West Kensington, W., for Messrs. Hoare & Co. Messrs. Hoare, Chapman, & Thomas, surveyors, Belgrave-road, S.W.—
Marlin £3,224 0 0
H. K. 3,047 13 0
Altin & Plater 2,985 0 0
Ashfold 2,984 7 8
Lestridge & Co. 2,930 0 0
G. T. Smith & Son 2,830 0 0
Lorden & Son 2,797 0 0
Henry Smith & Son (accepted) 2,737 0 0

LONDON.—For alterations and additions to premises, No. 17, Carey-street, London, for Mr. John Claydon. Mr. R. Owen Alsop, architect, N. -folk-street, Strand.—
F. Love £445 0 0
Sykes & Son 420 0 0
W. Laughton 420 0 0
Higgs & Hill 388 0 0
W. & F. Crocker 384 0 0
* Accepted, subject to alterations.

M. STODART & CO.
Office:
No. 90, Cannon-street, E.C. [ADVT

Wessex House, Northumberland Avenue, Charing Cross, London, W.C.

The Builder.

Vol. LI. No. 2250.

SATURDAY, DECEMBER 25, 1886.

ILLUSTRATIONS.

The Fireplace in the Guard Room, Mont St. Michel.—From a Drawing by Mr. E. Jeafferson Jackson	910
North Chancel Aisle, Amiens.—From a Drawing by Mr. E. Jeafferson Jackson	911
United Presbyterian Church, Braid, N.B.—Mr. G. Washington Browne, Architect	914
Church of St. Francis, Ashton Gate, Bristol.—Mr. John Beran, Architect	915
Mission Room, Lamplugh (Kirkland), Cumberland.—Messrs. T. L. Brooks & Townsend, Architects	918
Great Northern Central Hospital.—Messrs. Keith D. Young & Henry Hall, Architects	919
American Villa Architecture	922-923

CONTENTS.

Scotch Castles (Illustrated)	899	North Chancel Aisle, Amiens	907	Crystal Palace School of Practical Engineering	930
Egypt: Irrigation Report for 1885	901	Braid T.P. Church, Edinburgh	907	Broad Filtration Drainage at Godalming	930
Two Decisions on the Law of Light	902	Church of St. Francis, Ashton Gate, Bristol	907	Liverpool Cathedral Designs	930
Notes	903	Mission Room, Kirkland	907	Chimney Shaft for "Destructor"	931
The Parliament and Great George-streets Sites again	904	American Villa Architecture	907	The Student's Column: Stone Quarries.—XXVI.	931
A Sanitary Report	905	Great Northern Central Hospital	907	Venorum	932
Marble: Its Uses as suggested by the Inst.—Royal Institute of	905	Decorative Metal Work	907	Almanacs and Directories for 1887	932
British Architects	905	Manchester Architectural Association	907	Recent Patents	932
Obituary	906	Architectural Societies	907	Recent Sales of Property	932
The Laying of Main and Pipes	907	Royal Institute of British Architects	907	Miscellaneous	933
Fireplace in the Guard-room, Mont St. Michel	907	The Architectural Association	907	Price Current of Building Materials	933

Scotch Castles.



THE work on this subject, by two Scottish architects, of which the first volume has just appeared,* is, we believe, the first attempt to treat in a complete and consecutive manner a chapter of architectural history full of the most fascinating interest, equally as regards the picturesque of architecture and the picturesque of historical association. We refer now more especially to the section of castellated architecture, which is the subject of the first volume now before us; we presume domestic architecture, in the more restricted sense (perhaps we should say "less restricted," for probably castle life in the Middle Ages was not a very happy domestic existence), is relegated to the second and forthcoming volume. The authors advert in their preface to the late Mr. Billings's well-known work as the principal illustrative book on the subject hitherto, partly to emphasise the difference between their aim and his. Mr. Billings singled out a few specially fine examples, and gave very fine illustrations of them as examples of a certain type of architecture. The object of the authors of the present work is different. They do not profess to compete with Billings's book in regard to beauty of illustrations; their object is to give as many illustrations as possible, and to give not a few picked examples but a connected history of the subject. No one, we believe, will make the complaint which they anticipate as a possible one, that the illustrations are too numerous. In giving a general survey of a subject of this kind the more illustrations the better; and the plans and sections, as well as the views which are given, entirely bear out the authors' remark as to the amount of variety in detail which is to be found even among castles of which the essential features are very similar.

An illustrated treatise on castellated architecture furnishes a curious example of the manner in which force and despotism in life translate themselves into force and power in architecture. Every one of these castles was the centre of a petty despotism or would-be despotism, the symbol of life conducted on the principle that,—

"They should take who have the power,
And they should keep who can."

This is not a high standard of life, and yet its

* The Castellated and Domestic Architecture of Scotland, from the Twelfth to the Eighteenth Century. By David MacGibbon and Alexander Ross, Architects. Vol. I. Edinburgh: David Douglas. 1887.

architectural imprint is a noble and impressive one, for a system of life which goes by the law of the strongest must needs impress its character on its architecture. And so we have here a whole series of buildings of which the main feature is the expression of stern power and resistance to attack. There is no scamping here, for it is not a question merely of extras or of aesthetics, but of dear life. The stronger the castle, the better stand could be made at the last push, and the more likely was the owner to survive a reverse in the field. Accordingly we must not grudge stone or mason's labour; let us have a castle strong enough to resist the attacks of the combined forces of the Grants of Tulloch-gorum, or whoever else we may be at feud with, and hang the expense. That is the architectural expression of the Scotch Castle; and whatever we may think of its social morality, it is very effective architecturally. Walls 10 ft. to 14 ft. thick; no ornamental nonsense; very small window openings in the midst of great solid masses of walling; overhanging parapets and angle turrets; huge flanking towers to the gateway; such features as these make a combination which we may regard as stern and forbidding, but which is most impressive to the eye of any one with a sense of power and picturesqueness. All the littlenesses and frivolities of architecture are scouted here; solidity and mass, the very foremost essentials of architectural grandeur, are here unalloyed; and the modern man who wishes to build himself a residence of a monumental type, "ere perennius," may sigh over the economic prejudices of the modern contractor, which leave him no chance of building with the impressiveness of his marauding forefathers. To the latter, of course, the building of a castle was not a matter of sentiment at all; it was an exceedingly practical business; and if the MacTavish of the period had been told that men of future generations would regard his castle as a thing of picturesque effect, he would have been very much astonished, if you could have got him to understand what picturesque effect meant, which you probably could not. We look at these violent days now, however, from a safe distance; the strong men sleep their sleep, and only the castles from which they sallied to cut each other's throats or harry each other's cattle remain to tell somewhat of the tale of that wild lawless time to which distance lends a kind enchantment, and nowhere more than in Scotland. The very names of Tantallon, Ruthven, Linlithgow, Ravenscraig, seem replete with poetry; not less so some of the monuments themselves; Neidpath, with its simple solid block of tower overlooking the Tweed which sweeps beneath; Borthwick, with its grand

double masses of tower and the deeply shadowed bay between them. It is difficult to say whether the names or the buildings seem to have most of glamour and romance, associations half of violence half of chivalry; for, as we heard a member of an old Scotch clan reply, when jokingly told that his ancestors lived by lifting cattle,—“Yes; but they always lifted cattle like gentlemen!”

The authors group their castles under three periods, marked by distinctive forms of planning as well as by other differences; the first period ranging from 1200 to 1300, the second from 1300 to 1400, the third from 1400 to 1542. The typical arrangement of the first period is the enclosure of a space by a thick wall or *enceinte*, usually a more or less irregular quadrangle, sometimes a symmetrical square or other figure, with large towers at the angles. This early quadrangular plan is distinguished from the later courtyard plans by the fact that the enclosing walls, though of great thickness, are, in general, merely walls, and do not form part of any of the habitation structures within the enclosure, which in most cases probably were of a much more perishable character than the *enceinte*, as in many instances they seem to have disappeared, though the enclosure walls and angle towers remain in a state of considerable preservation. We give a reproduction from the illustration of the view of the remains of Inverlochy Castle, as one of the most typical examples of mere thirteenth-century castles, which are really walls enclosing a plot of ground rather than actual buildings in the usual sense. Here are seen three of the great circular towers which strengthen the angles of the *enceinte*, with the straight walls connecting them. The courtyard measures 101 ft. by 90 ft. internally, with two doorways, formerly defended by portcullises. The walls are 9 ft. in thickness,—

“The tower at the north-west angle, called the Comyn's Tower, is larger than the rest, and formed the donjon, or residence of the lord of the castle. It is 20 ft. in diameter within the walls, which are 10 ft. 4 in. thick, and contain a staircase 3 ft. 6 in. wide, arranged in the same manner as in the other towers” (a circular stair winding round the internal walls). “The angle towers were provided with loops to light the staircases and upper rooms, but they are now represented only by holes in the walls, the freestone dressings having been torn out. There is, however, one loop left in the north-east tower, showing that they were narrow slits, splayed on the outside, with a round termination or oilet at the bottom. The donjon was probably higher as well as larger than the other towers, as we shall see was usually the case. The whole castle was surrounded with a moat about 30 ft. wide, placed about 40 ft. from the building. This was no doubt supplied with water from the river. Its position may still be traced in the marshy depression in the ground round the castle.”

Some portions of the dressings still remain—

ing show, we are told, that the angles of the openings had plain splay. Nothing is said as to the character of the main bulk of the masonry.

Among the more interesting of the castles included in the first period are Rothesay, with the *enceinte* wall forming an irregular circle, with four towers at equal distances, the whole forming a grand sweep of curves when seen in perspective, the more effective by contrast with the square mass of the drawbridge tower; and Bothwell, an elongated parallelogram, with the walls canted at one end towards the centre line, on which stands an immense circular tower; the authors give a suggested restoration of this remarkable structure. Caerlaverock is another notable plan, a triangle with one angle truncated and covered by twin round towers with the entrance between them.

The second period presents the anomaly of a retrogression in the style of castle-building.

"The square towers or keeps which had become familiar to the Scots in their frequent invasions of the northern counties of England, naturally became their model, and all the castles of this period preserved to us are built on this plan. These castles consist of a square or oblong tower with thick walls, built sometimes with ashlar and sometimes with rubble work, and defended from the parapet or the roof, the angles of which are rounded, or more generally projected on corbels in the form of round

usually vaulted, and nearly cut off from the main floor, which was approached externally by a movable stair or ladder, so that assailants who had penetrated into the ground-floor took little by their move, having to make their way to the first-floor by some narrow staircase or trap where they could have been disposed of one by one as they came up. In Rossetti's striking poem, "The King's Tragedy," describing the



Neidpath Castle.



Stirling Castle.

According to the authors, the invasion of Edward I., at the close of the thirteenth century, was the indirect cause of the change and simplification of the form of the castles; the country being so weakened and impoverished that the simplest form of building, a stronghold or keep to accommodate the owner's family and personal retainers, was all that could be afforded,—

open bartizans. The parapets and bartizans have frequently open machicolations, but sometimes merely corbel without openings, and sometimes the parapet is carried up flush with the walls, without projection or string-course. The keeps of this period sometimes depart from the original Norman model to the extent of having a small wing added at one corner, so as to give the building the shape of the letter L."

The ground story of these buildings was

murder of James I. of Scotland at Perth, the king endeavours to elude his pursuers by descending through a trap-door on the principal floor into this vaulted ground floor beneath, which was not easily accessible to the attacking party, who came up by the staircase to the principal floor. This event was at the commencement of the third period of castle building, as classified by the authors, but their sections of Liberton

and Comlongan towers of that period show that the cutting off of the ground story beneath a massive vault was still continued, so that the "local colour" in Rossetti's description is, architecturally, quite correct.

As an example of the plain tower keep of the second period, we give the view of Neidpath in its present state; the enclosure and buildings adjoining are much later (1654), and of course the roofing and the finish of the walls above does not represent the original state; but the view conveys an idea of the nature of many of these fourteenth-century castles, massive blocks of building rising straight up out of the ground. The illustration, however, does not quite convey to the eye one of the peculiarities of the building, which is

that peculiar and very picturesque combination to be seen in not a few Scotch castles, where the stern architecture of the fourteenth-century keep is combined with graceful and fanciful details founded on French Renaissance, the combination of the two elements being as piquant and striking in the architectural as in the social history of Scotland in the early Renaissance period.

In considering the third period into which they have divided the subject, and which occupies a considerable portion of the volume, the authors commence, before coming to the courtyard form, by describing and illustrating various modifications of the simple keep towers which are to be met with dating from the early part of the fifteenth century. Concerning these

Among the courtyard castles which began to come into vogue in the fifteenth century, two of the most interesting are Donne and Tantallon, the latter named by Burns as a sort of emblem of endurance, in his prophecy of still greater perpetuity for the fame of Allan Cunningham,—

"The teeth o' time may gnaw Tantallon,
But thou's for ever."

Edinburgh Castle is naturally the subject of a lengthy description and many illustrations, for which we must refer the reader to Messrs. MacGibbon and Ross's pages. We give the illustration of Stirling Castle as an example of the courtyard form, showing the old form of round towers flanking the gateway, and the more refined-looking architecture of the courtyard buildings within and showing over them. The circular flanking towers, however, are here more or less of a survival, and not of the ancient date which might at first sight be given to such a feature; and the upper portions and battlements are (as the sketch partly indicates) a restoration, and a very weak one.

The authors merit the thanks of all architectural readers, professional and amateur, for the production of a very well-studied and illustrated handbook of a most interesting class of ancient buildings, of which we hope to see the second and completing volume in due time.

EGYPT: IRRIGATION REPORT

FOR 1885.*

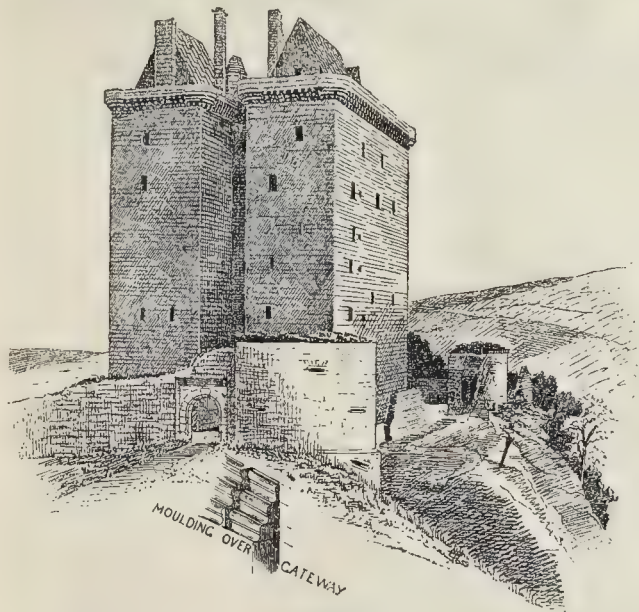
AT the present time, while there has been, and still is, so much heated discussion as to the English occupation, and predominance of English influence in Egypt, and so much scepticism abroad as to the degree of benefit derived from English guidance in the affairs of that country, it is refreshing to be able to turn to one document about which, at all events, there can be no mistake, and which tells its tale of accomplished facts in plain, straightforward, and unvarnished language. The Irrigation Report, drawn up by the Under-Secretary of State in the Public Works Ministry, Colonel Scott Moncrieff, for the year 1885, has lately found its way to this country, and we have no doubt that a brief summary of its contents will be of interest to many readers of the *Builder*. At the outset, however, we must express regret that the Report is not accompanied by a map, as, without its help, it is impossible to identify the localities in which the works enumerated are situated. We can only suppose that the document was originally intended not to travel beyond the limits of the official circle, or, at all events, beyond those of Egypt itself. If so, it is a pity, as every piece of reliable information like this Report will be welcomed in England, and increase the interest that is widely felt in all circles in regard to the country with which she has lately been so deeply and closely connected.

The Report opens by observing that the system successfully begun in the previous year was prosecuted throughout 1885, many improvements being introduced as occasion presented, and as the irrigation officers acquired a better knowledge of the country. Notwithstanding that there was a very much smaller volume of water in the summer, its distribution was so much better managed that a larger area of cotton was irrigated than had ever before been reached. The Barrage (weir) during 1884 had sustained a head of about 7.25 ft.; last year this was increased to 10 ft., so that all the canals received a considerable additional supply. Three temporary dams also were erected at points lower down the river, so as to allow as little as possible of the precious water to escape to the sea. The Nile began to rise at Wady Halfa on the 16th of June, and passing Assouan on the 22nd, it reached Cairo on the 5th of July, the last gate of the Barrage, which is twelve miles lower down, not being removed till the 24th. The festival of opening Khalig-el-Masri, which admits water into the canal on the right bank at Cairo,

* Irrigation Report for 1885. Cairo: National Printing Office, 1886.



Inverlochy Castle.



Borthwick Castle.

that the main block is an oblique quadrangle, opposite sides being parallel but the angles not equal: a form probably adopted merely because the conformation of the ground rendered it easier to build it so. The tower is L-shaped on plan, the re-entering angle being on the opposite side from the view. The walls are 10 ft. thick, and the place was in its time a very strong one of the kind. The original entrance was on the further and precipitous side of the site.

The authors go on to illustrate some cases of keep towers of this kind, which have become the nucleus for much more extended buildings grouped around them, such as Crichton and Castle Campbell; but these kind of additions were not developed till a later period. It is by these later extensions to fourteenth-century keeps that we obtain

we can only pause to remark on the fine example of Borthwick, before alluded to, and of which the illustration is reproduced. It would be difficult to find a more striking instance of stern and grand architectural expression produced simply by the disposition of masses of building. It is noteworthy that these twin towers are not exactly twin, one being a little wider than the other and projecting a little farther, but apparently more from indifference or accident than design. As an instance of the practical engineering of the builders, the lower porthole in the basement of the gate tower (seen in the view) is built parallel with the slope of the hill leading up to the castle, so that the whole hill becomes a glacis to it. The authors mention that the building shows signs of more attention to sanitary arrangements than the builders of castles of this date sometimes get credit for.

took place on the 5th of August, a date somewhat earlier than usual. The flood was a favourable one, for while in the previous year 91,624 feddans (acres) in Upper Egypt were not touched by the Nile flood, and so remained barren, in 1885 there was not a single acre that had not received water.

The manner in which the Barrage was enabled to stand the pressure of the additional head of water was by the construction of a second, or supplementary bar, of rough stone on the flooring, by which means the pressure was divided. The cost of this arrangement was only 7,627*l.*, and as all the stone was afterwards utilised in strengthening the down-stream apron of the Barrage, the advantage of the greatly-increased supply of water was gained at a nominal outlay. It is singular that so simple and obvious an expedient had not been tried before. One of the two large canals which supply the province of Sharkieh was this year cleared by dredging instead of by the customary *corvée* labour; though, owing to the dredger not being well adapted to the work, the expense of excavation was considerable. It is stated that a new drainage system was opened out this year in that province. It sounds strange that such works should be required in a rainless country; but whenever artificial irrigation is resorted to drainage is always required as an accompaniment. By another important alteration in certain canals, the silt clearances, which used to amount to 903,000 cubic metres, representing *corvée* labour to a value of about 45,000*l.*, were reduced to 106,000 cubic metres, representing about 6,300*l.* The cost of the alterations themselves amounted to 10,000*l.* In another case the silt clearances were reduced from 80,000 to 5,300 cubic metres, and an increase of about tenfold obtained in the volume of water supplied. The two provinces, Menoufieh and Sharkieh, are those which have profited most from the use of the Barrage. The great Central Canal, which in 1882 only took in 4,300,000 cubic metres per day, in 1885 carried 10,500,000 cubic metres, which, being distributed in the branch canals by new connecting links, increased their supply, much to the benefit of the crops dependent thereon. It appears, however, that, owing to the exceptionally low volume in the river, those benefits were not conferred without some injury resulting from the abstraction of so much larger a quantity, and nearly 9,000 acres of rice land were reported to have suffered. Even if this were below the mark, Col. Moncrieff "can state fearlessly that at least ten times the area derived great benefit, and that a very large tract, especially in the province of Sharkieh, received water for the summer crop which had never received it before." A very important innovation was made during the year in substituting money payments for silt clearances instead of removing them by the employment of the *corvée* in the Assiout district. A grant of 18,284*l.* was made by the Treasury for the excavation of 397,632 cubic metres, being, it is said, probably the first time that the State had ever paid for earthwork done in Upper Egypt. It was a large sum to lay out, but if it has been the forerunner of a total abolition of the baleful system of compulsory labour hitherto customary, it will prove to have been money well spent. Much discussion appears to have taken place on that subject during the year, and much of the injustice and abuse connected with it having been brought to light, permission was obtained from the Ministry to try an experiment for its redemption in certain villages of the province of Gharbieh, by converting the assumed value of *corvée* leviable into a rate on the land. With much difficulty, and in spite of strenuous opposition, one of the officers, Mr. Wilcocks, managed to maintain his canals without any *corvée*. In 1884 the *corvée* was equivalent to an army of 165,000 men working for 100 days. In 1885 it was equivalent to an army of only 117,700 men working for the same time. The country then was benefited in 1885 over 1884 by the labour of 48,000 men for 100 days.

In protection against the Nile inundation the sum of 61,550*l.* was expended as against

58,000*l.* in the previous year. Experiments were made in substituting roughly-made but hard bricks for the stone used in groynes, with a view to economy. As, however, the bricks lose so much of their weight in water, it is very doubtful whether they are the right material to use for that purpose. Groynes constructed for the purpose of diverting the current off a bank which is being eroded should, however, not be made solid. Experience in Holland on the Danube and in India tends to show that works made of stakes and brushwood with fascines or rollers, which admit of water passing through them with a diminished velocity, allow of the silt or sand held in suspension being deposited very rapidly, and so by filling up the foot of an eroded bank, affords a better protection, and obviates the effect of the eddy which is caused when the current is opposed by a solid structure. Timber and brushwood are, however, scarce articles in Egypt, and possibly this may be a reason why stone structures are resorted to.

The yield of the harvest is naturally looked upon as the measure of successful irrigation operations, but in Egypt there is no great credit to be obtained from a plentiful cereal crop, for there is always abundance of water available for it. It is the culture of cotton and sugar-cane, both requiring most water when the river is at its lowest, that forms the test. In this respect, the Report states, the cotton crop of 1885 was a disappointment. In the previous year the crop was estimated at 3,650,000 kantars, 13 per cent. higher than it had ever been known before. In 1885 the area sown was reported as considerably greater. The water-supply was more abundant. All seemed prosperous till the end of August, when a series of fogs set in, the cotton worm began its ravages, and where a yield of 4 or 5 kantars had been expected, the crop was not more than 2 or 3. Finally, the price in the market being very low, and at the same time that of wheat rising, the cultivator, instead of waiting for his last pickings, ploughed up the cotton plants and sowed wheat. The crop seems to have been injured by the inferiority of the seed sown, by over-cropping the land, and by defective drainage, the last of which causes is in process of being remedied.

Amongst the final paragraphs of the Report, the important announcement is made that, on July 27th, a decree was issued granting a million sterling to the Public Works Ministry for the improvement of irrigation works. Additional officers were at once obtained from India, and work was begun in earnest in the following October. Two projects especially had been under discussion as to the best method of improving and extending the supply of water for irrigation: one, the construction of a new weir, to be built across the Nile below Benha, some miles lower down the river than the Barrage; the other, the excavation of a large new canal from the eastern end of that work to supply the existing canals. The latter has been decided on as preferable.

The perusal of this Report certainly affords a satisfactory proof of the activity and usefulness of the Public Works Department of the State, and augurs well for a steady development of the agricultural revenue of Egypt. The rulers of that country have good reason to thank the Government of India for the experienced officers which it has sent there, and, as far as the Irrigation Branch of the State, at least, is concerned, there can be but one opinion as to the success of the guidance of the British Government in Egyptian affairs. It may be hoped that when the whole story comes to be told, it will be found that Great Britain is able to render an equally good account of its stewardship in all Departments of the State.

Art Copyright.—We hear that this much-vaunted subject will be treated in a complete and succinct manner by Mr. Reginald Winslow, barrister-at-law, in the new volume of "The Year's Art for 1887," which we believe is now ready. The volume contains some other important new features, and is published by J. S. Virtue & Co.

TWO DECISIONS ON THE LAW OF LIGHT.



HERE have just been reported in the Law Reports two cases on the subject of the law of light, which are of considerable importance. The first seems to lay down a definite principle, the other to afford an example of the way in which the Judges will exercise the discretion which they possess, under Lord Cairns's Act, either to grant an injunction or else to award damages when a right to light has been infringed. The first case is that of *Harris v. De Pinna* (Law Reports 33, Chancery Division, p. 238); the second, *Greenwood v. Hornsey*, in the same volume of the Law Reports, at p. 471. *Harris v. De Pinna* was an appeal from a judgment of Mr. Justice Chitty, upon whose decision, when it was given, we briefly commented. That decision raised the question as to what is a building within the meaning of the third section of the Prescription Act. The structure in question was a place for storing timber, and it was held that this did not constitute a building. Having already noticed that judgment, and as it is now commented on in the text-books on this subject (see Roscoe's "Digest of the Law of Light," second edition, p. 3) it is unnecessary again to refer to it, because the decision of the Court of Appeal proceeded on other grounds. The very important principle enunciated by the Court of Appeal,—one which we are not aware has been hitherto directly stated,—is that it is necessary to show "not only that the building has in some way or other enjoyed light, but that it has done so by a definite access for the statutory period." Applying this principle to the structure, the subject of the case before the Court, in which at one time a side would be open, and at another time closed up by piles of timber, it became clear that it was unnecessary to decide whether it was a building within the meaning of the Prescription Act. Because even if it were, and the light had not been enjoyed through one and the same definite aperture, of course, as Lord Justice Bowen said, "it does not follow that because you have not for some one moment or another in each year happened to enjoy the full flood of light which would pass through an uninterrupted window, that still there may not have been a continuing enjoyment which would satisfy the statute: otherwise a man could not pull down his blinds without fear of losing his right of light. One must look at the whole case and see whether this has been a continuous enjoyment for twenty years." Thus Lord Justice Bowen explains the strict principle laid down by Lord Justice Cotton and himself, and it follows from the two judgments that in order to give a right to light there must be an enjoyment of the light through a definite opening without obstruction except from merely temporary and necessary interruptions.

The main point of interest in *Greenwood v. Hornsey* is that the Judge refused to give damages to the plaintiff, as the defendant's counsel desired, and granted him an injunction. The diminution in value of the plaintiff's premises amounted, according to the evidence of the plaintiff's own witnesses, to 600*l.*; we may fairly, then, take it that the damage was, in fact, less. It appeared that at least 6,000*l.* had been spent on the defendant's premises, yet the Judge ordered a certain portion of the offending building to be pulled down. Under ordinary circumstances, this would seem to be a case in which the discretion given to the Judge by Lord Cairns's Act should be applied by the award of damages. In *Holland v. Worley* (Roscoe's "Digest of the Law of Light," p. 55), the late Mr. Justice Pearson summed up the reasons by which a Judge should be governed under such circumstances. But in the present case, on the motion for an interim injunction, the defendant had given an undertaking to pull down part of his building if ordered to do so, provided he was allowed to continue to build up until the hearing of the motion. Therefore, he went on building at his own risk, and this appears to be the reason why Vice-Chancellor Bacon refused to award damages. Had it not

been for this circumstance it seems clear that to have granted an injunction in place of damages would not have been a just decision, because, to apply Mr. Justice Pearson's judgment, this was a case where the plaintiff could be compensated by money, and where, in spite of the diminution of the light, his building would remain "substantially useful to him." It shows the danger, at any rate, of continuing to build after a warning, on the chance that a Judge will award damages only. In regard to the question of judicial discretion on matters of fact, it is wholly impossible to foretell what the decision will be, and, therefore, unless the plaintiff is satisfied with an undertaking by the defendant to pay damages if they are awarded at the trial by the Judge, it is most imprudent to continue a building on the chance of there being no order made to pull it or part of it down.

NOTES.

A FEW days will usher in a year which will be noteworthy for the immense number and variety of the schemes to commemorate Her Majesty's Jubilee; and if a list could be drawn up of the different plans proposed or already adopted throughout Great Britain, we should be astonished at the range of subjects suggested by local taste or convenience. One thing, however, is certain, that, whether in London or the provinces, an extraordinary impetus will be given to the building and contracting trades, and that no man, willing and able to work, will have the least opportunity of saying that he could not meet with employment. Monuments, statues, public parks and gardens, baths and washhouses, churches, libraries, hospitals, assembly-rooms, town-halls, &c., will spring up next year like mushrooms, not to mention the great central schemes of the Church House and the Imperial Institute. Some of the proposals, of course, are more or less catchpenny, such as the tower, 400 ft. in height, which is to rise from St. Martin's-lane, and to dwarf every building in London by its lofty hideousness, without a shadow of justification in the way of utility, either for the service of art or humanity. Of all the proposals that we have yet heard, Herefordshire may be congratulated on having one of the most definite and desirable. The Dean and Chapter have issued an appeal for funds (£5,000, we believe, is the sum named) to enable them to rebuild the west front of the cathedral, which fell down exactly 100 years ago, crushed by the western tower, that was too heavy for its foundation. This front is thought to have been built by Bishop Robert de Lorraine or Lozing, who was consecrated by Archbishop Lanfranc in 1079, and it is said to have been the most perfect specimen of arcade work in the kingdom. The defaulting tower was built about 1320. Included in the proposed undertaking is the refacing of the great central tower, which is showing many signs of decay. Fortunately, the mischief is external, and there is no fear of its sharing the fate of the western tower, which was made secure between 1843 and 1847 by Mr. Cottingham. Including his, the proposed restoration, if carried out, will make the fourth, the other two bearing the names of Wyatt and Sir Gilbert Scott. Over 60,000*l.* has already been spent, principally during the time of Deans Merewether and Dawes, between 1842 and 1863, and although the sum asked for now is certainly large, Hereford Cathedral is worth it all.

CONSIDERABLE improvements are being carried out at Winchester Cathedral. The northern part of the churchyard is being planted, and the Dean and Chapter hope to make the pathway round the cathedral and complete the improvements in the course of the winter. The dangerous high wall at the east end of the northern churchyard is to be removed and a substantial iron railing will take its place, which will greatly benefit the aspect of that somewhat forsaken district of the city. The new pathway will give the public a broad and pleasant walk all round the

cathedral; the turf will be reduced to order, and the clearance of more of the soil which impedes the view of the original level of the Norman work will be carried out. The Dean and Chapter, at whose instance this is going forward, also propose to prosecute further investigations underground in the hope of finding the foundations of St. Swithun's Chapel and of the curious Anglo-Saxon tower described by the Monk Westan in the tenth century. These works will cost about 200*l.*, and subscriptions towards the expense will be gladly received by the Dean. The small charge customarily made for showing the cathedral crypt to visitors has produced a sum sufficient to pay for the rebuilding of one bay of Walkeline's Lady-chapel which was left unfinished last winter, and it has also defrayed half the cost of the handsome tomb in which will be deposited the remains of Bishop Peter Courtenay, whose coffin was found last December in the easternmost part of the crypt. During recent excavations a trench was driven due north from the north-west door of the church, because constant tradition affirms that at that spot, just under the drip of the eaves of the roof, St. Swithun was buried in obedience to his own orders. The trench crossed the exact spot in which the saint is said to have lain until St. Ethelwold translated the remains to the new church. At a depth of 9 ft. below the present surface, and well beneath some chalk cists containing bodies which have rested there for many hundred years, an iron ring nearly 4 in. in diameter, with a staple of 5 in. in length attached to it, was exhumed by the excavators. In this much-corroded piece of antiquity, those who care to do so may recognise a veritable relic of the sepulchre of St. Swithun, which had a ring of this nature securely fastened into the top of the massive block of stone which formed the corner of the saint's sarcophagus, and which was miraculously drawn with ease from its position and replaced securely in position by a certain aged smith in token of the divine command laid upon him to initiate the business of translating the remains to a more honourable position in the church.

IT is curious to notice how often the desire of great capitals is to be connected directly with the sea, as though it were the one thing needful to make the situation complete. Amsterdam some years ago fulfilled this condition, although it really was a port previously, but with a roundabout outlet. Paris and Manchester are both at work with the same object, and now we hear the same of Brussels, where proposals have been made to the municipality by an English company to construct a canal to the Scheldt, with a depth of 6½ metres, and quays sufficiently spacious to allow twenty ships, of 2,500 tons burden each, to lie alongside; the whole to be connected with the great Belgian railway lines. An important undertaking is about to be commenced in South Russia, by the cutting of a canal across the Isthmus of Perekop, to connect the Sea of Azoff with the waters of the Black Sea. This will save 100 miles of very rough sailing, and especially the dangerous passage of Kerch, which in winter is often closed by ice. By this canal, the coalfields of the Donetz basin would be brought into the market, while the coal and salt trades of Odessa would be revolutionised.

WE have not as yet had an opportunity of seeing *in situ* the large series of mosaics, from designs furnished by Messrs. Clayton & Bell, which have just been completed on the wall of the nave of Chester Cathedral. The cartoons we have seen at Messrs. Clayton & Bell's; they give the facsimile of the tesserae work. The subjects are from the Old Testament, and consist of four large figures of Abraham, Moses, David, and Elijah, each between two scenes from their respective lives. The life of Abraham is illustrated by the Sacrifice of Isaac and the Burial of Sarah; that of Moses by the finding of the cradle and the scene where Aaron and Hur held up his hands; that of David by David before Saul (after the slaughter of the Philistine) and by his grief over the death of Absalom; that

of Elijah by the scene with the angel on the way to Horeb and the scene with Ahab in Naboth's vineyard. The tone of colour is generally somewhat similar to that which we have been accustomed to in Messrs. Clayton & Bell's windows, rather subdued and cool in general effect; and this kind of colour scheme suits well with the material employed, Messrs. Burke's marble mosaic; of course, the effect is very different from that of Venetian mosaic, and there may be something in the claims which have been inserted in some daily papers, that this is more suitable to a Northern cathedral than the gold and brilliant colouring of the Venetian mosaic; at least, so far as this, that we very seldom are allowed in this country to carry out a complete scheme of polychromatic decoration, and Venetian mosaic almost requires to be part of such a scheme, where everything is in harmony. There is no advantage, as seems to be supposed, in the fact that large tesserae are employed (as in the Roman mosaic pavements), unless the work is at a very considerable distance from the eye; on which head we have seen no information. If these mosaics are near the ground-line of the cathedral, beneath the windows, the tesserae are unquestionably too large for a good effect in such a position.

MR. JOHN HONEYMAN, of Glasgow, has published a paper on "The Incidence of Taxation as affecting the Housing of the Poor." It was originally read at a meeting of the Architectural Section of the Philosophical Society of Glasgow on December 15th. The object of the paper is to show that the rating of houses is a hardship on the poor, and that the nominal payment of house-rates by landlords is, in fact, a payment by the tenant, on whom the burden ultimately falls in the shape of rent. Mr. Honeyman exemplifies the unrighteousness of house-rates by the instance of a thrifty mechanic who lives in a house and pays rates, and a thriftless workman who lives in lodgings and pays none. It is disappointing, however, to find that when Mr. Honeyman asks himself the question, "How can the necessary taxes be raised in any other way?" His answer is, "It must be evident to you that it is quite impossible for me to enter on that subject to-night." It is altogether useless to show that a tax to raise necessary funds is burdensome and injurious in its consequences, if a better plan in place of it is not suggested. Mr. Honeyman's paper is interesting and suggestive, but the absence of an alternative scheme causes it to be of little practical value.

THE Government of India has lately published two official returns of the agricultural implements and machines which have been introduced into India since the year 1882-83, and which have met with more or less success. Out of sixteen different ploughs, the "Duplex," Watt's "Turn Plough," and the "Swedish Plough," seemed to have yielded the best results, but the latter has been found too heavy for ordinary-sized cattle. The implement which apparently suits the means of the cultivator best is the "Bengal Plough," manufactured at the Government Iron Works at Burrakur, and described as "a soil-inverting cast-iron plough." Its very low cost, 6*s.* to 10*s.*, puts it within the reach of the humblest, and that its economy is appreciated is evidenced by the fact that 212 ploughs were sold in the first two months of its introduction; the best possible test of its suitability and efficiency. Of irrigating machines, the Cawnpore chain-pump seems the favourite, but its price, 5*l.* 10*s.*, is rather too high to allow of its being very generally used. Attempts to reduce its cost will, it is said, be made at the Burrakur Works. Messrs. Hunt & Co.'s chaff-cutter, as stated by the Director of Agriculture and Commerce, is "getting very popular." As yet there is not much demand for other kinds of implements, such as harrows, corn-shellers, and thrashing-machines. But machinery connected with sugar-manufacture meets with demand, especially cane-crushing mills, evaporators, and centrifugal machines. A general

introduction of machinery in agricultural operations marks a new era in India, for, independent of their poverty, the native cultivators are very conservative in adhering to the methods and customs of their forefathers. At the same time they are intelligent enough to appreciate such innovations as are likely to conduce to or add to their prosperity, and the machines which combine efficiency with moderate cost will be most acceptable, so that manufacturers in England who are desirous of securing a market in India will do well to keep those two essential conditions always in view.

WE hear that the Society of Arts have obtained leave from the Benchers to set up a plaque, or tablet, at Lincoln's Inn in memory of John Thurlow. Born in the year 1616, at Abbots-Reading, Essex, whereof his father was rector, Thurlow entered of Lincoln's Inn, and was "called" in 1647. Having been appointed receiver of the cursumus fines in 1648, he in 1652 became Secretary to the Council of State; and in December of the following year, a protectorate having been declared, Secretary of State to Oliver Cromwell. He filled that office under Richard Cromwell (who, by the way, was in after years a student, like to his father, at this same Inn) until January, 1660, when Thomas Scott replaced him. He died in 1668, and lies beneath Lincoln's Inn Chapel. The chambers to be distinguished are the ground-floor set at No. 24, Old-square (olim Gate House-court), their windows looking upon Chancery-lane. These he tenanted during the period 1646-1659. Having regard to the highly important and confidential business which passed through Thurlow's hands, much of it being secret service, it is scarcely too much to say that in these rooms the affairs of England, perhaps of Europe, were for a while controlled. Thurlow also had chambers in Dial-court, since known as No. 13, Old-square. In a false ceiling of No. 13 were accidentally found, *temp.* William III., the collection now known as the "Thurlow State Papers," which Dr. Birch edited in seven volumes, folio, 1742. Subsequent chroniclers have confounded, or rather treated as one, the two sets of chambers. We believe that the numbers of the staircases have not been changed. The No. 13 of Thurlow's and Dr. Birch's days was pulled down in the autumn of 1881 for the lengthening westwards of the chapel.

IN the last issue of the *Mittheilungen* of the German Archaeological School at Athens (1886, II.), a very remarkable grave-relief is published, of a style so far unique. The subject represented is a warrior, with spear, shield, and helmet, in the act of trampling on a fallen foe. Though we have a number of grave-reliefs with somewhat analogous representations, e.g., the famous Delft vase, they are always monumental in character, both as regards the fallen as well as the victorious warrior. Here we have the scene represented from the point of view of the situation. The execution is as singular as the conception of the scene. It is simply a drawing in stone as thoroughly pictorial in manner as the bulk of the reliefs so far known to us are sculptural. The effect on the eye in the excellent auto-type published in the *Mittheilungen* is so foreign that at first sight one is tempted to think that the relief is not Greek at all. A closer inspection corrects the error, but leaves the impression that this is Greek painting, not Greek sculpture. The relief gives occasion to an interesting paper by Dr. Loewy on the connexion between the sister arts of relief working and painting. We may add that the stele is inscribed ΑΚΙΩΣ ΘΑΝΩΝ. It was found at Corinth, and is now in the Central Museum. It is a specimen that should, we think, find its way rapidly into cast museums, if only from its remarkable technique, and with a view to correcting any too narrow view of the scope and manner of Greek relief work.

THE statement made by M. de Lesseps as to the prospects of the Panama Canal, at the meeting of the Geographical Society at Paris

on the 17th current, is the most enigmatical that has yet been reported. "There will not be sufficient time," he said, "for the construction of locks. We shall make them later on; the essential point is, that by the date mentioned shipping shall be able to pass through the canal." But the object of making locks is to diminish the excavation, by raising the level of the canal. If the latter were so far completed as to allow of the passage of shipping, it would be not only unnecessary, but impracticable, to insert locks later on. The seven kilometres of the sections of Culebra and Emperador contain fifty millions of cubic metres of excavation, of which seven millions and a half were excavated up to the spring of the present year. The avoidance of cuttings of such unprecedented magnitude by passing through a series of locks has always been advocated by a section of the supporters of the canal; and the report of July last was taken to intimate that M. de Lesseps had become convinced of the necessity of adopting his expedient. But to open the canal first, and then to make locks in it, is a proposal which it is impossible to comprehend.

IN order to give encouragement to the art of designing and executing medals, the Society of Medallists will next year award prizes for models in plaster of medals commemorating the Jubilee of her Majesty the Queen. The Society intends issuing casts in bronze of the successful competitions. The Hon. C. W. Fremantle, Deputy-Master of the Mint, is President of the Society, and the Honorary Secretaries are Mr. R. S. Poole and Mr. H. A. Grueber, of the British Museum. The competition will be open to all artists and students.

VASES with Corinthian inscriptions are still rare, and beyond their epigraphical value have the special interest that they often help us to determine the early pre-Attic art form of a myth. Such is the case with the interesting Corinthian vase from the Louvre, which Dr. Graef publishes in the *Jahrbuch* of the German Institut (1886, band I., drittes heft). The scene represented is Peleus lying in wait for Thetis: from a careless reading of the inscription the design had previously been interpreted as representing Odysseus surprising Nausicaa and her maidens. The wrestling scene of Peleus and Thetis is very well known, and hitherto it has been customary to consider this as the rude and earlier form of presentation. The surprise scene, as we have it in the famous polychrome Cameiros vase of the British Museum, was regarded as a softer type, originating in later days. We now see that the Cameiros "surprise" type is only the late descendant of a long line of ancestors. The discovery is certainly a warning to vase-students to be careful in their statements as to the priority of certain types. With the Corinthian vase Dr. Graef publishes the fragments of a very charming, fine red-figured vase, now in the possession of Dr. Heydemann at Halle; it was found at Ruvo, and in date stands about midway between the Corinthian and the Cameiros vases.

THE same number of the *Jahrbuch* contains a note by Dr. Furtwängler worthy of attention, on the celebrated bronze "praying boy" of Berlin, which has recently raised so much attention. Dr. Furtwängler publishes a gem of the Stosch collection, which must long ago have excited attention but that it is catalogued under the erroneous title, "Prométhée debout attaché aux rochers." It represents a boy in the conventional attitude of prayer, with the hands uplifted in a pose closely analogous to that of the Berlin bronze. The specially-interesting point is that the gem echoes in style not the Berlin bronze, which is late and soft in character, but rather some earlier embodiment of the same type, probably of Polycletean date.

THE new National Liberal Club-house, situate at the junction of Whitehall-place with the Victoria Embankment, and of which Mr. Alfred Waterhouse, A.R.A., is the architect, is rapidly approaching completion, and it

is hoped that the building will be available for members at Midsummer next, when it is anticipated that, in consequence of the Queen's Jubilee celebration, an unusually large number of country members will be in Town. We gave views and description, with a plan of the upper ground-floor of the new club-house, in the *Builder* for May 9, 1885.

THE Christmas number of the *Art Journal* contains a fine photogravure of one of Meissonnier's finest works, the figure of "Luis" on his white horse, with the title "1814"; and the New Year's number starts with an effective etching by Mr. Murray from Mr. Luke Fildes's "Venetians." Among the special subjects promised for the ensuing year are some articles on the modern use of terracotta, by Mr. E. Ingress Bell.

THE year's number of the *Portfolio* is a beautiful volume in regard to the illustrations, not without matter of permanent interest also in the letterpress. Among articles interesting to architectural readers are those on "Hatfield House" and on "The Borough, Old and New" (both very well illustrated). Among the landscape illustrations are some very fine and effective mezzotints, especially one by Mr. Brandard, after Rembrandt's "Tobias and the Angel."

HONORARY Secretaries of Provincial Architectural Societies seem, on the whole, to take life easily; if we may judge by their deliberation in forwarding news of their Societies' doings. In another column, for example, is a very brief paragraph, giving an account of a resolution passed at a meeting of a provincial society, held on Tuesday, last week, and forwarded to us on the Friday morning following, too late, of course, for insertion in last week's issue. This is no uncommon experience. Hon. Secretaries who send news of this kind seem generally to take two or three days to think about it first. The consequence is that their missives have frequently to be relegated to the category of what is vulgarly called "stale news," information which is out of date. A brief résumé of what is done and said at a meeting may be of interest if sent at once, but in most cases it is of very little interest the week after. Hon. Secretaries will, perhaps, kindly note this, in their own interests as well as ours.

THE PARLIAMENT- AND GREAT GEORGE-STREETS SITE AGAIN.

THIS debateable ground is again the subject of projected improvements. It will be remembered that just two years ago a scheme was promulgated by a company for the construction of a new street from Parliament-street to Delahay-street (opening into the latter at a point over against No. 15), and for the widening of those thoroughfares, together with Charles-street. Statutory notices have just been given for another Bill, also promoted by a company, containing very similar provisions, but with the substitution of two new streets from Charles-street to Great George-street, and Great George-street to Broad Sanctuary, in lieu of that from Delahay-street to Parliament-street. The company proposes to widen Parliament-street along its western side for the whole length between Charles-street and Parliament-square, to move further southwards the existing line of Charles-street opposite to the Local Government offices; and to widen Delahay-street for the whole of its eastern side, and along its western side from No. 9 southwards. This last-named operation will serve to straighten the existing elbow in that thoroughfare. Powers will be asked for authority for compulsory purchase of lands, &c. required for the works, and for exemption from the provisions of section 92 of the Lands Clauses Consolidation Act, 1845. Clauses will be inserted in the Bill for conferring its powers on a company to be incorporated thereunder, or upon trustees for carrying out any national or public work or object, upon the Commissioners of Woods, Forests, and Land Revenues, the First Commissioner of Works, or upon the Corporation of London, or some of them. It has been suggested that here might be found an appropriate

site for the Queen's Jubilee Church House, or the Imperial and Colonial Institute.

Parliament-street was built in the middle of last century, pursuant to an Act 28 and 29 (George II., c. 38, as an approach to Labely's (Old) Westminster Bridge, which was opened for traffic on November 17, 1750. About this time the Woolstaple, its round tower and water-gate destroyed for the bridge's western abutment, gave way to Bridge-street, whereof only the northern side remains, and that entirely rebuilt. Some thirty years previously had been pulled down the King's Gate, in King-street, which stood by the opening into Downing-street. This gate should not be confounded with the Cockpit or "Holbein's" Gate by Whitehall. At that point branched off eastwards a narrow thoroughfare, skirting the old Palace bowling-green and Lord Loudoun's house, and communicating through Bennett's court and Brewer's-yard with Cannon-row, and so on to the Staple. Between the narrow thoroughfare and King-street ran numerous bye-ways, such as (counting southwards) Petitioner's-alley, Rhenish Wine-yard, Stephen's-alley, White Horse-yard, and Clinker's-court. All these, together with the market just south of Clinker's court, and Lord Rochester's house at the northern apex, have been obliterated by Parliament-street. In tracing the growth and prosperity of Westminster, chroniclers scarcely make enough of the circumstance that its importance must have been much enhanced by the establishment of the Staple, in close proximity to the Minister and the Palace. We read that in 1353, King Edward III. provided for the repairs of the Strand by levying certain duties on the wool and other merchandise carried, be it by water or by land, to Westminster Staple. And, further, that the traffic resulted in such an increase of the rents along the highway that the residents were called upon to themselves pave the rest of the way, whilst the balance was to be spent upon a bridge (i.e., landing-stage, or stairs) near to the Palace and Staple. We read in Mackenzie Walcott's "Memorials of Westminster" (1851) that the Act 27 Edward III., et. 2, cap. 1, made Westminster one of the ten towns in England wherein the staple or market, removed from Bruges, might be held for wool, leather, woollens (beeces), lead, and other commodities. The Mayor of the Staple and his Court had a jurisdiction, *ad hoc*, extending from Tott-hill to Temple Bar.

The southern end of King-street opened into Union-street close by Richard II.'s "High Tower," or "High Gate," which formed the north-western entrance into New Palace-yard, and was taken down, *teste* Maitland, in 1706, as "having occasioned great obstruction to the Members of Parliament in their passage to and from their respective Houses." Between Union and Downing streets the following thoroughfares led, westwards, into Delahay and Duke streets:—Bell-alley, George Inn-yard, Blue Boar's Head Inn-yard, Antelope-alley, Gardner's, or Gardner's, lane, Charles-street, Rose and Crown-court (since Crown-street), Bell-yard, Sea-alley, Axe-yard (since Flindyer-street), and Duffin's-alley. It will be seen that of these all from Charles-street to Downing-street are absorbed in the new Foreign, India, Colonial, and other offices block of buildings. Those south of Charles-street may yet be traced, with the exception of George Inn-yard and Bell-alley, which were supplanted by Great George-street, in or about the year 1750. In his New View of London, 1708, Hatton describes Duke-street as "a spacious and pleasant street between St. James's Park, N., and Long Ditch, S., mostly, especially the W. side, inhabited by persons of quality." At that time it really lay between the western ends of Crown-court and Blue Boar's Head Inn-yard. Of the persons of quality, we may instance Matthew Prior, where the Charles-street steps now lead down into the park; Bishop Stillingfleet, Archbishop Hutton, and Dr. Arnold, the musical composer. To Lord Jeffery's house in Duke-street we recently adverted.* M. I. Brunel had offices here, at No. 18, and dates a letter hence on December 5, 1840. Delahay-street formerly opened into Long Ditch, which, terminating southwards at Broken-cross and the end of Thieves (or Thieves') lane, is now represented by Princes-street. Long Ditch, with a part, now gone, of Delahay-street, marked the course of one of the streams forming the delta of the Aye Bourne, that flowed around Thorn-eye, the

island of brake and thorn. It coursed along Gardener's-lane, at the eastern end whereof the water was crossed by a foot bridge, giving admission into the Minster precincts, which is said to have been provided by the pious care of the bridge-building consort of King Henry I. A small arm from the river used to run up where is now Great George-street. The name of the quondam Flood-street, between Dean's-yard and Old Tott-hill-street, recalls the inundations which often visited a site that lay nearly 6 ft. below high-water mark.

A SANITARY REPORT.

The substance of this report* is that, while the state of the urban districts is, on the whole, satisfactory, that of the rural districts is as bad as it can be, and that the legislation of the last fourteen years might as well have not been passed. The cause of this state of things is the hostility and indifference to sanitation shown by rural sanitary authorities, who are chiefly composed of farmers. The Medical Officer of the Local Government Board, in condemning the conduct of the rural sanitary authorities, blames the Local Government Board, by implication; for clause 299 of the Public Health Act, 1875, enacts "that when complaint is made to the Local Government Board that a local authority has made default in providing their district with sufficient sewers or with a sufficient supply of water, or in enforcing any provision which it is their duty to enforce, the Local Government Board shall make an order limiting a time for the performance of their duty in the matter of such complaint. If such duty is not performed by the time limited in the order, the Local Government Board may enforce the same by writ of mandamus, or may appoint some person to perform such duty, and shall by order direct that the expenses of performing the same, together with a reasonable remuneration to the person superintending such performance, shall be paid by the authority in default." This provision is a dead letter. At page 318 the report relating to Kingsbridge, Devonshire, is,—"Kingsbridge in same state of bad drainage as when visited by Dr. Ballard in 1882, but a drainage scheme said to be under consideration." A drainage scheme was prepared several years ago and was shelved until after the visit of the inspector in 1885. Since then satisfactory progress has been made in draining Kingsbridge and Dodbroke, but the Local Government Board could, if they wished, have prevented years of delay. Another cause of complaint is the great amount of circumlocution and delay in getting sanitary improvements carried out. It often happens that when some sanitary improvement is resolved upon, by the time the Local Government Board signify their approval a new Board is elected hostile to the policy of their predecessors, and the proposed improvement is consequently abandoned. Instances of this are numerous. At Birdbrook, near Haverhill, the inhabitants had no water but that which was obtained from polluted wells. Power to borrow 300*l.*, so as to obtain a better supply, was asked for, and in October, 1884, the Local Government inspector held an inquiry in the locality. Months then elapsed, and when the desired consent was granted a new Board had been elected, whose first proceeding was to shelve the scheme of their predecessors. A similar instance took place at Staines with regard to the drainage.

The Public Health Act, 1848, enacted that, upon the petition of thirty, being not less than one-tenth of the inhabitants of any place, or if it appeared from the returns of the Registrar-General that the death-rate of the district for the preceding seven years averaged over 23 in 1,000, an inspector would be sent to hold an inquiry, and if he reported it to be necessary a Local Board should be formed. The Local Government Act, 1858, altered this excellent arrangement by providing that no Local Board should be formed without the consent of a majority of owners and occupiers of the district, thus allowing the sanitary state of a place to depend upon the wishes of a majority of the inhabitants, who often refused to make any improvement.

The Public Health Act, 1848, provided that the Medical Officer of Health and Surveyor

should not be removed without the consent of the general Board. The Public Health Act, 1875, repeals that, except as far as regards any officer part of whose salary is paid out of moneys voted by Parliament. Attempts are often made to establish a similar security of tenure, but without any idea that it was for several years in operation. In 1872 another Public Health Act passed, dividing the country into urban and rural sanitary authorities, the rural authorities to be the Boards of Guardians. Medical officers and inspectors of nuisances were to be everywhere appointed, and great apparent activity prevailed. In a short time the salaries of the inspectors were reduced, and things lapsed into their former state. For instance, an inspector of nuisances was appointed for twelve months at a salary of 150*l.*, which, upon the expiration of the time, was reduced to 60*l.* Matters have gone on in the same way ever since. Generally speaking, the salaries and tenures of medical officers are so unsatisfactory that no one cares to undertake the duties. The medical profession have frequently applied to the Local Government Board to alter the terms of their appointments, but without success. The report alludes to the small salaries of Medical Officers of Health, and the system of appointing them for limited periods, but does not cast the blame in the right quarter. For not carrying out sanitary legislation excuse may be made for those who are ignorant of its importance and wish to keep down the rates, but for the apathy and neglect of the Local Government Board there is none.

MARBLE: ITS USES AS SUGGESTED BY THE PAST.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

At the meeting of this Institute on Monday evening last,

Mr. William Brindley, of the well-known firm of Farmer & Brindley, read a paper bearing the above title. Mr. Brindley's remarks, the result of notes made during successive and repeated journeys through France, Italy, and South-Eastern Europe, were illustrated by a very fine collection of specimens, besides a large number of photographs and some drawings of pavements and wall decorations.

The author commenced by reminding his audience that the name Marble, from the Greek *marmaire*,—to gleam, sparkle,—well applied to the Grecian white marbles, which differed materially from those of Carrara. The Greeks, judging from their works *in situ*, cared only for white marble, with occasionally a plinth, step, or back of a sculptured frieze, of black, adding to its whiteness. Their temples in Sicily confirmed this, being coated with *marmoratum*, a white stucco, made of pounded white marble and lime putty, and rubbed to a fine marble-like surface, examples of which still existed at Girgenti. The Romans had continued the process at Pompeii. The Greek's quarrying was further proof of his love for white, the grandest quarries extant being those of Pentelicus. The ancient marble-pitched slide, for lowering the blocks, still existed on Mount Pentelicus, and a small groove for the conveyance of water from quarry to quarry could still be traced. The vein of statuary in the great quarry pitched into the mountain, where the Greeks had followed it, producing a huge cave, from which they seemed to have obtained their best statuary for sculpture. The *debris* of the floor was now concreted together, the stalagmitic cement being of pure crystalline marble. After a description of the quarry and its marbles, the author mentioned the base rock of the Acropolis of Athens, a solid mass of rich coloured marble, which, although on the spot, had been discarded by the Greeks. The Parthenon and other buildings on the Acropolis were of an ivory-white marble, which, under the blue of an Athenian sky, produced a most grand and impressive effect. Although white marble only had been used by the Greeks, it was not from dislike to colour, but the opposite: to enable them to apply whatever colour they chose. Existing remains proved that they used colour and gold freely, and many of the broad Doric mouldings were, he thought, designed specially to receive colour. Whatever his tools and appliances, the Greek had executed as delicate work as could now be accomplished, while he used the drill far more dexterously than any modern workman. The Romans seemed to have introduced coloured

* Report on the Results of a Sanitary Survey made in anticipation of Cholera, 1886-8. By Dr. Ballard, 120 pp. London: Hansard.

* Vide the Builder, June 5, 1886.

marbles in monumental works after their conquest of Egypt, whence they derived the first ideas of monolith columns. The Romans imported from every corner of their vast empire the grandest and choicest materials for temples and palaces, an example we, as a nation, might well follow. The early buildings of Rome contained few varieties of coloured marbles, the number increasing as the colonies matured. The monoliths in St. Peter's and San Sebastien were cut from the quarry of Porta Santa, as was the immense basin discovered by Mr. Wood at Ephesus. In the ancient quarry in Tunis, which supplied the *giallo antico*, and varieties of rose and orange *brascias*, the Romans had out a large portion of the mountain away, and one could distinctly see whence they had cut their monolith columns, and hewn them roughly into shape whilst attached to the rock. These quarries had been specially protected by a massive wall, remains of which still existed, together with ruins of the adjoining Roman city, but no marble was used in their construction, it being reserved for Rome, where 172 columns of it were still extant. The pavement in the Basilica Julia was mostly composed of it, and also the columns in St. John Lateran, the Pantheon, and the Arch of Titus. Most of the coloured marbles in Italy had, no doubt, been quarried during the time of the Cæsars. The ancient quarries of Egyptian or purple porphyry had not yet been found, for the statements of modern writers as to their locality were incorrect, Syenite granite being mistaken by most of them for the more valuable material. Nothing could approach the purple porphyry in colour, firmness of grain, or durability, and columns wrought 1,900 years ago still retained their freshness of colour. It had been obtainable in very large sizes, only exceeded by the granites of Egypt and the green *Cipollino* of Carystus, which latter was much appreciated by the Romans, for in Rome alone 500 columns still remained; and good *Cipollino* was now again obtainable. The Romans, who had learned it from the Greeks, retained the employment of marble and the methods of working it just the same until the time of Justinian. When Constantine was converted, the Pagan temples which could not be adapted to the Christian religion had been allowed to decay, and then seemed to become the quarries to supply materials for churches for nearly 1,000 years. In the great sea wall of Constantinople, where it was partly broken down by the sea, columns used for bond could be seen, as well as the upper beds of carved capitals and the lower portions of moulded bases; the carving of the capitals being as beautiful as it was various in design. The Byzantine interiors exhibited most charming examples of marble decoration, and it was instructive to note the small quantity of marble used, it being a thin, yet durable, applied decoration, showing no desire to appear anything different. Several smaller churches in Constantinople, like St. Sophia, showed skill in surface decoration, the walls being covered with oblong panels in tiers of rich marble, framed with narrow white mouldings and bands of a different colour, continuous lines of colour on white being introduced between these panels, while the whole was surmounted by a marble mosaic frieze, with a cornice carved with small sharp triangular shadows. This system applied to St. Mark's, Venice, but at Palermo the marble panels were more elaborately framed with bands of very choice mosaics. The marble balustrade round the gallery at St. Mark's had probably been copied from St. Sophia. At St. Mark's any early carved stone found had been walled in so as to be seen. The marble pavements of Greek temples were probably the earliest, and were usually thick slabs, white, and of large dimensions. The Greeks also perfected the tessellated mosaic pavements; from them the Romans had gained their knowledge, brought to Rome many of the beautiful pavements found in Greece, and becoming proficient themselves in the art, used it throughout their empire, even in Britain; but here, at their departure, it had fallen into disuse until a few years ago. We had to thank French architects for the revival of this art, but modern pavements, owing to cheapness, were very inferior to the ancient: an old *tessera* could be chopped into three modern ones. Good concrete foundations were necessary for the success of these pavements. Some of the grandest pavements were the simplest, as those of the Basilica Julia at Rome, St. Sophia, and the one under the dome of St. Mark's. The

author differed entirely from those who thought St. Mark's pavement was always undulating or bent as at present: these slabs being sawn from a single block, the waste of working them crookedly would have prevented the markings opening out into one connected pattern; if this pavement were ever repaired, he thought the broken slabs would be found level underneath, and if reversed would produce an even surface. After describing the pavement in the Basilica Julia, the author proceeded with an account of the mosaic pavements of *opus Alexandrinum*, so various and plentiful in Italy, and of which we had a good example in Westminster Abbey. They were usually composed of but few colours, red and green porphyries with white palambino for the mosaics. These pavements had always been made out of old materials, and the variety of geometrical design was truly amazing, some of the most beautiful being in Palermo. The white palambino was a limestone of pot-like texture. The great pavement of Sienna Cathedral, one of the finest Italian Renaissance works, consisted of pictorial subjects, in dark green marble and mastic inserted into thick slabs of white marble. Marble pavements in squares of black and white, introduced about the time of Torregiano, had been largely used, as at King's College Chapel, Cambridge; at Beauchamp Chapel, Warwick; and in domestic work generally. The white tiles came from Italy and the black from Belgium. With the Dutch and Belgians these pavements had never fallen into disuse, and the demand was still great for them. Our Medieval builders had used coloured marbles very freely in church architecture, the retiring grey Purbeck, Petworth, or Frosterley being used; and their work taught the value of greys, their colour, in arceding for instance, giving distance, but with quiet dignity, holding its own, as something of extra value. The most satisfactory of the altars and monuments of the Italian Renaissance were executed in white marble, with only one colour introduced for the columns, pilasters, frieze pediments, and the panels of base. Polished marbles and stone rarely went well together in the same work, but some marbles, greys, reds, and *Cipollinos*,—looked very well dull-polished, and in that state would go better with stone. English alabaster was an excellent economical material to work with marble, and though only used for inferior work, would, if carefully selected, and used where wet would not run over it, be found better than many stones, and keep its colour. It had been used for monumental work from a very early period, and the most delicate work had been executed in it. About the fourteenth century it came into general use in Derbyshire, and during the Elizabethan period was the material most used for important monuments. Memorial slabs of incised marble had preceded brasses, and were far superior to them. The English Renaissance, culminating in the "Adam style," had left us marble work in chimneypieces equal if not superior to anything on the Continent, the designs being good and suitable to the marble, which was usually of the best quality. The onyx marbles of Algeria, Mexico, and California,—of the same nature as Oriental alabaster,—could be cut and ground thin enough for window purposes. At Tarragona Cathedral there were some good examples in orange-yellow Oriental alabaster, and also at Orvieto; almost any marble with crystalline statuary ground an inch thick, placed on the sunny side of a church in Italy, would admit enough light for worship, but would not do in England, with its variable climate. Great Britain and Ireland contained many varieties of well-known coloured marbles, but they were little used in comparison with foreign marbles, on account of the bad quarrying and high railway rates. If consistent detail were used, Carrara marble might be employed for public buildings. A marble to stand exposure to the weather should be close, hard, and vitreous looking, plenty of which could be selected. The mouldings used in the palaces of the Cæsars and other important buildings in Rome were usually very simple, and looked well in marble, costing less than many modern ones which were designed forgetful of the mason's method of work. Mouldings also needed to be drawn specially to suit the colour. Marble linings, when possible, should be fixed hollow at the back, and a few small places left open in the joints until the solid walls were dry, the hollow allowing the slab to keep a little warmer than the wall, thus

avoiding condensation. In the British Museum, the South Kensington Museum, and other similar collections, were some fine examples of ancient coloured marbles, but they were seldom distinguished by names, and when they were, the names were generally incorrect. In the University Museum at Oxford was one of the finest collections of specimens known, but they had been for years in a dark corridor where it was next to impossible to see their colours. In France, coloured marbles were appreciated as objects of beauty, the same as fragments of sculpture, the collection in the Museum of the Louvre being, in the author's opinion, the most instructive known. Mr. Brindley concluded by referring to the useful arrangements of the Museum of the French School of Mines, where the wall space was divided to represent each geographical department, thus enabling one to see at a glance everything geological in each Département likely to be of use, viz., its earths, sands, clays, limes, stones, marbles, and granites.

[For a report of the discussion which followed see p. 927.]

OBITUARY.

Mr. James Collis.—The death is announced of Mr. James Collis, late District Surveyor of Lee, Charlton, and Kidbrooke.

Signor Enrico Terzaghi.—The death is announced of Signor Enrico Terzaghi, a Member of the Academy of Fine Arts of Milan. His parents were in humble circumstances, and were engaged in the furniture trade. He was educated at the Academy of which he afterwards became a member, between the years 1820 and 1830, and carried off several prizes in the competitions organised by the Academy. He received his first instructions in practical architecture from Signor Moraglia, a Milanese architect of some repute, and assisted him in carrying out several of his works. He afterwards commenced practice on his own account, and built several churches in Milan and its suburbs, among which may be mentioned the Church of St. Giocchino, one of his latest works. Among his secular buildings may be noticed the Patronate for the Society for Relieving Discharged Prisoners, the Savings Bank in the Via St. Paolo, the Hotel Branca in the Via Borgonovo, and the Hotel Grondona in the Corso St. Celsio. He was a member of the Commission for the restoration of the basilica of St. Eustorgio and the Church of St. Eufemia, and also for the completion of the Church of St. Fedele. His body was followed to the grave on the 29th of November by a numerous concourse of artists, friends, clients, and a small number of relations.

Professor Sacchi.—The *Politecnico* of Milan publishes in its current number the funeral oration pronounced over the grave of Professor Cav. Archimede Sacchi, an architect and writer on architectural subjects, and a former contributor to the *Politecnico*, who died at Milan in July last. He was a pupil of the architect Balzaretti, but does not appear to have seriously practised his profession. He will be best remembered by his two works "*Le Abitazioni*" (Dwelling-houses) and "*L'Economia del Fabbriare*" (Economy in Building), which have passed through several editions. He restored the Castle of Sartirana and the Palace of Arengario at Monza. He made a design in 1869 for a new western front to the Church of Sta. Maria del Fiore at Florence and another design for a cupola for the cathedral at Pavia. Cav. Sacchi, who was in his forty-eighth year, was Professor of Architecture at the Academy of Fine Arts at Milan, a member of the Communal Council, a member of the Commission for Public Buildings for Milan, and a member of the Provincial Commission. He was also Vice-President of the Milanese Institute of Architects, who propose to commemorate his memory in a special manner.

Didsbury.—Christ Church has been presented by Mr. William Roberts with a new clock and carillon, by Mr. J. W. Benson. The escapement is Graham's dead beat. Time is shown on three copper dials, 4 ft. 3 in. in diameter; the hours are struck on a tenor bell of 18 cwt., and the Cambridge quarters are chimed on four smaller bells, the striking being by improved rack repeating work. The carillon or chiming machine plays seven tunes, on eight bells, at intervals of three hours, and is entirely automatic.

THE LAYING OF MAINS AND PIPES.

A BILL has been brought in by the Metropolitan Board of Works to remedy a defect in the Metropolitan Management and Building Act (Amendment) Act, 1878, with regard to the subsoil of streets, and to regulate the laying of mains and pipes in the metropolis. It has been found that while the abstraction of gravel from the sites of buildings can be prevented, there is at present no power to prevent the sites of new roads being excavated, the gravel or other material being removed, and the excavation filled up with objectionable materials. The Bill proposes to prohibit the forming or laying out of any street without the consent of the Board over land where the sand, gravel, or subsoil has been removed, and it shall not be lawful to remove any sand, gravel, or subsoil from land over which it is proposed to form any new street, or over which any such new street has been formed, without the consent of the Board; and the Board in giving their consent may impose any condition they may think fit for the purpose of securing stability and protecting health. The consent of the Board is not required where no more of the surface soil has been removed, or is intended to be removed, for the purpose of forming a foundation for the paving, metalling, or flagging any street, road, passage, or way.

Any person contravening the Act is to be subject to a penalty not exceeding 5*l.* for the first offence, and to a continuing penalty of 20*s.* a day for every day during which the offence is continued.


As the Bill was originally drawn, the District Surveyors were to enforce the conditions imposed by the Board, and were to be paid such fees in respect of their supervision as the Board might appoint, and such fees were to be recoverable in the manner provided in the 51st section of the Metropolitan Building Act, 1855; but in the Bill as revised the enforcement of the Act is placed in the hands of the several Vestries and District Boards.

Complaints have been made to the Metropolitan Board by the various Vestries and District Boards that by reason of the gas mains and water pipes in the metropolis being laid at an insufficient depth below the surface of the streets, the Vestries and District Boards have been made liable for damages occasioned by injury to these pipes by steam rollers employed to level the macadam of the roads. To remedy this state of affairs, it is proposed by the Bill that mains or pipes shall not be laid in any new street, nor any mains or pipes relaid or renewed without the approval of the Vestry or District Board. The Vestry or District Board in giving their consent may impose conditions with regard to the depth, position, and course of any mains or pipes, subject to an appeal to the Metropolitan Board of Works. The penalty proposed for any infraction of the law is 5*l.* for the first offence, and 20*s.* a day for every day that the offence continues.

The short title of the Act is the Metropolitan Management Acts (Amendment) Act, 1887.

Illustrations.

FIREPLACE IN THE GUARD-ROOM,
MONT ST. MICHEL.

 SHORT time ago we gave an illustration of the proposed exterior restorations of Mont St. Michel, we give here a sketch of the fireplace in the interior of the guard-room, from a sketch by Mr. E. Jefferson Jackson. The effect, it will be seen, is obtained entirely by the mouldings, which are deeply undercut, and give strong and effective lines of shadow. The ornamental cresting, as it may be called, is not very well designed for its situation, and it may be doubted if the work would not be better without it.

NORTH CHANCEL AISLE, AMIENS.

This bit of thirteenth-century work from a great building is also by Mr. Jackson, the author of the last-mentioned sketch.

BRAID U.P. CHURCH, EDINBURGH.

This church, at present in course of erection from the designs of Mr. G. Washington Browne, occupies an important site in a rapidly-rising suburb. The object aimed at in the plan is to ensure the most favourable conditions for

preaching, and this is accomplished by arranging the seating so that every worshipper sits directly facing the pulpit, while all corners and obstacles to direct seeing and hearing are avoided. To make the building a more perfect auditorium there is a rise of 2 ft. upon the floor from front to back, and the ceiling is slightly domical. The materials employed are local red sandstone for the rubble walling, with Prudham stone dressings; the roof is constructed of iron principals and purlins, and covered with Westmoreland green slates; the internal walls are plastered, and the seating is formed of selected yellow pine.

The church is seated for 750 people, and the cost, including hall to seat 250 persons, session-house, vestry, boundary walls, heating, lighting, &c., is estimated at 5,000*l.* Messrs. Wm. Beattie & Sons are the principal contractors, and Mr. Wm. Bruce is the clerk of works.

CHURCH OF ST. FRANCIS, ASHTON
GATE, BRISTOL.

THE materials of this church, of which we give a view, are local stone for the walls, with Cattybrook bricks for all dressings and inside facework, the columns of nave, window-cills, and tracery being of Bath stone.

The roofs, which are to be open-timbered (except the chancel, which will be boarded and divided into panels), are to be covered with Broseley tiles; gangways and chancel-floor are to be tiled, and windows are to be fitted with rolled cathedral glass.

The heating and lighting will be an addition to the cost (about 5,000*l.*, including boundaries) as well as fittings of every kind. The church will accommodate 750.

The architect is Mr. John Bevan, of Bristol, who is carrying out this and some other churches under the Bristol Church Extension Commission.

MISSION ROOM, KIRKLAND.

KIRKLAND is a small mining village in the parish of Lamplough, Cumberland, and, as is frequently the case in the mountainous districts, one or two miles away from the parish church.

The room is intended to be used for both secular and religious purposes. When the service is secular the chancel is shut off by revolving shutters.

The walls are built of local limestone in squared rubble-work, and are practically above the window-cills on each side, nothing more than buttresses. This proved to be a very cheap plan, for the entire cost of the building, which has seats for 280 people, was, inclusive of fittings, fences and gates, and architect's commission, under 600*l.* The architects are Messrs. T. L. Banks and Townsend.

AMERICAN VILLA ARCHITECTURE.

THESE are three examples of modern American villa architecture. The cottage at Newport, designed by Mr. Luce (not Lacey, as printed in the illustration title), owes evidently a great deal to English architectural fashions; that above it, at Elberon, is an example of what may be called the new American school of domestic architecture, which is striking out a form and feeling of its own. The summer residence at Bar Harbour, the upper of the three illustrations, derives its character mainly from the fact that its principal portions are entirely of timber and shingle, and are treated accordingly. This being a seaside villa, the architect seems to have had the rather happy idea of giving a kind of lighthouse effect to the prominent feature of the house, in keeping with the *genius loci*.

The illustrations are drawn from photographs by Mr. A. B. Johnson.

GREAT NORTHERN CENTRAL
HOSPITAL.

IN 1884 the Committee of this Hospital invited five architects to submit designs for their projected new buildings in the Holloway-road. The result of this competition was that the design submitted by Messrs. Young and Hall was awarded the first place, and they were appointed architects to the new building.

The original design submitted included three circular pavilions, two of which were three stories in height, the third being only two stories high and being intended for future extension. The upper floor of one of the larger blocks was occupied by the operation

theatre and small wards for special cases. The out-patient department was much smaller than the one now proposed, and was arranged on two floors.

After much consultation between the Committee and the architects, it was decided to provide accommodation for the whole number of patients (150) at once, to build one circular and one rectangular pavilion, the wards in each pavilion being identical in point of floor area, wall space, and cubic space, and to considerably enlarge the out-patient department, which was to be wholly on the ground floor.

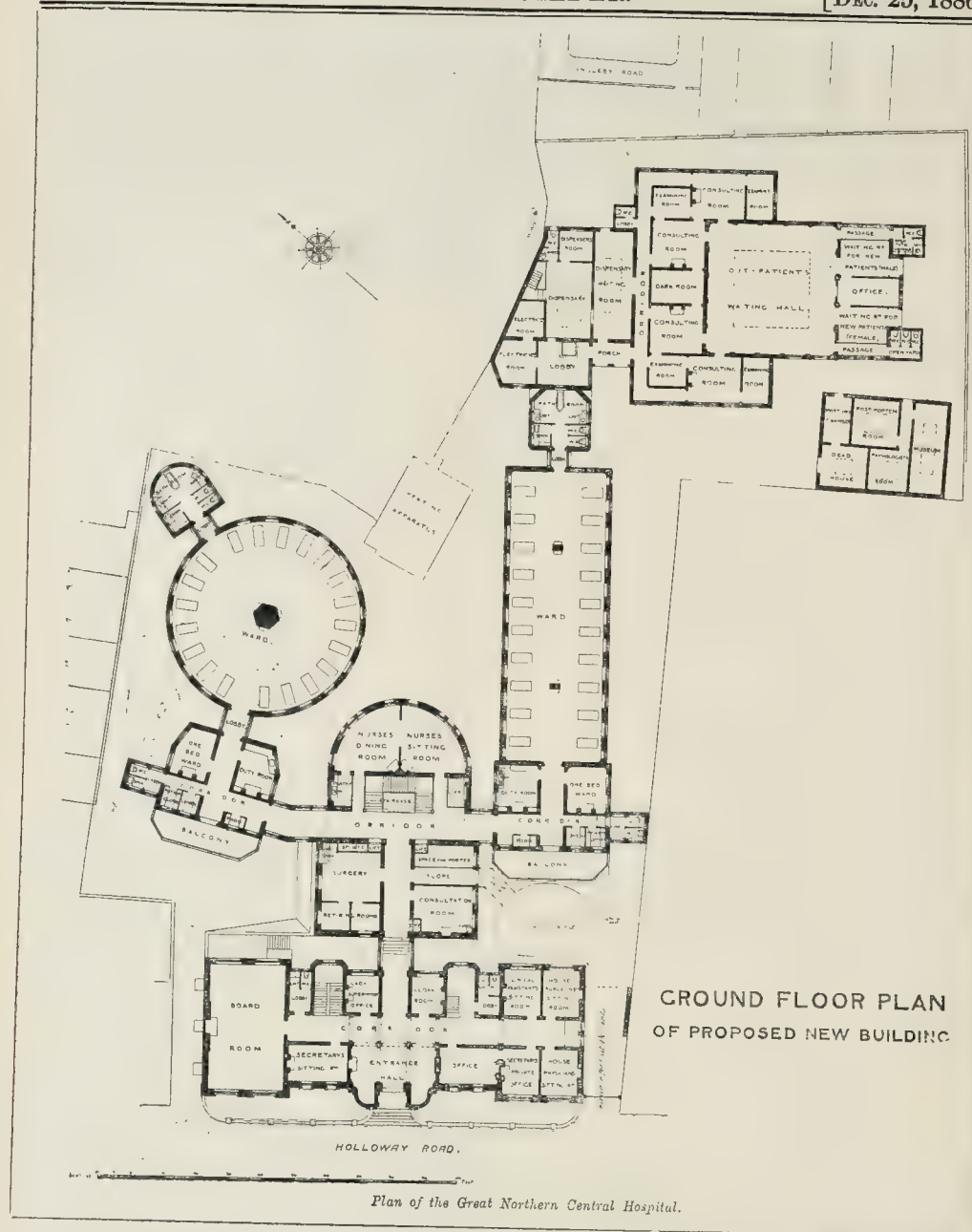
The design we illustrate to-day is the one adopted on the lines of the modifications described above.

The buildings may, for purposes of description, conveniently be divided into—1. Front administration block; 2. Back administration block; 3. Circular ward block; 4. Rectangular ward block; 5. Out-patient department; 6. Mortuary.

1. *Front Administration Block.*—Basement contains porters' room, stores, and coals. Ground-floor: Entrance-hall, board-room, secretary's office, lady superintendent's office, secretary's, physician's, surgeon's, and clinical clerk's sitting-room. First floor: Sitting-room and bedroom for lady superintendent, sitting-room for paying patients, twelve bedrooms for ditto, and one nurse's room. Second floor: Eight bedrooms for paying patients and sitting-room for ditto, one nurse's room, six bedrooms for staff, pantry, bath-room, &c. Third floor: Nurses' bedrooms with bath-room, &c.

2. *Back Administration Block.*—Basement: steward's office, and stores, with lifts, wine and beer cellars, main staircase, and passenger lift, linen-room and store, and way to out-patient department under rectangular ward block. Ground-floor: In-patients and casualty entrance, surgery, with examining-rooms; consultation-room for medical staff; main staircase, with corridors right and left to ward pavilions; nurses' dining-room and sitting-room, with pantry attached. First floor: Bedrooms for nurses, main staircase, operating theatre, surgeons' room, and chloroforming room. Second floor: Bedrooms for nurses, main staircase, mezzanine, bedrooms for servants. Third floor: Kitchen scullery, larder, servants' hall, main staircase. The lift is brought up to this floor to enable patients to be taken out to the flat roofs over the ward blocks.

3. *Circular Ward Block.*—Under the ground-floor is an open basement, 5 ft. high. Ground floor, entering from main corridor: recess for basket for soiled linen, cupboard for food, way out to balcony. The balconies are specially arranged so that patients in bed can be wheeled out on to them direct from the wards. Cupboards for linen and patients' own clothes, water-closets, and slop-sink, duty-room, and one-bed ward. The connecting lobby between the duty-room block and ward is a covered bridge, 7 ft. 6 in. high, with clear space between its roof and the floor of the lobby above. Ward for twenty beds, 57 ft. 6 in. diameter, 12 ft. 6 in. high at external wall line, rising to 13 ft. 6 in. high at central shaft. Wall space per bed, 8 ft. 6 in.; floor area, 123 ft. 3 in. per bed; cubic space per bed, 1,613 ft. These figures are exclusive of space occupied by the doorways. Each ward is warmed by three of D. O. Boyd's hygienic ventilating stoves, placed on three sides of the hexagonal chimney-shaft. Fresh air is brought up from below to the back of each stove, and extraction-shafts are carried up from openings at the ceiling level on the remaining three sides of the hexagon. The shafts to each ward are entirely distinct, and are carried by fire-clay pipes with the smoke flues. The warming power of the stoves is supplemented by hot-water pipes running round the ward, which are so arranged that the water can be shut off except when required for use, and it is not anticipated that this would be the case except in the most severe weather. In addition to the windows, which are double-hung sashes with hopper lights above, fresh air is admitted at the floor level by Ellison's patent ventilators. The floors will be constructed of iron joists and concrete, and solid wood blocks, the precise nature of which is not yet settled. The lobby connecting the wards to the closet and bath-room block is constructed in the same way as that connecting the ward block with the duty-room block already described. The w.c. block contains two water-closets, a sink-room, and bath-room, with four lavatory basins. The walls of this block are lined throughout with



glazed bricks,—and the bath-room is warmed by hot water.

4. *Rectangular Ward Block.*—Under the whole of this block is a basement, the floor of which is on the same level as the basement of the back administration block. This basement, which is quite open at the sides, forms a covered way from the administration and wards to the out-patient department and dispensary.

The duty-room block is similar in all respects to that of the circular ward block, except that the intervening lobby is in this case omitted.

In the rectangular ward block, except that the water-closet and bath-room block is arranged in a similar way to that of the circular ward block.

5. *Out-patient Department.*—The entrances for out-patients are placed at the north-east, for the reason that the committee contemplate the

possibility of obtaining an entrance at some future time from the Manor-road. The male and female patients enter at separate doors into small waiting-rooms for new patients. Separating these waiting-rooms is an office with an entrance to each room and also to the large waiting-hall. The main waiting-hall has seating accommodation for over two hundred patients, and is divided centrally by a gangway, one side being reserved for male patients, the other for females. The closets, &c., for each sex are separately arranged. The consulting-rooms are four in number, and to each is attached an examining-room. In addition to these is a room for ophthalmoscope work, accessible to two of the consulting-rooms. The exit from the consulting-rooms is into a passage which leads directly to the dispensary waiting-room. This passage is only 7 ft. high, and the rooms abutting on it have both vertical and top

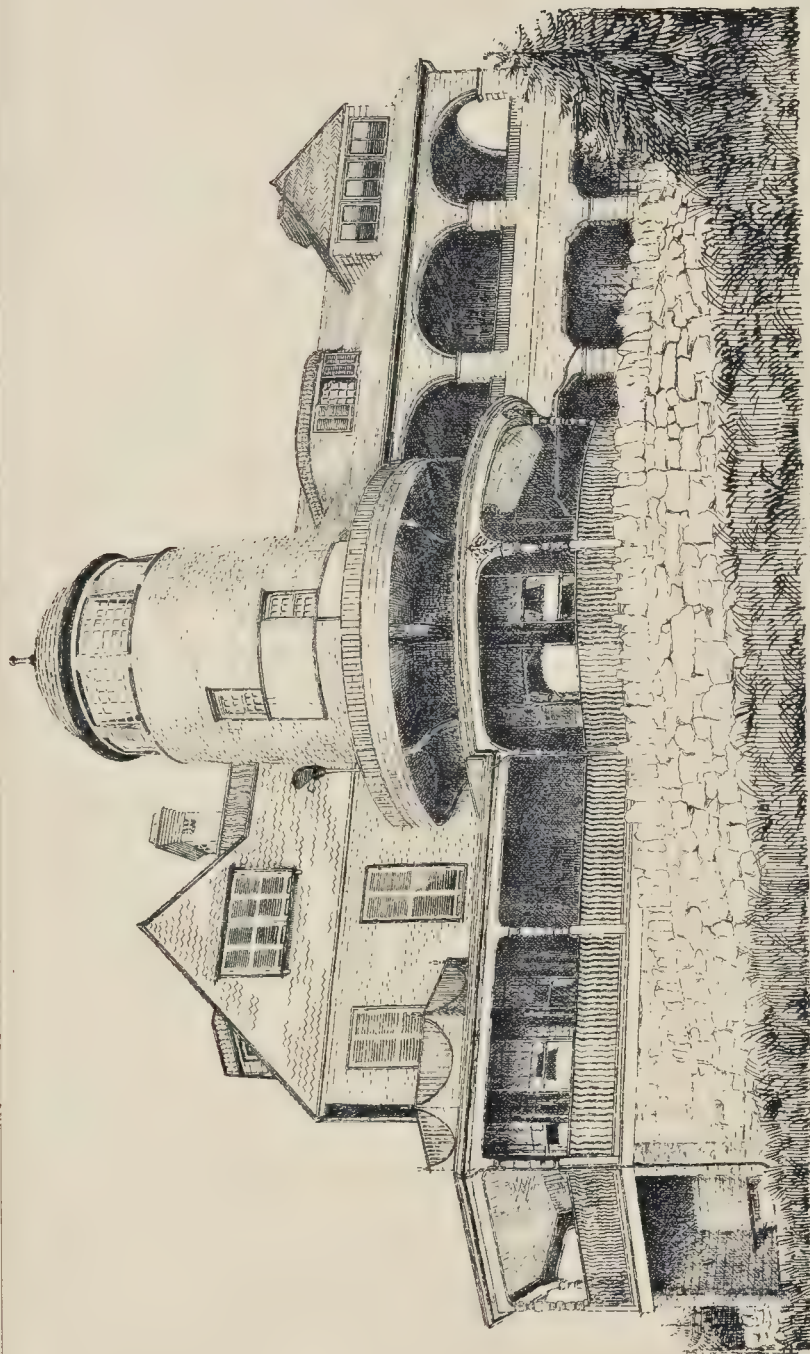
lights over its roof. Adjoining the dispensary waiting-room is the dispensary, with dispenser's and electrician's rooms, &c., and drug-store under. On the hospital side of the dispensary is a lobby for serving out medicines, &c., for the in-patients.

6. *Mortuary Block.*—This contains museum, room for pathologist, post-mortem room, dead-house, and mortuary chamber.

The front of the Administration Block is to be faced with red brick and terra-cotta, the rest of the buildings with plain stock, with red brick arches.

The contract for the entire buildings was taken by Messrs. Brass at a cost of 40,300*l*. Of this the Committee have up to the present arranged to carry out the back part of the administration block and the rectangular ward block. The remainder is postponed until the necessary funds have been obtained.

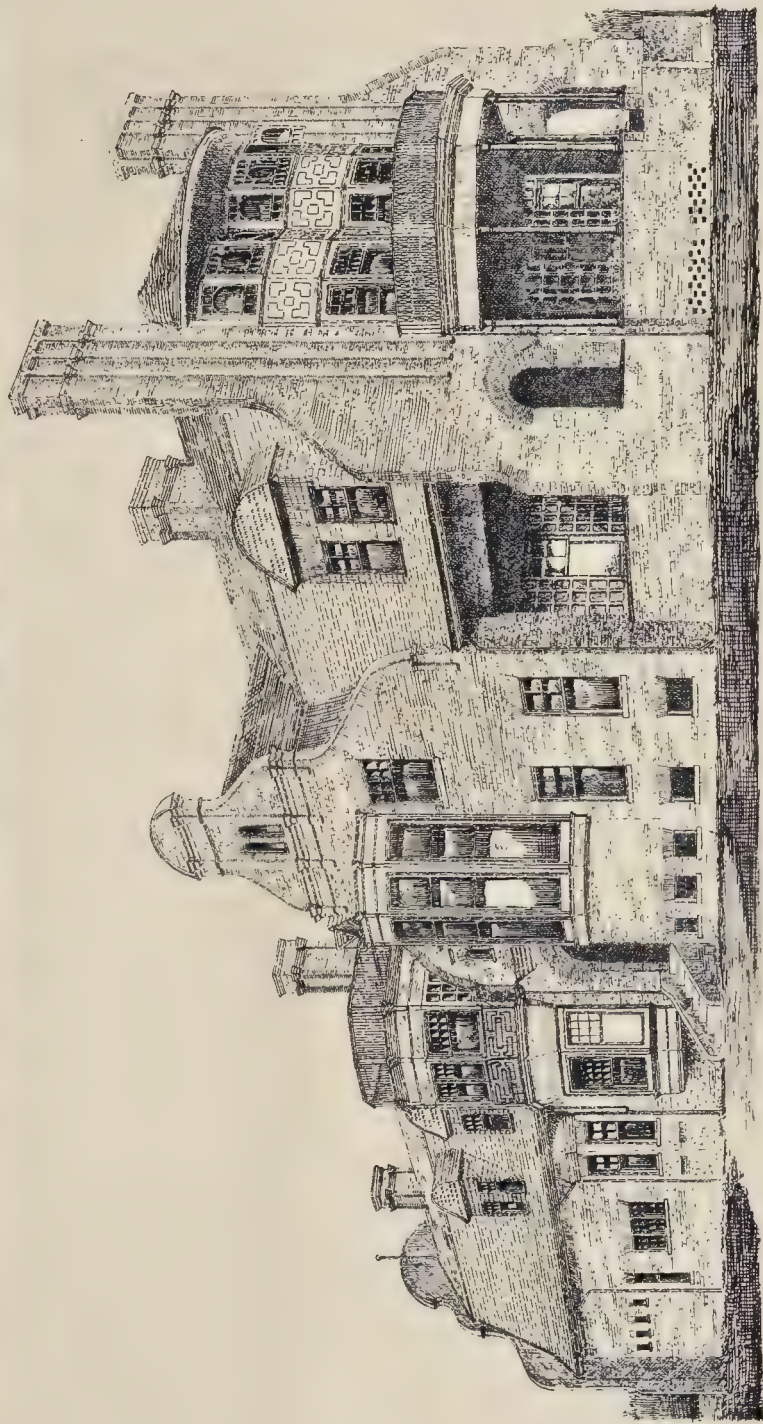
THE BUILDER, DECEMBER 25, 1886.



SUMMER RESIDENCE BAR HARBOR, MASSACHUSETTS. MR. H. E. JONES, ARCHT.



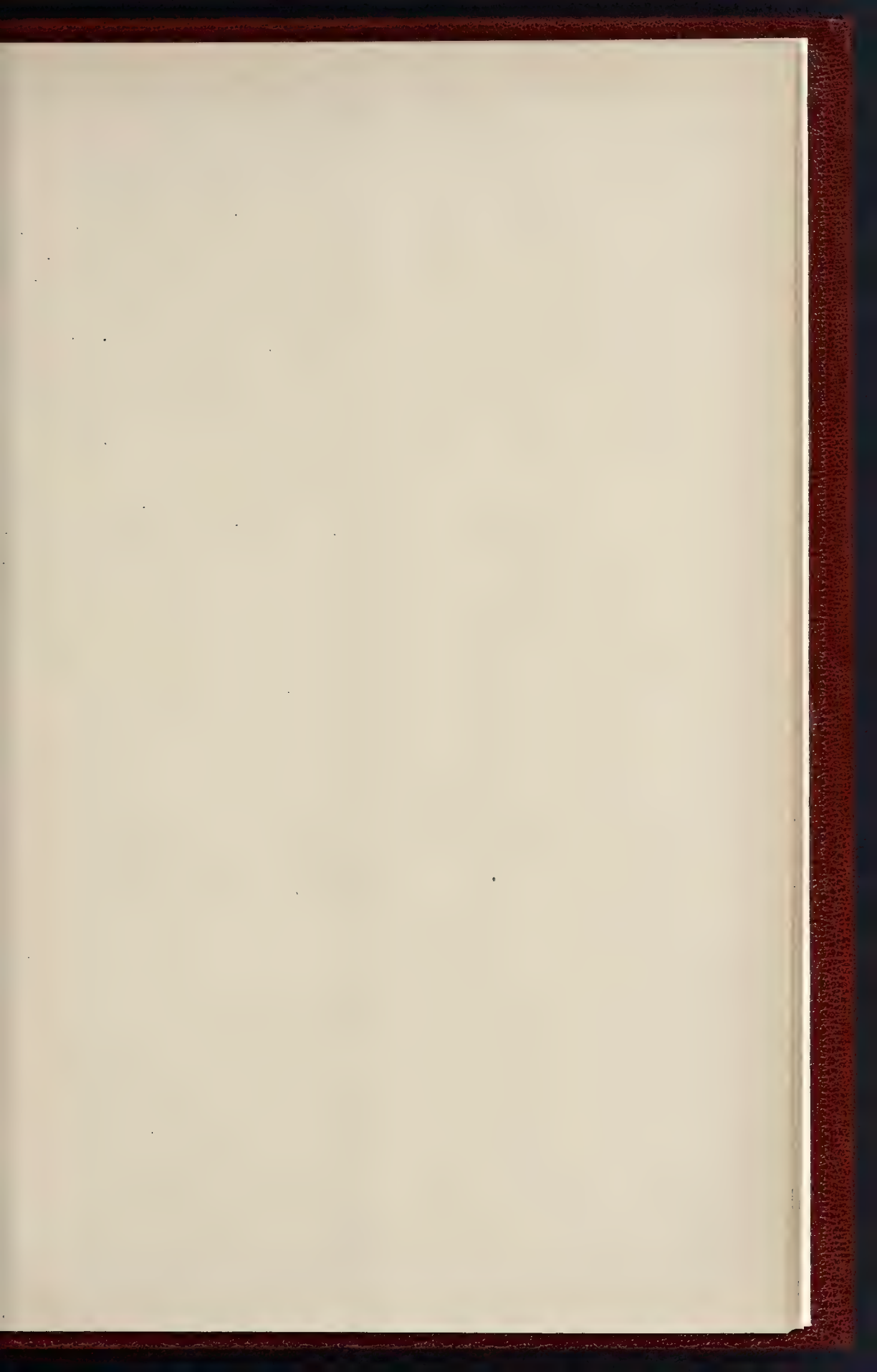
THE CASINO, ELBERON, U.S.—Messrs. Hoad and White, Architects.



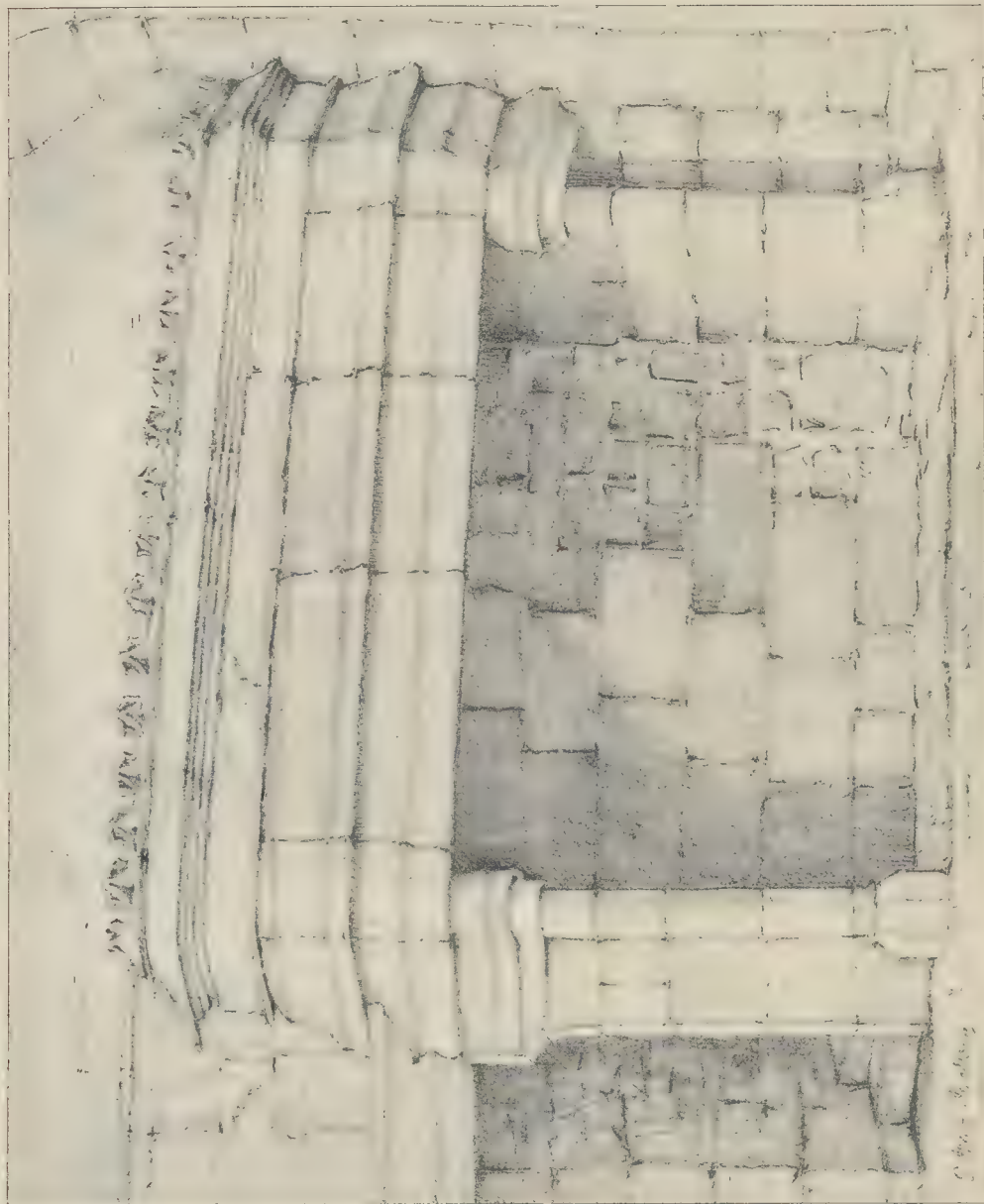
SEA SHORE COTTAGE AT NEWPORT, MASSACHUSETTS.—Mr. C. S. Laro, Architect

NO. 12. 40. NEWARK, N.J. 50. NEWARK, N.J. 50. NEWARK, N.J. 50.

AMERICAN VILLA ARCHITECTURE

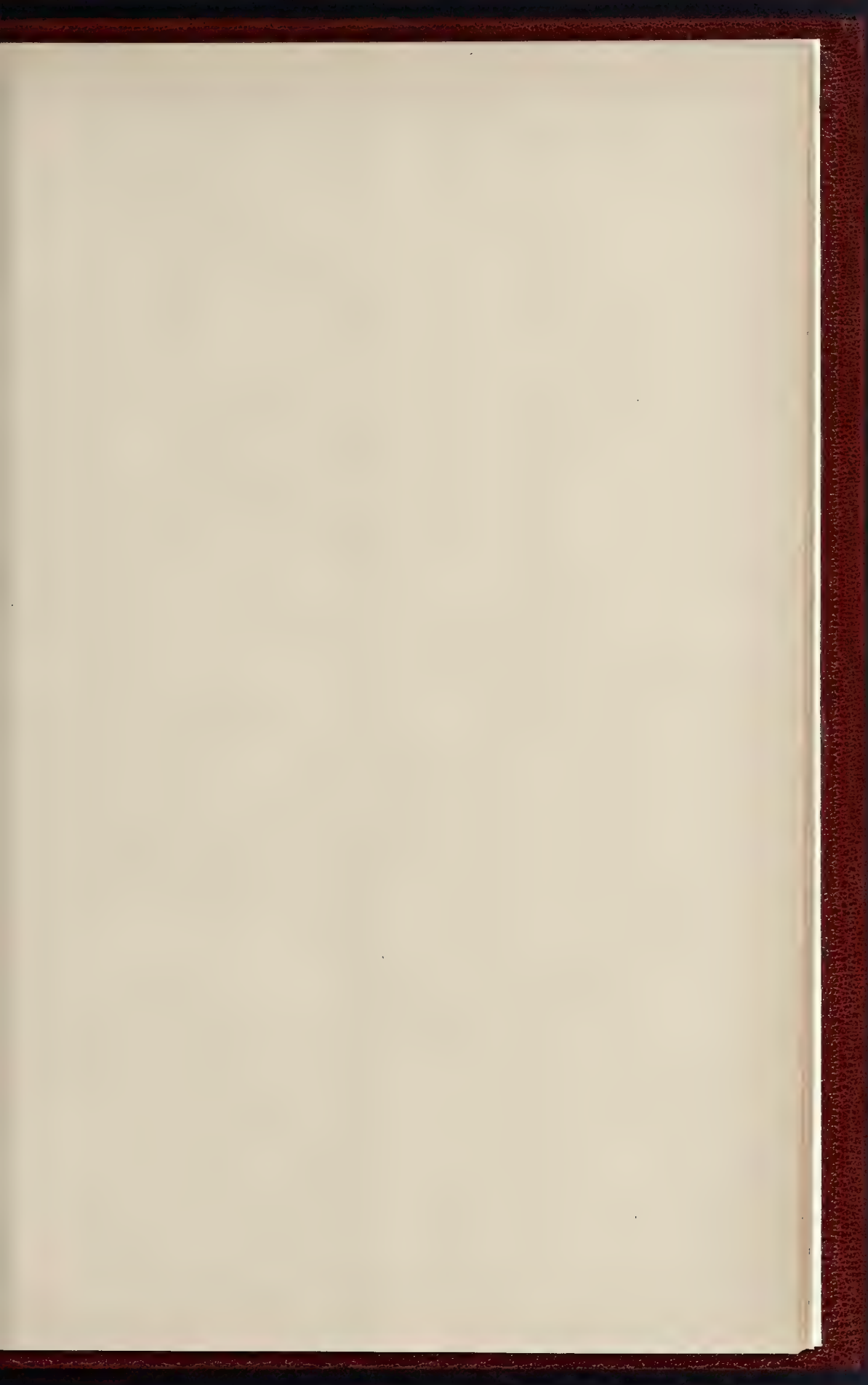


THE BUILDER, DECEMBER 25, 1886



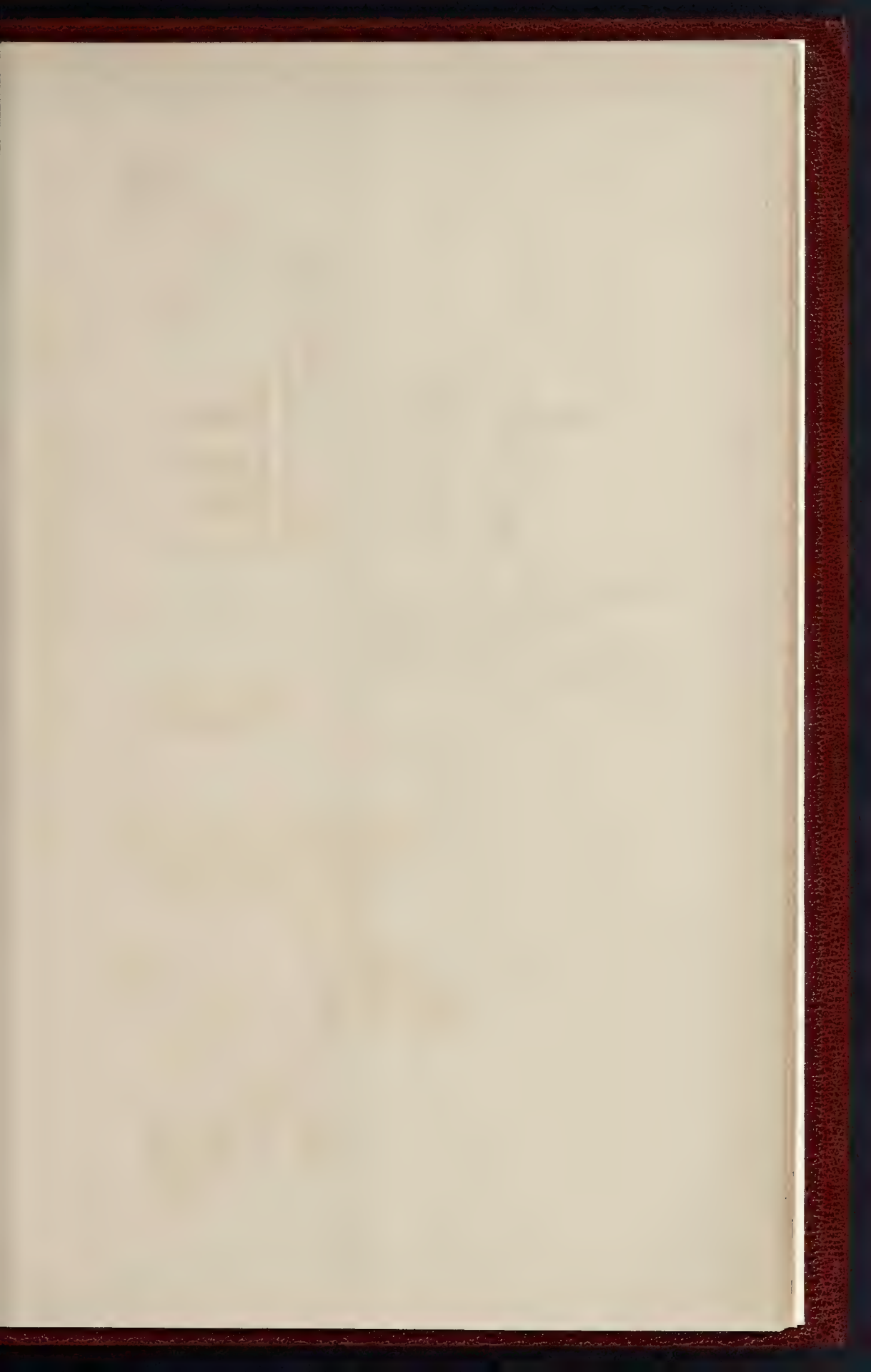
THE FIREPLACE IN THE GUARD ROOM, MONT ST. MICHEL.—FROM A DRAWING BY MR. E. JEFFERSON JACKSON.

NEW PHOTO. SIMON & CO. LONDON

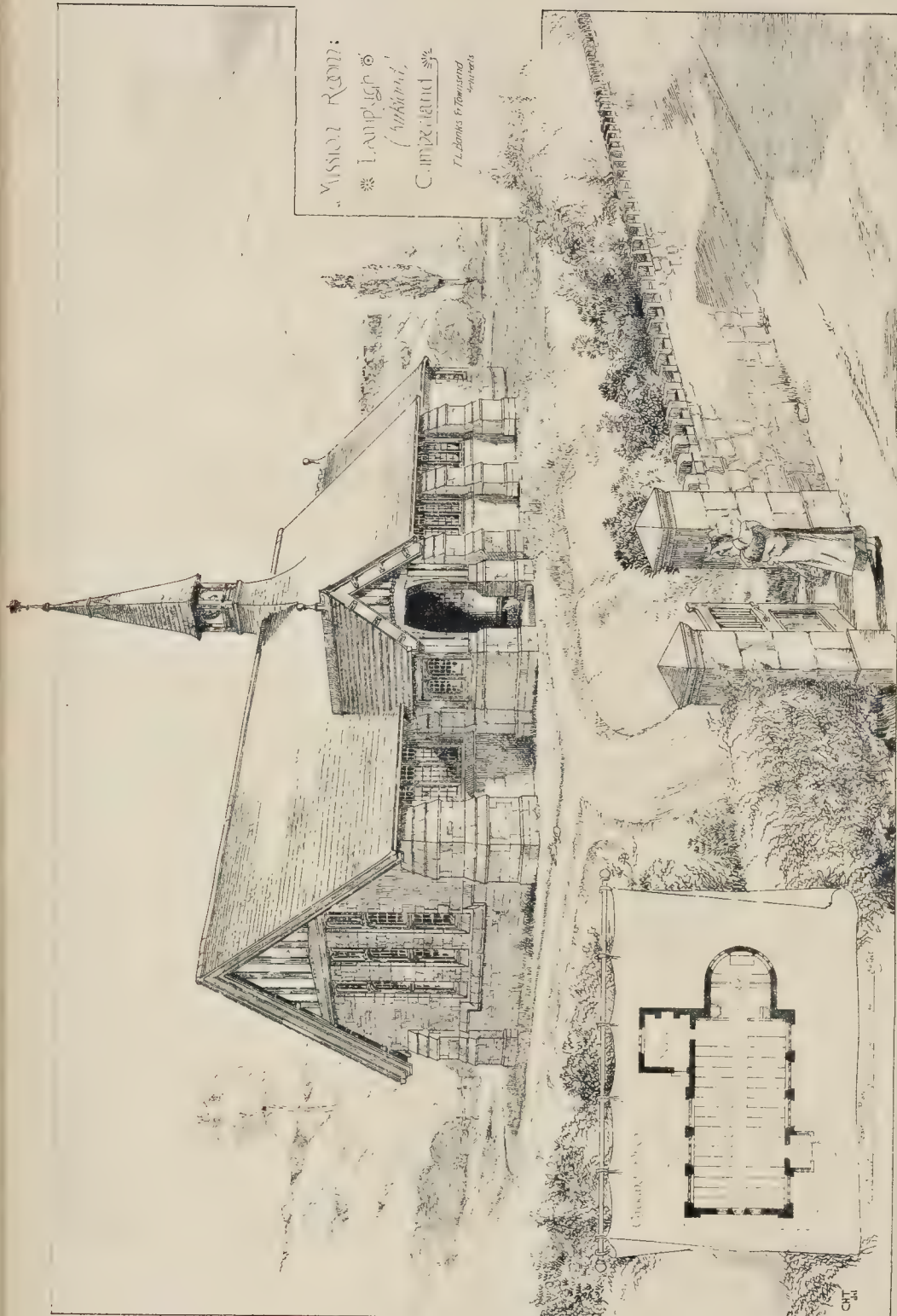




UNITED PRESBYTERIAN CHURCH, BRAID, N.B.—MR. G. WASHINGTON BROWNE, ARCHITECT.



MISSION ROOM:
Lamp-light
Chancel,
Chancel and
T. L. Banks & Townsend
Architects

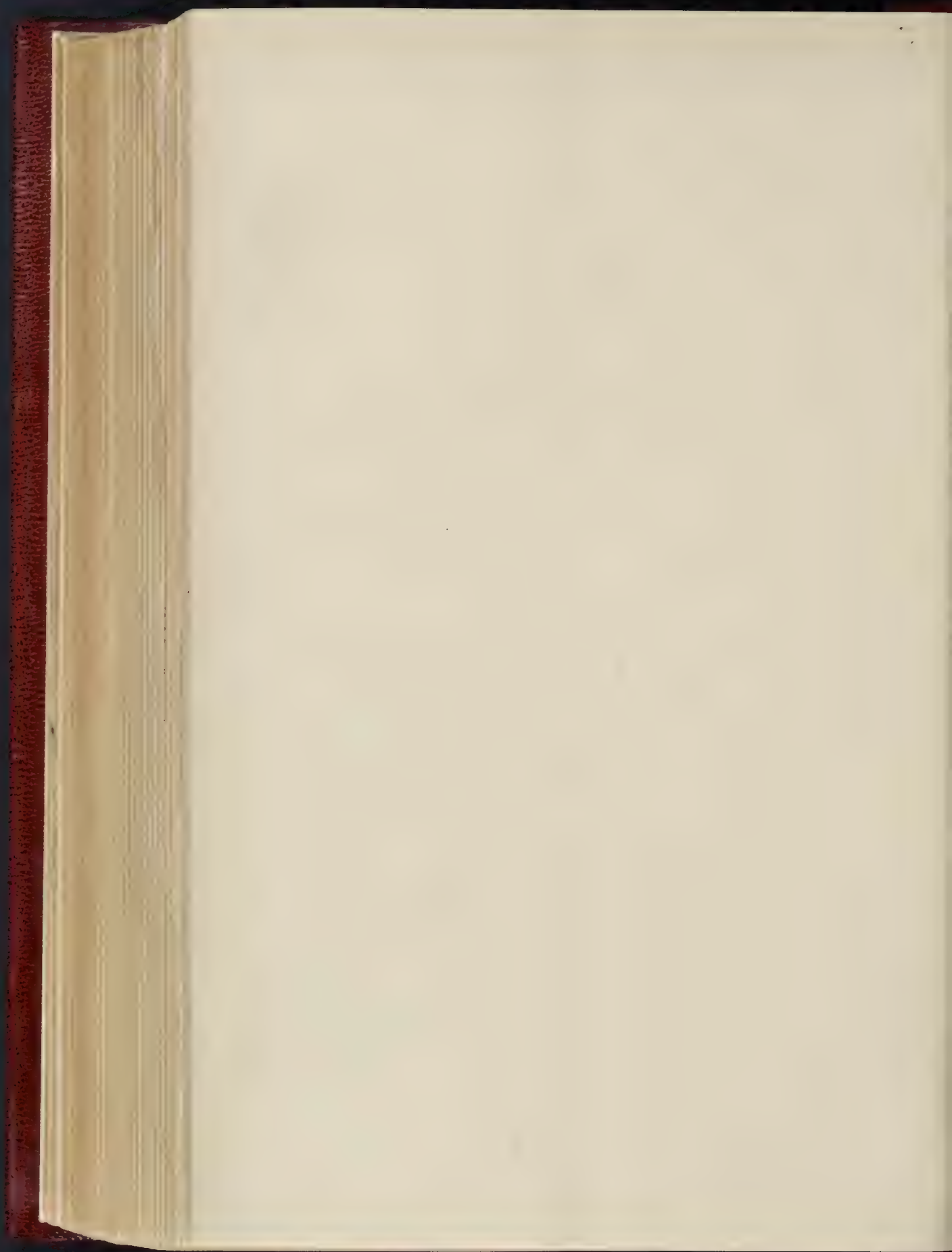


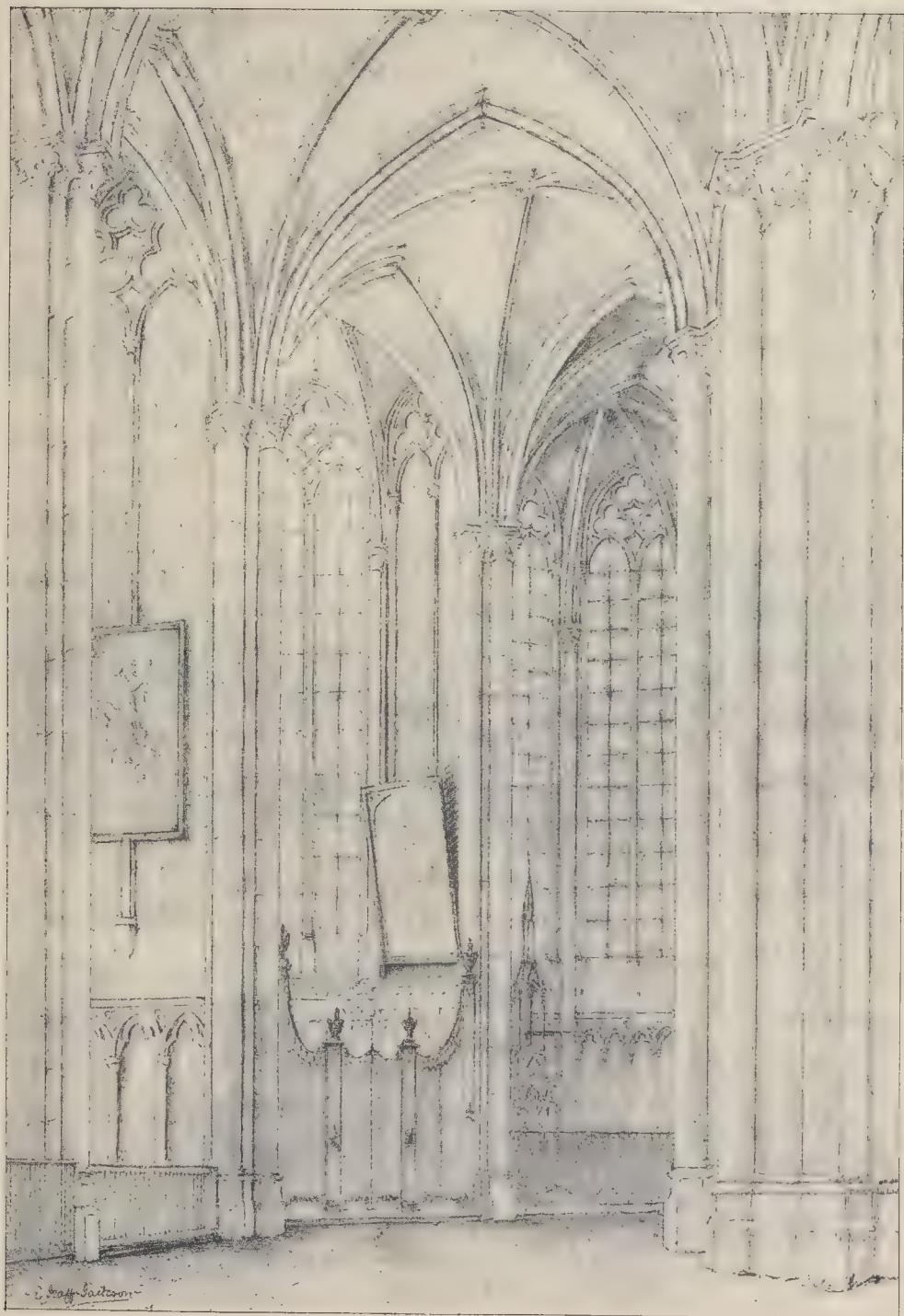


GREAT NORTHERN CENTRAL HOSPITAL.—MR. KETH D. YOUNG, F.R.I.B.A., AND MR. HENRY HALL, A.R.I.B.A., ARCHITECTS.



CHURCH OF ST. FRANCIS, ASHTON GATE, BRISTOL. MR. JAMES DUNN, ARCHT. R. I.





NORTH CHANCEL AISLE, AMIENS.—FROM A DRAWING BY MR. E. JEAFFERSON JACK.

DECORATIVE METAL WORK.

At the meeting of the Architectural Association on the 17th inst., the following paper on this subject was read by Mr. H. Longden:—

In dealing with the subject I have chosen for to-night's paper, I wish to restrict the metals of which I shall treat by omitting gold and silver, as, though they have been used decoratively, as in the Pala d'Oro at St. Mark's in Venice, and various shrines of gold and silver which have perished, such as St. Cuthbert's, in Durham; St. Alban's, in St. Alban's Abbey; St. Thomas's, in Canterbury; St. Edward's, in Westminster Abbey; their use has not been extensive, compared with the use of other metals, and I have no experience of this.

The use of metal work in decoration, both as fixed in buildings and in useful movable articles, is most ancient, and we have records of the use of bronze very extensively in ancient Greece and Rome.

In the total destruction of the civilisation of the Ancient World the bronze so used was mostly melted, and we have few remains of it. This is much to be regretted, as, except gold, this is the most enduring metal, and is susceptible of the finest work which the modeller or sculptor can bestow upon it, besides being capable of treatment by the chaser's art.

It has the great virtue of tenacity, so that cast work in this metal may have thick and thin places, such as cast iron, and, to some extent, cast brass, will not allow without cracking.

By the process of "coring," by which is meant making the casting hollow by putting inside the sand mould a reduced and generalised copy of the figure, vase, candelabrum, capital of a column, or whatever may be the subject of the casting, leaving a thin space between the "core," or reduced copy of the article, and the outer envelope of sand, called the sand mould, the whole casting may be made of about equal thickness all over, so using less metal and saving expense, which is an object not to be lost sight of, besides other advantages.

Some very fine examples of bronze work are shown among the drawings*; the statue of Colonna, by Verocchio, is by that great man who was architect, sculptor, bronze founder and finisher (which in those times were the same thing), and painter. The band of bronze ornament round the pedestal shows what might be done by sculptors now if they called in architects to help them with the pedestals of their statues.

Another example is an interesting triangular pedestal for a statue, with a band near the top and another near the base, of bronze. This is all Italian work.

The best example I can refer to of this work in England is the gates and the enclosure of the tomb of Henry VII.'s chapel in Westminster Abbey. The construction of the great gates of the chapel is curious. There has been made a frame of wood forming large squares which is covered at the front and back with cast bronze mouldings, and the interiors of these squares (so to speak) are made of thin open-work castings, with devices of the rose, portcullis, &c., suitable to the place and founder.

The screen round the tomb is differently made, not having the wood internal construction, and the gates of the screen are made of bronze castings only, ingeniously fitted together, as it was evidently not convenient to make very large castings.

The work on the tomb is very fine, and shows the change in style, from the latest Gothic in the gates and screens to the Renaissance in the tomb, in a most interesting way. There is some other fine bronze work in the Abbey, but I must not dwell upon it.

I do not attempt to speak of bronze statue founding, as that is a subject in itself. Mr. Simonds, the sculptor, lately read a learned and instructive paper upon this subject before another society; and it requires some one with skill such as his, which I do not possess, to treat this subject.

I wish to plead for the use of this metal more in architectural work. I have seen it used with marble in recent work with the happiest effect. It is a metal which is beautiful if left in its own golden tone, and which in changing from this tone never becomes ugly. It will

take gilding perfectly, and will take various patinas, the green, the brown, the black; and, when used with marble of fine contrasting colours, produces effects which cannot be had so well in any other way. It lends itself best to decoration of the finest and most monumental work, and, if the tendency to greater refinement in style which I seem to observe in the works of the best architects continues, I have no doubt that this metal, with its mellow and grave tones, will be more used and valued.

Our neighbours the French have been skilled in the use of this metal for many years; indeed, they may be said never to have ceased using it since the time of Cellini.

We have scarcely used bronze for many years, but there is no reason why we should not, and there is every reason why we should, I venture to think.

I am happy to say that in our great Cathedral, St. Paul's, in this city, some bronze work gilded is to be used in the new reredos which is being put up, and I hope this will only be the prelude to the more extensive use of this metal for which I have pleaded.

Brass is a metal for which no pleading is necessary. It has been adopted very widely in the last thirty years. I can remember when brass was thought rather vulgar. It was used for door and other knobs, for very every-day candlesticks, window-fastenings, and things little thought of.

Among the many changes made by Pugin, whose name must ever be honoured by us, it was discovered that brass was a metal which had a beauty of its own, and that it could be applied in many ways to decoration in public buildings, churches, and houses.

We have all seen the "Medieval gas fittings" which, if they became painful and at last almost odious, began in the fine work of Pugin, and, as he used the metal, were beautiful and useful.

At the same time, I must confess that the feeling of softness which the special smoothness and polish which brass will take seems to me to call for in design, was not so thoroughly studied when it was first reintroduced among us as it ought to have been.

I have the pleasure of showing you some examples of this metal in very happy treatment, some of them kindly lent to me and some belonging to myself.

As exemplifying the great beauty of softness and rounded contours with great delicacy in curves and the very fine detail, some of it almost imperceptible, which the skilled turner knows how to give to his work, I have here a thick low candlestick, probably Dutch, which is one of the finest examples of this kind of work I have seen. A small candlestick here, too, of a not uncommon Dutch type, but very good in its profiles, is a good example of the softness.

The Italian candlestick shows fine contours and turning, with bold chasing of a good Renaissance type, and an interesting tripod foot, with the arms of the donor or owner of it let in in silver.

Two brass dishes here are examples, one of Venetian engraved work, full of subjects, and the other of hammered raised work, showing a coat of arms, with mantling, probably of Italian work.

The Persian jug has fine form, and delicate engraving covering the jug with diaper. The handle, in the form of a serpent, is well designed.

The brass fire-irons of old Dutch make are in bold Renaissance style, and the warming-pan and the simple English brass dog of a very traditional form, applied both to iron and brass, with variations suitable to the material, show various uses for brass, all good and characteristic.

The double-branched candlestick is a good example of what I take to be Flemish beaten work. It cleverly treats a design which almost suggests solid cast work without attempting what sheet brass will not do, and it has an advantage in its lightness for its purpose of hanging on a wall.

The oval basin or dish is good Italian work, and it excels in the specially Italian way of getting good effects with broad and simple means.

The brass plate with a figure of William of Orange is Dutch work, and dates itself 1696. It has a bust of William with the orange branches and Fame blowing her trumpet over his head. The form of it is like that of the firebricks in cast-iron which were put behind

the wood-fires down upon the hearths, and my idea is that the Dutch housewife, who was very patriotic and very tidy (two great Dutch characteristics), had this made to cover up the iron fire-back in the summer when no fire was wanted, and it would look very resplendent, as you may see, when standing down on the hearth of a wide open and lofty fireplace, and surrounded with clean, fresh-looking Dutch tiles in a spotless room.

I have not much here to show the brass balustrades, which are a special feature in screens to choirs and chapels in churches in Belgium and Holland. They have a very rich and beautiful effect, whether used with wood or with marble, and they agree well with buildings and fittings of the fifteenth century, or any later style.

A modern example of this is in the chapel of Castle Howard, where an oak screen has a balustrade and panels of brass work in it, and the effect is sumptuous.

Mr. Norman Shaw has used a brass balustrade in a house in Cheshire as part of a screen between a saloon and a corridor, with shutters behind the balustrade, so that the screen may be an open or a closed one at will.

At Hal, in Belgium, where is a very interesting church, there are a brass font and lectern of very good fifteenth-century work. There are casts of these in the South Kensington Museum.

The lecterns in brass are so common that I should not name them further, but that I wish to mention that in King's College Chapel in Cambridge, which is exceptionally fine, and that the candlesticks in brass, of great height, which Mr. Gilbert Scott designed, and Mr. Barkentin made within the last twenty years, are in perfect agreement with the style of the lectern, and are, I make bold to say, quite as fine as the old work in both design and execution.

In Germany the Lutherans spared much of the work in the churches which was destroyed in Holland and in England; and in St. Mary's, Lubeck, there is a brass sacrament house, on the north side of the high altar, of the most elaborate fifteenth-century work, with a spire, — the whole thing being about 25 ft. high, if I remember rightly.

The monumental brasses in some of the German churches of the fifteenth century are very fine. They are not simply engraved and filled in with black or colours, or with the ground left in strong hatching, but they are modelled in low relief, and are well chased and finished with a dull polish. Such brasses as these let into walls, not into floors, are, unless they are torn away in some revolution, more enduring than marble or stone, and are capable, either as cast and chased work, or as work hammered out of plate, of being made very handsome memorials. I have seen some of these lately in which brass, or brass and copper, have been used with marble as wall tablets with excellent effect.

I cannot plead for the use of brass very extensively in town churches, where there is smoke in the air, and often chemical vapours too, as the colour of the brass goes and it turns absolutely black, especially in cheap, common things, which are made of inferior brass; but in country places, and where the rubbing of the brass is not considered too troublesome, I would plead for its being used in the various ways I have described, as the more it is rubbed the better it looks, and the satiny polish of old, well-rubbed work is specially delightful.

In work connected with the household there is no need to say a word for brass. It is now used most extensively, almost too extensively, about fireplaces, in arrangements for lighting, whether by gas, electricity, or by candles or lamps, — in grilles, in dishes, in ornaments, and even in such things as flower-pots and jardinières, where the use of it becomes meaningless. It has almost come to this, that if you look into many windows where household articles are shown, you are repelled by the gaudy display of polished brass everywhere, and you are tempted by this extravagant over-use of what is a good and useful thing in moderation to forswear the use of it. It is the bane of everything in these days of "fashion" that a thing pretty and good in itself is seized upon after it has been introduced, and used for a time with reticence and good taste, and everybody must have this good thing everywhere until one becomes tired of seeing it, and almost wishes it were banished from use. I fear lest the use of brass should

* It should be mentioned here that the paper was not only illustrated by drawings, but by a large number of actual specimens of ancient and modern metal work.

be passing through this phase now, but it will always have its special use and beauty if care and good taste are exercised in the application of it.

Copper is a metal too soft to use very much in decoration, but it has a fine colour, and, used in mixture with brass (with which it has a natural affinity in colour, being the mother-metal, so to speak), it enriches the composition.

If the main structure of anything be in brass, and the copper be applied in inlay, in incrustation, in bands, or in many other ways, an admirable effect may be had. Mr. Benson has lately made lamps and many household things in which this mixture of metals is treated with great originality of design.

I have here an old tinned copper bowl of Persian work, which has good engraving upon it, and is of a good form. I do not know the use of this, but the ornament is quite characteristically Persian, and it is a good example of engraving where the ground is cut away and the pattern is left.

Steel was much used in the latter part of the eighteenth century, when the metal had newly come into general manufacture. It has rather a cold and severe tone, but in things which can be cleaned it may be used with excellent effect in a room.

I have here a fine example of the work of the end of the eighteenth century in an old grate, which is made of steel, engraved and enriched with bosses and beading of the refined kind which began to be used about that time. I find that our English work of this time was better than in any country in steel.

We now come to iron, the metal which is most used in decorative metal work.

Cast iron has not the same qualities of tenacity as wrought iron,—but there are many good qualities of this metal,—and for resisting fire in fireplaces good strong cast iron is the best. I have seen castings of iron called "rolls" for rolling steel, which, by careful selection of metals, and a special mode of melting, were so strong that a shaving has been turned in a lathe from one of these rolls (say 2 ft. diameter), which shaving was long and curling (say 1 ft. long) when measured in its spiral form, not straightened out, and it could be pulled out and would return to its shape, like a steel spring. This was, of course, quite an exceptional quality of cast iron, but it shows what that metal may be.

I can remember the time when wrought-iron ornamental work was not thought of; everything was made of cast iron, and very badly made too, as design, but that need not be so.

I have a small plate here of a design by Alexander Thomson (called "Greek Thomson"), of Glasgow, which shows what may be done in a railing in this material; and Mr. Butterfield has shown in the screen which closes the court of All Saints' Church, Margaret-street, how a master can treat this metal.

The quality of breadth of design can be got by cast work better than by wrought work (this applies to bronze as well as to cast iron), and in the screen I have mentioned, Mr. Butterfield has done what he could only have done in cast metal.

Mr. Philip Webb has treated cast iron in an original way too, covering it with fine delicate ornament, so arranged that it does not become monotonous, and yet is an enriching of the surface which cast work will specially allow.

The old backs of fireplaces which I have named before are good examples of the right use of cast iron. I have here the finest I have seen of its type, the back which I will call the Trophy back, from the trophies of arms upon it. This has what I believe to be the lion of Flanders on a shield, and dates itself by style as of the sixteenth century.

The back of the "Woman of Samaria" is interesting from the costume and architecture. Our Lord sits on one side of the well of Samaria with His disciples behind him, and the woman of Samaria stands on the other side listening to Him, with her friends and neighbours trooping out of the gate of the city. The well is of a fine early Renaissance type, with sculptured stone margin, and a canopy over it with tiled roof, into which the bucket rises. The brass water-pot is of fine design. The towers of Samaria are in the distance.

The Fairfax back is, of course, English, and I believe it is a Sussex back. It belongs to the time of the Commonwealth, and is of a shape commoner in England than abroad.

There are very fine backs of a later date in

Sir Christopher Wren's part of Hampton Court Palace, and in the Hôtel de Cluny in Paris there are good French ones. The design of these, about the time of Francis I. and Henry II. of France, was particularly fine. They are larger and higher than the English backs usually were.

The cast-iron fire-dogs, which one may still find in Surrey, mostly broken, I fear, are very interesting. The dog I have here I take to be from an old French one, but I am not confident about this. It has a good, sturdy, cast-iron character, and succeeds in getting as much variety of shape and surface as can be expected in a material like this, while it is remembered that it must be exposed to many blows, and these often when the dog is heated and would therefore crack the more readily under a blow.

Wrought-iron, which has special qualities of strength, tenacity, durability, and relative cheapness, is coming more and more into use daily. For some time, as I have said, it fell out of use, but the Gothic movement in England brought wrought-iron into vogue again, and after the use of it being almost confined to ecclesiastical work in hinges and screens it has now come into houses. Outside railings, grilles to protect windows and fanlights, knockers, door-handles, internal grilles to cover pipes, dogs, fenders, and iron fittings for lights, are made in wrought-iron. There is some reason to fear in this, as in the case of brass, fashion may overdo a good thing, but the extravagant use of iron cannot be gaudy at least. Polished iron is not suitable for use in our damp climate, or I should recommend this, as the fine grey polish which it will take is very harmonious with rooms which are furnished richly. When labour can be found without too much inconvenience, polished iron should certainly be used.

For external work black or painted wrought-iron must be used. I fear that the manufacture of iron now is not favourable to such durability as some of the specimens I have here shown. The old mode of smelting with charcoal made a finer, closer, and more ductile iron, less liable to rust than the modern iron. Perhaps, also, the atmosphere in our great cities and towns was not so unfavourable to the duration of wrought-iron work. In making fine wrought-iron work, it is important that the best iron now obtainable be used; indeed, when the work is intricate and needs many welds, none but good iron can produce the effects aimed at.

I have been favoured with drawings of ironwork from Italy and from England principally. The French have been very clever smiths always, and there is a little of their work shown in sketches from St. Maclou at Rouen. They have in this, as in nearly everything else of an artistic or ideal kind, carried their boldness to the extent of temerity. Their ironwork of Louis XIV.'s time is very stately, rich, and well balanced in design, with firm leading lines and graceful foliage and garlands. In Louis XV.'s time the curves became bolder and looser, as in all art of that time, and any one who has seen the Grande Place of Nancy, which was built in this reign, will not forget the wonderful profusion and richness of the iron screens which come in, I think, eight times in the regular composition of buildings and screens. In Louis XVI. time the work became elegant and rather stiff, and soon the line ironwork died out. The German work is comparatively clumsy, and the endless scrolls with sprays going out at strange tangents, and passing through the scrolls in gratuitously difficult ways, the scrolls ending in flowers of the shape of silkworms cocoons, and with antennae springing from them so as to remind one of great insects, which seem among the most characteristic Medieval German work, are not very beautiful, if they are very clever from the iron-worker's point of view.

In later times the ironwork throughout Europe seems to have been greatly affected by the French taste of the time. There are great quantities of fine rococo ironwork in Vienna, I believe, and I have seen in Zurich a house with extremely good balconies and balustrades in this style.

In England we have always had rather a different way of doing work to that of other countries, even when the same wave of feeling as to style passed over us. The very noble work of Huntington Shaw, from Hampton Court, which we have preserved in the South Kensington Museum, is different from any other work, though it has its points of resemblance with French ironwork. This and the

gates and grilles in St. Paul's are some of our best ironwork in England. I have here some sketches from the Hampton Court screens, and I think this kind of work is very much to be studied and followed by us. The construction is good, and the ornament is so applied as to enrich the construction without hiding it, and to make a good composition of open and solid work, well contrasted and varied in the screens almost infinitely. There is a largeness of style in these screens and in the St. Paul's work, which must have been impressed on it by Sir Christopher Wren, who was such a great architect and engineer, and who impressed his feeling of grand style on all the people who worked for him. The later English work, of which I have a small example here (a bracket), and some interesting drawings, is simple and direct in style. One example from the Adelphi, which is now taken away, has a very good contrast of free and rigid lines, and I have noticed in the recent work of many of our architects that the best characteristics of the old examples have been followed.

I have here some good pieces of ironwork also. The churchyard cross comes (as far as I am concerned) from Basle, and was, doubtless, taken from some neighbouring churchyard. It seems to be a piece of work of the middle of last century, but the date has been partly obliterated. There is a small crucifix painted on the back of the box, of which some traces remain. The freedom and luxuriance of the ironwork go quite as far as such qualities may reasonably go, I think. The projecting hook is to hang either a lamp or a holy-water pot upon.

The grille is a fine piece of lattice work, and the finishing of the cross bars with roses on the frame is very pretty and simple. This has evidently been a door to an aumbry, and has had two locks, so that something precious was kept behind it.

The panel of scroll work is a good example of pure smith's work in getting ornament out of the flat bar, and then returning to the flat bar shape.

The "landier," as the French call it, is good as smith's work, and is an illustration of how meat could be roasted before a wood fire and small stew pans could be heated on braziers of charcoal in the small dishes on the swinging arms of the "landier."

The old English iron dog, of great simplicity of style, has a dish at the top for the same purpose, and is prepared with hooks for spits to rest on.

On the board are good examples of a knocker, a handle, some flowers, and some scrolls of rococo work, with very clever treatment of thin iron foliage.

The two Italian dogs of iron and brass have good points in regard to the treatment of both metals.

There is on the board a naïve and interesting piece of engraved work on polished iron sheet, with the openings cut out very irregularly with a chisel after the engraving has been done.

The lock and key of Louis XIV. style are very good.

The two high wrought-iron candlesticks and the gridiron are pieces of old work, showing how interesting a thing, made almost without design, may be made by the workman setting about in a simple direct way to his work.

There are many fine drawings here from Italian ironwork, including the screens at Orvieto, which have in the finials some of the best work in the naturalistic way that exists, I believe. There are also other screens, fire-irons, brackets, and well work, all of that surpassing beauty which Italian work had until recently, and which they have now quite lost, apparently.

In a paper like this I am only able to touch the fringe of so large a subject as the decorative use of metal work, but I have slightly described some uses of the metals most used in connexion with buildings. I have endeavoured to speak as much as possible of what I have seen and known myself, and to illustrate my paper by actual examples.

It has been my great pleasure and privilege to witness much of the great revival in architecture, and I may say all of the revival in the arts as applied to architecture. I saw the Exhibition of 1851, and though I was too young to be able to understand the difference between our design and that of other countries,—and, let it be remembered, no country then exhibited very fine decorative work,—yet I know that at that time gasfittings made in imitation of

convolvulus; thin stamped brass leaves and cinque white glass flowers, out of which the gas-pipe came, were thought elegant; but that these things would now be scouted. I do not mean to say that I think the general level of taste is high, but it is better than it was then. In that Exhibition some work directed by Pugin was shown, and from that Exhibition we began to learn that the state of things in England as regards design might be improved. Many currents have run towards the improvement. Among these are the increased study of all kinds of old work by architects and craftsmen, the direction of work by Pugin, by Alfred Stevens, by Godfrey Sykes, and by numerous living architects and designers. The teaching of drawing, now so widely diffused, and, in consequence, the new spirit that is put into work by the men who execute it, are such things as I scarcely could have expected to see. Let it be always remembered that the same people, as to race, live in these islands as those who did some of the beautiful work which we have collected here, and of which we have drawings here. There is no reason why these men now living amongst us should not do work as good as the old men did. There is skill, and patience, and dexterity in our own people, and, as we need not be ashamed to compare English work, from the twelfth to the eighteenth century, with work of other countries, so, I am convinced, and that by experience, we need not be ashamed to compare that of the nineteenth century. The design, by whoever made, must be suitable to the material, and I will answer for it that there are people now who will carry it out, in metal work, in the spirit of the design. We may leave our record for future times in these accessories of architecture, as we shall in architecture, that there were good men now, who studied their work, took account of modern conditions and requirements, and, at the same time, studied how to treat the new things in the spirit of art, of loving study, and patient endeavour which characterised the work of former times.

[A report of the discussion which followed will be found on another page.]

MANCHESTER ARCHITECTURAL ASSOCIATION.

The ordinary fortnightly meeting was held at the Diocesan Building, on the 14th inst., Mr. L. Broth in the chair. The proposed new Charter of the Royal Institute of British Architects was the subject of discussion, in which Messrs. Mee, Chadwick, Mould, Hodgson, Woodhouse, and the Chairman took part. The following petition to the Queen's most excellent Majesty in Council was adopted:—

1. That the Royal Institute of British Architects has presented a petition to the Queen's most excellent Majesty in Council, praying for the grant of a new Charter of Incorporation, confirming the privileges which it enjoys under the charter granted to such Institute by his Majesty King William IV., subject to certain variations thereof which are sought to be made by the provisions of the said proposed new charter.

2. That the said provisions of the said proposed new Charter relate, among other matters, to the improvement of architectural education and to the establishment of examinations in connection therewith, and further, to the adoption of by-laws, which are thereby authorised to be made, regulating, among other matters, the relations of the said Royal Institute to such branches thereof as may be established in the United Kingdom, or India, or any colony or dependency of the United Kingdom, and to other societies having kindred aims and purposes.

3. That your petitioners have perused the said proposed new Charter, and cordially approve of the provisions thereof.

4. That the said Royal Institute is the oldest and only chartered society in the United Kingdom, and includes among its members a larger number of representative architects, both metropolitan and provincial, than any other society.

5. That your petitioners, whose Association was founded in the year 1874, and who represent sixty-three persons engaged in the study and practice of architecture in the City of Manchester and surrounding towns, have at all times been in friendly intercourse with the

Royal Institute, and have always recognised it as representing the interests of the profession generally.

6. That your petitioners take great interest in the subject of the federation of the said Royal Institute with provincial societies, and believe that by the closer connexion which would thereby be established between architects practising throughout the United Kingdom and the Colonies, great advantage would ultimately accrue to the profession at large, and to the public generally.

7. That your petitioners are satisfied that under the powers proposed to be conferred on the said Royal Institute due provision will be made by means of federation or otherwise for securing the advantages above referred to. Your petitioners, therefore, humbly pray that the new and revised Charter of Incorporation, for which the Royal Institute of British Architects have made application, as aforesaid, may be granted.*

ARCHITECTURAL SOCIETIES.

Manchester Society of Architects.—We understand that the Manchester Society of Architects have been empowered by the Fine Art Section of the Manchester Jubilee Exhibition to undertake the collection, selection, and hanging of such architectural drawings, &c., as will illustrate the progress of architecture in the United Kingdom during the reign of her Majesty, and that they are now taking steps in that direction.

Glasgow Architectural Association.—The third of the series of lectures was delivered on Tuesday night by Mr. James Sellars, I.A., at the rooms of the Association, West Campbell-street. The subject was "Quality, Pattern, and Price." The lecturer said that these three things were as important in connexion with a building as any other article of commerce. In order to obtain quality in a building, he was of opinion that the young architect must first acquire a thorough knowledge of construction, and then show that he possessed it by preparing a complete specification or description of the work to be done. The writing of specifications was almost a lost art in the present day, and the want of specifications led to all kinds of abuses. Quality in a building would generally be got if the tradesman understood that the architect knew how work should be done, and appreciated good work when he got it. As regards the pattern or design of a building, he urged that the chief thing to be aimed at was suitability for its purpose, both as regards arrangements and decoration, and condemned a blind following of precedent, the reproduction of old forms and arrangements of building, if it was done for no better reason than that they were copied from old examples. Engineers, he said, were not trammelled by precedent, and, as an illustration, referred to the Forth and Tay bridges, in which new forms, new materials, and every new invention were used. Dealing with price, he again referred to the necessity for careful specifications, in order to insure accurate estimates. With a specification there was nothing, in his opinion, to prevent absolute certainty as to the cost of a building. In conclusion, he urged the members of the Association to train themselves by every available means, so that their work would always be of the best quality, the most fitting pattern for its purpose, and produced at a fixed price. That would raise the status of the profession, and insure for it the respect of the public. The lecture, which was instructive and practical throughout, was listened to with attention by a large attendance of members and others interested. At its conclusion a vote of thanks was heartily given to Mr. Sellars.

Andover School of Art.—The annual meeting of this school was celebrated on December 14th, by a *soirée* and an exhibition of the works of the students. The Town Hall was handsomely decorated for the occasion by the Mayor, Alderman F. C. Ellen. The report was read by the secretary, Mr. Drinkwater Butt. This showed the number of students to be 81, a slight falling off from last year, which, however, was counterbalanced by the increased success in the examinations, in which there were only six failures.

* The report of this meeting was forwarded too late for insertion in our last.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The fourth meeting of this Institute for the present Session was held on Monday evening last, Mr. E. P. Anson, F.G.S. (President), in the chair.

Mr. J. Macvicar Anderson (Hon. Sec.) announced that the late President, Mr. Ewan Christian, had forwarded a copy of his report upon the Liverpool Cathedral competition, as a presentation to the Library.

Mr. Anderson further stated that the holder of the Godwin Bursary for the year, Mr. W. T. Oldreive, had submitted a report of thirty pages, dealing with a tour he had made in Germany, and which the Council had considered of sufficient merit to entitle him to the whole sum due, viz., 40*l*. The holder of the Aldwinckle Studentship, Mr. G. J. Oakeshott, had, in compliance with the conditions laid down, made a two months' tour in Italy, studying, measuring, and sketching examples of Classical Renaissance architecture at Florence, Siena, Bologna, Orvieto, Brescia, Mantua, Cremona, and Genoa. Mr. Oakeshott's drawings were on view in the Arbitration Room, and would well repay an inspection. The Institute had already voted its acknowledgments to Mr. Aldwinckle for this special one year's Studentship, and hoped that his example might be followed by others of its members. Another set of drawings was also on exhibition below, viz., those of Mr. A. B. Mitchell, the winner of the Soane Medallion. The conditions of this prize were that the successful competitor should go abroad for six months, and submit on his return the drawings he had made. Mr. Mitchell had been absent for twenty-seven weeks, and had submitted in all 215 drawings. He (Mr. Anderson) had seldom derived such peculiar pleasure from drawings he had inspected as he had from those of Mr. Mitchell. In point of execution and artistic touch they were really exquisite, the effect having been obtained by combining with pencil lines a shading in a delicate tone of Indian ink. The Council had, with the utmost pleasure, awarded the full sum of 50*l*. to Mr. Mitchell for work of such perfection.

Mr. W. H. White (Secretary) said that some injustice might be done if it was supposed that Mr. Mitchell had originated that mode of sketching. Mr. Mitchell, indeed, had informed him that he acquired it from a Russian student he had met at Milan, and in a late copy of the *St. Petersburg Architect* this student's drawings would be found reproduced.

Mr. R. Phené Spiers added that this Russian student, M. Tschagine, had studied for some years at Rome, and, doubtless, had picked up what was known as the style of the Fortuny school. Mr. Mitchell, having met with M. Tschagine, had doubtless adopted the same method, which was one well recognised in the French school.

Mr. R. W. Edis, F.S.A., said that having seen these drawings he would ask the permission of the Council to offer the sum of twenty guineas for one month's work on measured drawings and details of sixteenth, seventeenth, and eighteenth century English work, in opposition to mere sketches.

The President announced that on the 14th of February the Council would proceed to the nomination of candidates for the Royal Gold Medal. Members who desired to propose candidates should forward the names to the Secretary within the next fourteen days.

Mr. W. Brindley then proceeded to read a paper entitled "Marble: its Uses as suggested by the Past." Of this paper we give an abstract on another page.

In the discussion which followed, Mr. Alfred Waterhouse, R.A., remarked that as he had been the means of inducing Mr. Brindley to read his paper, he would like to express the pleasure he had derived in listening to it, and to move a cordial vote of thanks to him. He would also congratulate Mr. Brindley on the beauty of his sketches of ancient quarries, which were of peculiar interest to the members of the Institute. Special attention had been called to the flatness of the mouldings in the ancient Roman buildings, and to the beautiful mouldings of black marble cut out of extremely thin slabs. In lining an apse with marble, architects should do precisely as Mr. Brindley had suggested, viz., use thin slabs of marble, and let them come together, as if each had a perfectly flat surface.

Mr. George Aitchison, A.R.A., seconded the

vote of thanks to Mr. Brindley, who had brought before them some of the rarest specimens of marble to be found in Europe. He had seen various specimens at Mr. Brindley's works, which he did not suppose could be seen elsewhere, except possibly in some of the Roman and Eastern churches. The information given in the paper had been so condensed that it was really difficult to enlarge on all the subjects. Many of the specimens were quite new to him, and he might particularise a beautiful bit of green marble from Norway, exhibited by Mr. Brindley at the Health Exhibition. The instances which had been given in the paper of the way in which the Greeks, Romans, and Byzantines had used marble, were extremely useful to English architects who had that material to deal with. Unfortunately, at the present day it did not find much favour with the public, on account of its cost possibly; but its use was one of the most effective and permanent means of imparting colour to the interiors of buildings. He could not quite agree with Mr. Brindley as to the use of it externally, and particularly in London, where it so rapidly got corroded on the surface; and so covered with the usual coating of London soot and dust that many of the finest marbles might be mistaken for any common kind of stone. The columns at the Grosvenor Gallery, which, he was told were of Oriental jasper, after being unpolished for a few years, were hardly to be distinguished from Portland stone, except on a wet day. He had seen the grand collection of antique marbles Signor Corsi sold to the Duke of Devonshire, which were given to the Radcliffe Library, and afterwards turned over to the museum at Oxford. At Mr. Brindley's suggestion, he went down there, and by the courtesy of Sir Henry Acland the cases were brought into the light, when he had the pleasure of inspecting them for the greater part of a summer's day. One specimen was particularly interesting; he did not know its modern name, but by the ancients it was termed phengites. It was a yellow and white marble, which took a brilliant polish, and Domitian was stated to have had the corridors of his palace lined with it, because, acting as it did as a mirror, he was not afraid of being stabbed from behind.

Mr. Burke said that Mr. Brindley had taken them over a great extent of ground. He had said that in the old mosaics he had found the tesserae deep, and that was really the case, but the reason why these were not used at present was that people would not pay the money for them. In all the best types of old mosaic he had seen, the pieces were small but deep, three-eighths of an inch being about the size used, but when mosaic was revived twenty or thirty years ago, multiples of half an inch were made. Of the three-eighths-inch there were some 5,200 tesserae to the square yard, and in the half-inch about 9,400. It followed that the cost per yard, in a given area, must be ruled by the multiplicity of the tesserae laid down, and that was why all work at the present day was inferior to that spoken of by Mr. Brindley. It had been said that in this climate marble was corroded by the action of the weather, and no doubt that was so. It was also the case in France, but the great fault in England was that it was not kept clean. The same thing occurred with stone and many other materials, but it would be avoided if the buildings were kept cleaned periodically, and marble and various materials might then be employed on the outside of buildings, looking for a number of years almost as well as when first put up. Some columns could be seen in a building in Cuckspur-street* not at all corroded, and, except that they were very dirty, they appeared to be as good as when new, so far as the surface was concerned. The angles were still sharp, and he had not been able to discover that any particle of the surface of the marble had been affected. If a company could only be established which would take in hand the cleaning of public buildings, then marble might be used with both a present and lasting effect.

Mr. William Woodward remarked that after what they had read in the *Times*, after what Mr. Brindley had said that evening, and after seeing the specimens of marble in the room, he hoped they would hear no more of the ridiculous theory as to the intentional waving of the pavement of St. Mark's.

Mr. J. H. Heathman spoke as to the advisability and practicability of keeping buildings

clean, and gave some of his experience in connection with such work.

Mr. Thomas Blashill desired to express a hope that so beautiful a collection of specimens might remain for some few days open to the inspection of the members. He had had the pleasure of looking at many of the marbles in Rome and in the neighbourhood of Naples, in company with Mr. Brindley, and he hoped the members would not lose such an opportunity as they now had of making themselves better acquainted with so beautiful a material, with a view to using it as occasion enabled them to do so. He had been much struck with the reluctance the English people appeared to have to the use of marble. In travelling on the Continent, from Rome to Holland, he had found in all the countries he had passed through that marble was profusely used, both in and out of doors. Why there was a deadness in England to the beauty of marble he had never been able quite to find out. Perhaps it was because the English people had not seen sufficient of it; and when the demand for marble arose, he hoped it would be got cheaper and more easily.

Mr. J. P. Seddon said that as far as his knowledge of marble-work went, great damage had been done in the endeavour to clean it. It had been mainly used in England in interiors, where it was too often simply cleaned out of existence by zealous people with pails of water and soap. Twenty years ago the whole of the steps up to the altar of a cathedral he knew were of black marble, but now they were like the poorest of limestone, a great portion of the surface being absolutely washed away. Those who put in marble should give careful instruction that it should never be washed in that way, but rather polished. There were many valuable marbles to be found in this country, and he had never observed any reluctance to their being used; indeed, people seemed to be very pleased to have them. The Devonshire marbles were used with good effect, because of their warmth of tone.

Mr. R. Phené Spiers remarked that he would not like it to go forth as the opinion of the Institute that the mere washing of London buildings would preserve the stone. Quite the contrary was the case.

Mr. Ralph Nevill said that in countries where the summers were hot the coolness of marble was very grateful, whereas nothing could be more unpleasant in an English home than any great extent of marble surface. He remembered going into the beautiful room at Gattion Hall, built by Lord Monson as a reproduction of the Corsi Chapel at Rome, and it was like entering a tomb. The coldness of marble always militated against its general use in England; but where it was most likely to be of service was where great cleanliness was required, as in many public buildings, and where good systems of artificial heating could be applied.

Mr. Edis said that he entirely differed with Mr. Nevill as to the effect of the use of marble in English houses. He had used it considerably, and had never found any unpleasant effect, nor fault found, with interior decorations of marble. By the aid of those marble masons who had joined with him in this decoration, he had been able to do the work almost as cheaply as in tiles delivered in London, though, no doubt, that was to a certain extent due not so much to their cost as to the carriage and firing of them. He knew of two large country houses where the halls were more or less done in marble, very warm, charming, and bright in effect. At the same time there was very much difference in the marble decoration of interiors. If a vast amount of colour were attempted in marbles the effect was kaleidoscopic. Mr. Brindley had in his paper thrown out hints which were extremely useful to architects and students. It would be well if the Institute applied to quarry owners for 4-in. cube samples of all stones and marbles produced throughout the kingdom, and he hoped the hint would be taken up by the Council in order that such a collection might be formed.

Mr. Octavins Hansard said that for years the Institute had possessed one of the most remarkable collections of stone ever made in this country. It was contained in a cabinet on the landing of the staircase leading up to the meeting-room, and represented the selection of stones for the Houses of Parliament. But he supposed the case was not opened above once in three years, its position being an unfortunate one.

Mr. Edmund Woodthorpe considered that what the last speaker had said was another powerful reason why the Institute should remove from their present wretched building. They had within their walls beautiful specimens locked up in a cupboard located near the lavatory, while the collection of portraits was hung up so close to the ceiling that one could not see the features of their past presidents. There was the greatest necessity for a new building.

The President said that he very much agreed with Mr. Edis as to Mr. Nevill's observations respecting the non-applicability of marble in our domestic architecture. It occurred to him that it was a matter of taste, and his taste went with Mr. Edis, in fact, he considered that marble might be satisfactorily applied in the internal decoration of English houses. The wonderful industry of the lecturer, not only in compiling his paper, but in bringing so valuable a collection of marbles together, entitled him to their warmest thanks, and he (the President) agreed with Mr. Blashill that it would be a pity if within a few minutes after the meeting they should all be cleared away. He understood now that Mr. Brindley would permit the specimens to remain until the following Thursday, which would allow better opportunities for inspection. One thing that had struck him in the numerous visits he had, for the last few years, paid to Rome, was the enormous amount of marble the Romans had imported. Scarcely any people had been so great in their building-work, and the wealth of marble which had been massed together in Rome surpassed the wealth of any other building material for decorative purposes that had ever been known. Even now, in passing along the Via Sacra, one saw in all directions fragments of marble columns and bases, doubtless at one time forming portions of magnificent buildings. And not only were these to be seen in Rome, but they were scattered far and wide over the Roman Empire, at least as far north as Lyons and Perigueux, and as far south as Sicily. The Baths of Caracalla also showed the enormous amount of surface covered, the Romans laying on the marble as a thin veneer, not more than $\frac{1}{4}$ in. thick. Some reference had been made to the prodigious use of marble in Belgium, but it must be borne in mind that it was a marble-producing country. A great quantity of the marble used in this country some time ago came from Namur, and the Belgians had sent over an enormous amount of manufactured chimney-pieces.

The vote of thanks was then put, and carried by acclamation.

Mr. Atchison said that before Mr. Brindley replied they should not lose the opportunity of asking the owners of marble quarries to supply the Institute with specimens of their products, so as to form a collection which would be useful and instructive to the members and the public. He might add to what the President had said about Rome, that there were two or three miles of quays on which the marble was wont to be landed, and where the unworked blocks were still lying, some on the pavements, and some slightly beneath the soil, so that when a demand arose for antique marble, there would be a fine supply to hand.

Mr. Brindley, in replying, referred to the President's remarks as to the extent of the Roman quarrying. He had prepared a rough diagram, showing the extent of the Roman quarries, and it would be seen by it that they were scattered over the entire Roman empire both in Europe and Africa. It had been said that Roman marbles had been found in Lyons, and in the cathedral there could be seen two columns, of about the tenth or twelfth century, of Numidian marble, such as was not even to be found in Rome. This would show the difficulty he had had in compiling his paper, for in France alone there were 626 quarries, while Belgium had no fewer than 100, the whole of the district about Namur, extending into the North of France, being one mass of marble, chiefly grey and reddish-brown. Some one had mentioned Lord Monson's hall as an unsatisfactory example of the use of marble; but Mr. Holford's house in Park-lane was one of the best examples of marble-work in London, although there were far too many colours. Mr. Seddon had referred to marble-cleaning, and he might say that a year or so ago, in passing through Leicester-square, he had seen a man cleaning down the statue of Shakspeare, each stroke of the brush

* The Sun Fire Office.

making the dirty marble immediately white. The man was simply using muriatic acid, which ate away the face of the marble. With reference to polygonal slabs, architects never thought of covering an apse with ground-out slabs, but he had had to do it on several occasions. The columns referred to by Mr. Aitchison, in front of the Grosvenor Gallery, were *lumachella*, composed of compressed shells, with an amount of cement in them. It was akin to our Petworth and Parbeck marbles, which were simply compressed muds.

The President stated that the next meeting would be a special one, held on the 17th of January, to award the medals and other prizes.

THE ARCHITECTURAL ASSOCIATION.

The fifth meeting of this Association for the present Session was held at 9, Conduit-street, on the 17th inst., Mr. J. A. Gotch (President) in the chair.

The following new members were elected, viz., Messrs. R. A. J. Bidwell, J. Linton, C. D. Rutter, H. E. Napier, W. Goodwin, R. G. Borland, G. Horsley, F. L. J. Barrow, E. Banks, G. W. Soltan, E. A. Cooke, Percy M. Roberts, E. A. Benstead, A. G. Turner, F. A. Kirby, Percy Clark, H. Harris, and F. V. Stokes.

Mr. H. D. Appleton (hon. secretary) announced the receipt of the following communication:—

"Société Centrale d'Architecture de Belgique, Fondée en 1873.

Belle, 8 Décembre, 1886.

Secrétariat, 46, Boulevard Anspach.

Monsieur le Président,—Nous avons eu le plaisir de connaître, à notre Société, dans la dernière Assemblée Générale, votre séance de mois de Novembre dernier. Le titre de Société Correspondante que vous nous offrez nous honore beaucoup; notre assemblée a conféré également à l'humanité le même titre à votre société.

Nous souhaitons volontiers avec vous, Monsieur le Président, que la correspondance qui s'établit entre nous développe les sentiments d'affection sympathie, et de bonne confraternité entre les membres des deux sociétés. Nous vous prions d'agréer, Monsieur le Président, l'expression de nos sentiments les plus distingués.

Le Président, JULES BRUNFAUT.
A Messieurs les Président et Membres de l'Association Architecturale de Londres."

A donation to the library was announced from Mr. F. R. Farrow (Assistant Librarian), consisting of two volumes on "The Antiquities of Ionia." A cordial vote of thanks was thereupon presented to Mr. Farrow.

Mr. H. Longden then read a paper on "Decorative Metal Work," which we print on another page.

The Chairman, in inviting discussion, expressed regret that Mr. Longden's excellent paper had not extended to greater length, he being so well qualified from personal experience to treat such a subject as that of Decorative Metal Work. The numerous examples Mr. Longden had brought with him were really as instructive as his paper, showing as they did the manner in which the various metals should be treated, and that effect could only be gained by treating each metal in its own natural style. This principle was becoming more and more recognised in the present day. The kind of *tour de force* which was the aim of the artist of fifty years ago,—if artist he could be called,—to imitate in one material what was wholly foreign to it, seemed to be dying out, and people were getting more into the way of treating materials naturally. Mr. Longden had brought some excellent examples of work in each of the metals he had named. His suggestion with regard to the ornament for the fire-stove was good, and might with advantage be adopted by some enterprising firm. In iron, and more especially cast-iron work, there were many excellent examples extant, dating from the end of last century, one which he had in his recollection being a very large stove at Knole House, of which the casting was extremely delicate. The great drawback to cast iron from an artistic point of view was that if one had a good design, one's neighbours might have a similar thing, so that miles of the same pattern in cast iron might be seen. Cast-iron fire-dogs were seldom to be seen in use now-a-days, but he had noticed them used at a country house in Northamptonshire. At Drayton, in the same county, there was so much iron work that the owners lately found it would take about 800l. merely to repair it. In a little inn at Lisieux, in Normandy, he had seen the spit and the two dogs turned by a weight before the open fire. In connexion with cookery, all things difficult to clean should be avoided. Art was in reality only common-sense made beautiful, so that to devise a gridiron which

was beautiful to the view, but which would be an everlasting nuisance to the cook, would not be a realisation of art. An enormous quantity of beautiful ironwork was to be seen round about London, and he had more particularly in view some fine gates near Carshalton. These had never been figured, but were well worthy the attention of the Association.

A Member remarked that Pugin might really be termed the progenitor of brass bedsteads, one designed by him being still preserved in his house.

Mr. J. D. Sedding said that Mr. Krall, who was a true artist, was sitting beside him, and might have something of interest to say. In looking at the examples before them, and especially at the Swiss churchyard cross, they could realise how extremely difficult it was to draw ironwork. He liked to frequent the workshop where it was being wrought, and hoped that many of the members would do the same. The practical character of the papers that were now being read before the Architectural Association redounded very much to the credit of the President. Mr. Sedding then proposed a vote of thanks to Mr. Longden for the care he had bestowed upon his paper, and the number of subjects he had brought to illustrate it.

Mr. Krall said that the only thing that Mr. Longden appeared to have omitted from his interesting paper was the treatment with ironwork of panels in doors and in the dados and friezes of rooms, as in the old time, which had been adopted, perhaps, more thoroughly in France than anywhere else. These panels were very effective when properly treated.

Mr. L. A. Shuffrey asked whether the models for casting the old fire-backs were originally made in wood? They must have been modelled in some way, and he had often wondered whether they were done in clay, or wax, or otherwise. At Penhurst Place there were some fine dogs with the arms of Lord de Lisle.

Mr. G. H. Fellowes-Pryne seconded the vote of thanks, and said that the colour of ironwork was in fact one of the most difficult things that architects had to deal with. In its natural state it was always beautiful, but in the grey distance its effect was frequently lost, and therefore required picking out in colours. Chocolate and blue had been used to a great extent, but the latter colour again seemed to throw it into distance. It was a question also whether gilding ironwork to imitate brass or any other metal was the right thing to do.

Mr. J. M. MacLaren said that Mr. Longden's paper had chiefly dealt with old work, but he would like to hear some discussion on the subject of modern ironwork, and a comparison drawn between the two. One of the things which was often very unsuitable in the design of modern wrought-iron work was the spacing-out. The arrangement of the carving and the filling of the detail in the best examples was generally done on a great scale. In looking at the treatment of modern ironwork, and especially the wrought-iron work of the last twenty years, it seemed to be of one quality, and very unsuitable, with a smallness of scale in design. The designer appeared, first of all, to start with a want of principle, and then to go on in a very languid sort of way, in filling up the spaces; in fact, starting at random from one corner and eventually landing at the last corner, somehow or other. Thus a great deal of modern ironwork was designed without any principle guiding the designer, which often led to smallness of scale, —a pettifogging kind of treatment, with an unsatisfactory result. One of the most beautiful examples of modern ironwork had this great defect of smallness of scale; he referred to the sign hanging out from Mr. Norman Shaw's building at the corner of Pall Mall and St. James's-street.* On paper its design looked skillful and well set out, but the reality had the fault of being too small in scale: consequently a great deal of the value of the curves was lost as the sign hung against the sky. Had the height at which this sign would hang, however, been considered, and less detail put in, it would have been far more successful. There was one other point that architects had to face, viz., the treatment of cast-iron work. He was glad that Mr. Longden had not shirked the matter, and one of the first things architects would have to do, with regard to the treatment of cast-iron work, would be to study its capabilities and its limits, and thus be enabled to brush away a great many of the difficulties

that beset them in designing in cast iron. In the treatment of cast-iron work the great thing to aim at should be reserve, instead of redundancy of design. Eastern work generally was very suggestive in the treatment of cast-iron, but a great deal in this direction remained to be done in London, for one might travel through its miles of streets without coming across a single lamp-post worth looking at. This was not as it should be, and he would like to see subjects put down in the Examination for cast-iron work. He believed that Mr. Aitchison was somewhat unpopular with the Royal Academy students because he had put down several such things amongst his subjects, the reason for his unpopularity being that the students found themselves face to face with rather difficult tasks. When a student sat down to design a column well, it took some time to study the general proportion and the spacing, and indeed was one of the most difficult tasks he could be set to do. It was, in fact, somewhat like designing a wall-paper, where there was a subject with certain limits which could not be overstepped, for in dealing with cast-iron there were the same limits. A great deal might be learned by architects both in regard to proportion and detail in the designing of cast-iron work.

Mr. H. W. Pratt remarked that the last speaker had called to his mind a criticism he had heard from a gentleman who was neither an architect nor an artist, although he had some appreciation of what was good proportion and what was not. This gentleman one day called his attention to the design of the gates under the great tower of the Law Courts, stating that there seemed to be a lack of scale in them as compared with the building to which they were attached. He (the speaker) at once felt the truth of the remark, although he spoke with great diffidence in criticising the work of so great a master in decorative ironwork as Mr. Street was. The excellent work in the grilles and front railings there was so good that the gates did not show equally to advantage. In the designing of wrought-iron work there seemed too often to be a multiplicity of detail, and a lack of bringing out the most prominent features; and in looking at the old examples before them one felt this all the more. It was characteristic of the old work that it was designed for the purpose for which it was to be used, and there was an amount of "go" and an interest about it which the modern work entirely lacked. Mr. MacLaren had referred to the inartistic London lamp-posts, and that reminded him that he had lately found an old Sussex town lighted by bracket-lamps from the houses, which struck him as much more interesting and picturesque than the usual ugly lamp-posts. The members were under special obligation to Mr. Longden for bringing so many valuable examples of metal-work before them, but he (Mr. Pratt) should have liked to have heard some suggestions as to how modern wrought-iron work could be treated so as to preserve it better. The old examples before them, and the many old railings and gates about the metropolis, showed that ironwork could last for a great number of years, though the modern work did not last so well, but soon began to show signs of rust and giving way. It seemed a pity, considering the amount of pains thrown into the scrolls of leaf-work and foliage, that so much labour should be put into something which should so soon decay. No wonder, therefore, that people had recourse to cast-iron, and that, too often, of a very inferior design. It was only repeating an old tale to refer to the designs in cast-iron being an imitation of wrought-iron work, but it always astonished him that founders who knew how the designs were produced should continue to practise seventeenth or eighteenth century wrought-iron designs in cast-iron work, which were not at all adapted to the material.

Mr. Max Clarke referred to the excellent designs in cast-iron work of Mr. Sellars and Mr. Thomson, of Glasgow. He would have liked to have heard something about the railings which had been put round the new statue of Queen Anne, in front of St. Paul's Cathedral. He understood this was a reproduction of the first cast-iron work put up in England, exactly reproduced by Mr. Penrose. He would have liked to have had some information as to Wren's cast-iron work.

Mr. Leonard Stokes said that cast-iron work had been a good deal "slanged." In wrought-iron work they should be careful lest in ten

* Illustrated in the Builder for Nov. 14, 1886, p. 699.

years time they asked themselves how they could have gone in for all this twisted work of all shapes and forms. Architects to a certain extent had themselves to blame for what appeared in the founders' catalogues. If they would only set the example of insisting upon having what they wanted, then the great founders would produce something fit to be used. At present, in his opinion, the opposite was the case. He would like to have Mr. Longden's opinion as to whether bronze, in itself a costly metal, could be legitimately gilded.

Mr. A. O. Collard thought that a reasonable complaint had been made about the London lampposts, but any one who walked along the Thames Embankment could not fail to notice the peculiarly excellent lampposts designed by the late Mr. Vulliamy. Mr. Longden had omitted to refer to the many grand old hinges on church-doors. These not only acted as hinges, but actually bound the doors together, enabling them almost to dispense with tenons. Then, again, he might mention the very fine specimens of candelabra and lamps to be seen in this country as well as abroad, one candelabrum in a curious little church near Minster, in the Isle of Thanet, holding no fewer than thirty or forty candles.

The vote of thanks was then put, and very cordially received.

Mr. Longden replied, and observed that the study of this kind of work was at once his business and pleasure. He had been collecting for some time things which seemed to illustrate excellent work in the different metals; some of these he had brought with him, mostly from his own collection, but others had been lent him by Mr. Peto, the architect. He was afraid he had somewhat cursorily dealt with the subject, but he had been afraid to say too much and to be too technical. He had originally been trained as a founder, and therefore might naturally be expected to take notice of the remarks that had been made about cast iron. He was glad to hear Mr. Stokes say what he did. Twenty years ago he (the speaker) asked an architect to design a particular thing in cast iron; but the answer he received was, "You might as well ask me to design in melted butter!" That architect was apt to say rather sharp things; but if he had reflected he would never have made that remark, because it was a legitimate material, and it was his own fault if he could not design in it. Mr. Sellars, of Glasgow was an admirable designer, a man of the greatest fertility of mind and appreciation of the various materials, and he had designed very fine cast and wrought iron work, as had Mr. Thomson. As a founder, he (Mr. Longden) would say that cast iron could be decorated so as to be exceedingly beautiful. The stove at Knoles, referred to by Mr. Gotch, was a monumental erection, as the French say, but was covered with delicate work, and did not look heavy. Cast iron, he affirmed, could be treated well, and if people did not do this, it was their own fault, and not that of the material. The colouring of wrought iron was no doubt a difficult matter. He remembered a bit of work at Ronen, part of which was coloured darkish, and the remainder gilded, and another example in the Cathedral at Perugia was coloured pea-green, and gilded in parts. The chocolate and blue of the "Medieval metal-worker" were not at all to be admired. The Italians made their work exceedingly thin, and in some cases even as thin as tape. When gilded iron did not imitate anything else, it was quite legitimate; because gilding was quite a different thing from brass, and could not be mistaken for it. Dealing with the duration of ironwork, he was sorry to say that there was a great difference between the quality of the old and modern material. The Swiss churchyard cross he had referred to was an example which had been out of doors at least a hundred years, without an atom of its surface being gone, and it showed what sort of material used to be produced. The best recipe he could give for getting ironwork to last was that everybody who had it made should insist on having the very best material, and that it should be well painted. He had not said much about *repoussé* work, but in some cases the effect was got with great simplicity, and the warming-pan he had exhibited was an excellent specimen of this. *Repoussé* work had been very well done in England in recent years, and not long ago when comparing work he had seen in France, Germany, and Switzerland, with English work,

he found that the latter was as good as anything they were doing abroad. With regard to gilding bronze, he had been asked why so beautiful a metal should be gilded? The reason was, that bronze might be finely worked, being susceptible of the most delicate chasing, which in some positions would not be well seen unless it was gilded. He had not dealt with candelabra. There were several fine ones in England, commonly called "spiders," but some of the best he had seen were to be found in Holland, and notably in a church at Leyden. These were often well treated, and the appearance of the great arms for candles was very effective in perspective. There was also a fine example in the Church of St. Marie at Lubeck, and anyone who wished to see good Renaissance iron work of a northern type should visit that city. As to the patterns for fire-backs, he had never seen any old ones, and he was not aware how they were done. He imagined, however, they were frequently done by modelling in plaster or wax on the board, and the mould taken from that. These things were only made once, and so it did not matter if the wax or plaster came away, but now-a-days patterns were kept and reproduced. Mr. MacLaren's remarks as to scale and design were good, but were more matters for the consideration of architects. There was no doubt that much modern ironwork was very often "all-overish."

CRYSTAL PALACE SCHOOL OF PRACTICAL ENGINEERING.

THE fourteenth year and the forty-second term of this School closed on Saturday last by the usual gathering of the friends of the school, exhibition of their work, delivery of the report of the examiners, and presentation of the certificates awarded to the students. The examiners on this occasion were Messrs. Fred. H. Anson, C.E., M.E., and S. C. Best, C.E. Mr. John Carruthers, C.E., Consulting Engineer to the New Zealand Government and to the Republic of Venezuela, presided, and expressed the pleasure and surprise he had experienced in his going over the School and examining the work of the students, who enjoyed there advantages unknown when he entered upon the profession. The combination of theory and practice in this school were admirable and most effective.

The lectures for the term were on "Materials and their Manufacture." Twenty-five students attended the lectures; twenty-two were eligible for examination; eighteen passed the examination satisfactorily. W. E. Underwood was first, and had also a certificate for work in the fitting-shop; B. G. Lloyd was second for lecture questions, and a certificate as first for work in the fitting-shop. For work in the drawing office, H. P. Miles was first of ten students in the order of merit; in the pattern-shop, J. H. Chute was first of eight students awarded certificates.

In the second year's course, fourteen students of the first term received certificates for the preparation of surveys, plans, &c. for Parliament; F. Grover first. Thirteen students of the second term received certificates for calculations, plans, and estimates for a railway and dock; E. P. Verrall first. Six students of the third term received certificates for design and construction of existing or original engineering or other works; J. F. Harrison first. Special certificates were awarded to two students for a fourth term in the civil engineering division, devoted to sanitary engineering, including water supply. Another special certificate was awarded to J. Chiles in the marine-engineering section. This certificate is awarded for successfully driving engines at sea over a course of 1,000 miles. Three certificates were also awarded to students in the Colonial section.

Mr. J. W. Wilson, Principal of the School, called upon as usual, delivered a brief address, mentioning that the School commenced with the year 1873, when nine students were enrolled. The number had increased continuously, until the complement of eighty has been reached, which has been the number for the last and several preceding terms. About 150 of our most eminent engineers and public men have attended and given their services in examining and reporting on the students' work, and in presiding at the close of the terms. From all of these gentlemen gratifying expressions of opinion respecting the character and work of the school had been recorded.

BROAD FILTRATION DRAINAGE AT GODALMING.

AN inquiry was held at Godalming by Mr. Arnold Taylor, Inspector of the Local Government Board, on Wednesday week, in reference to an application from the Godalming Main Sewerage Board for sanction to borrow 8,000l. for the purchase of land to be used for the purpose of sewage purification for the borough and contributory districts. Mr. J. C. Ramsden, chairman of the Sewerage Board, stated that in July, 1885, the Board made an application to the Local Government Board to sanction a loan to carry out a system of sewage disposal by chemical treatment and precipitation, but after that inquiry the central Board refused to sanction the loan, because it did not altogether approve of the scheme. The Local Government Board at the same time advised that, as a system of chemical treatment exclusively would not be satisfactory, a system of broad irrigation or filtration through land should be adopted. The Central Board asserted that a system of chemical treatment only would involve the Godalming Board in trouble with the Thames water companies, as the Wey, which passed through the district, was a tributary of the Thames. There was no alternative but for the Sewerage Board to secure a suitable piece of land in the district for the purposes of broad filtration. After various endeavours, they obtained an offer from the Smith Charity of 83 acres (the Unstead Farm) for 7,500l., subject to the consent of the approval of the Charity Commissioners. The Surveyor, Mr. Moon, reported favourably as to the suitability both as to the locality and character of the land for sewage irrigation purposes. The population of the district to be drained was reported to be:—Borough of Godalming, 2,505; Farncombe, 2,500; Charterhouse, 1,200; Crown Pits, 560,—total, 6,705. The estimated population forty years after this, taking into account the land adopted for building purposes, was given at 11,163. The rateable value of the united district is 27,000l. The area of the several contributory places proposed to be sewered is 567 acres; the length of the sewer from the town to the works would be about 2,705 yards. Mr. Eastwood, an owner, objected to the proposed site, as it would injure his property; and the Inspector expressed the opinion that, having so much land as was proposed to acquire in this instance, he did not think there would be any nuisance if the works were properly managed. Alderman Stedman raised the question as to whether, if the land were put up to public auction, the Board would not require to give more for it, and the Inspector replied that such a contingency was unlikely, as the land was at present of more value for public purposes than any other, and the Board were, perhaps, giving more for it than anybody else would. A question was also raised as to allowing the refuse water from the mills at Cateshill, of Messrs. Spicer and Co., to flow into the new system, the Clerk mentioning that the authorities had power to reject everything but sewage, but that matter would hereafter be considered. The Inspector will hand in his report in due course. The Local Government Board has intimated that it will comply with the request of the Rural Sanitary Authority and hold an inquiry on an early date in reference to the alleged pollution of the River Wey from various sources.

LIVERPOOL CATHEDRAL DESIGNS.

SIR,—With reference to two points in your article on my report in your paper of Saturday last [p. 867], I would say:—1. That as regards the estimate, the sum within which the competitors were to work was 500,000l., and not 300,000l. The latter sum was named by the committee, but owing to my representation as to its insufficiency the larger sum was allowed, and on it my valuation has in each case been based. I stated from the first that less than 500,000l. would be insufficient for the erection of a cathedral worthy of the city. 2. Although I was undoubtedly surprised at the manner in which it was done, I had no objection whatever to the publication of my report. I believe I never have, and hope I never shall, write anything of that nature which may not be published. I write what I honestly think, and if people are not satisfied I cannot help it. I have done what I believe to be my duty.

As regards Sir Christopher Wren's plan for

St. Paul's I perfectly well remember the story, though it must be fully fifty years since I read it as related by Elmes; but when looking again over the plan two years ago I came to a very definite conclusion that it was good for us, and for his fame, that it was not carried out, and was disappointed accordingly.

EWAN CHRISTIAN.

Hampstead, December 20, 1886.

CHIMNEY SHAFT FOR "DESTRUCTOR."

SIR,—The following description of shafts for "Destructor furnaces" may be of use to your correspondent (p. 893, ante).

Messrs. Manlove, Alliott, Fryer, & Co., of Nottingham, who have had experience in this class of work, have designed a chimney-shaft, which they recommend, the dimensions of which are as follows:—

	ft.	in.
Height from ground line to top of coping.....	150	0
Outside diameter at bottom over flue opening.....	14	6
Inside diameter of main shaft over flue opening.....	8	6
Outside diameter at top under brick set-offs.....	8	6
Inside diameter at top under brick set-offs.....	6	0
Height from ground line to top of coping.....	150	0
Outside diameter at bottom over flue opening.....	14	6
Inside diameter of main shaft over flue opening.....	8	6
Outside diameter at top under brick set-offs.....	8	6
Inside diameter at top under brick set-offs.....	6	0

The shaft from the ground-line to the top is divided into six sections:—

	ft.	in.
1st section to a height of 30 ft. above ground.....	3	0
2nd " " of 24 ft. high.....	2	7 1/2
3rd " " of 24 ft. ".....	2	3
4th " " of 24 ft. ".....	1	10 1/2
5th " " of 24 ft. ".....	1	6
6th " " to underneath cap.....	1	2

Fire-brick lining $\frac{1}{2}$ in. thick for 30 ft. high above ground, with an annular space all round, between itself and the shaft proper.

Foundation bed of concrete, to suit locality or nature of ground.

Bradford Corporation Chimney.

Circular brick shaft in connexion with "Fryer's Destructor" for town refuse:—

	ft.	in.
Total height, including foundations.....	150	0
Concrete foundation, square.....	30	0
Outside diameter at ground surface.....	14	1
Inside diameter at ground surface.....	9	7
Outside diameter at top.....	8	0
Inside diameter at top.....	6	8

The shaft is built up in four sections, the lowest being 2 ft. 9 in. in thickness, and the highest 1 ft. 2 in.

A fire-brick lining, 8 ft. internal diameter, is built to a height of 45 ft., apart from the shaft proper.

The foundation rests upon tough clay of a somewhat bluish colour, known locally as "Bowling Tough."

The time occupied in building was nearly five months. The batter of shaft is $\frac{1}{4}$ in. to 1 yard, or 1 in 72.

Mr. J. H. Cox, Borough Surveyor, designed the shaft, and Messrs. Naylor & Smith were the builders.

Chimney Shaft, Lett's Wharf, Lambeth (City Sewers Department).

For destructor apparatus burning 70 to 80 tons of refuse per diem.

This shaft is founded on a cast-iron cylinder filled with concrete, on account of the ground being affected by tides.

	ft.	in.
Height from ground surface to top of Portland stone cap.....	150	0
Outside measurement at foundation.....	18	0
Outside measurement at ground-line.....	14	6
Outside measurement at top.....	8	6
Inside measurement at top.....	6	0
Height of $\frac{1}{4}$ in. fire-brick lining.....	30	0

The shaft is built with London stock bricks, and was completed in three months.

Colonel Haywood was the engineer, and Messrs. Manlove, Alliott, Fryer, & Co., the builders.

R. M. BANCROFT.

Sewage Disposal at Royton.—The Oldham Standard reports that the Royton Local Board, having received notice from the Corporation of Salford as to the intention of the Corporation to take proceedings against all local authorities who allow sewage matter to flow into the rivers Irk and Irwell, or any of their tributaries, at a special meeting held on the 10th inst., unanimously appointed Mr. Robert Vawser, C.E., of Manchester, engineer to the Board, for the purpose of preparing plans, sections, and estimates for the construction of the works required for effectually draining the district and dealing with the sewage at outfall works, and also for the supervision of such works during their construction.

The Student's Column.

STONE QUARRIES.—XXVI.

SLATES.

I propose to devote the concluding article of this series to the consideration of slate quarries. After what has already been said concerning the formation of slate, the student will readily understand that all the principal slate quarries in the United Kingdom are situated in the oldest rocks, viz., the Cambrian, Silurian, Devonian, and Carboniferous formations. It does not, however, of necessity follow that these highly altered argillaceous rocks are everywhere of such extreme antiquity. All that is required is great lateral pressure on a clay deposit, by which the particles composing the clay are rearranged. It so happens that the precise conditions producing such a material have not been present in rocks of later date than those indicated, as far as Great Britain is concerned. In other words, we have had no great mountain-making phenomena actively at work since those early times in this country. But we have only to study the Alps,—or, in fact, almost any of the more recently elevated mountain chains,—to be cognisant of the fact that slates may be of tertiary age, even approximately as recent as the deposits upon which London, Paris, or Brussels, stands.

English slate quarries are situated in Cornwall, Devon, Somerset, Leicestershire, Lancashire, Cumberland, and Westmoreland. Those at *Delabole*, near Tintagel, in Cornwall, have been justly celebrated for a long time for producing slate of great durability, in addition to lightness and strength. Borlase in 1758 speaks of the extent of these workings. The *Delabole* quarries produce not only roofing slates, but flagstones or brick slates, which are used for pavements in passages, court-yards, &c., and for tombstones. The inscriptions upon old tombstones of this slate remain remarkably perfect; showing its durability when exposed to atmospheric influences. These slates are shipped at Tintagel and Boscawen.* The colour is greyish-bine, and examples of it may be seen in Wellington College at Sandhurst. Other quarries in Cornwall are *Boscawen*, *Camel*, *Launceston*, and *Trevarnet*, near Padstow.

The slate from the *Burntall* quarry, near Tavistock, which produced good roofing slate, is now nearly worked out. Other quarries, in Devonshire, are the *Pomphlet*, near Plymouth, which supplies chimney-pieces, slabs for paving, and blocks for building; *Penrice*, near Totnes, where the slate is green, as may be seen in the Royal Exchange; and *Woodland*, near Newton Abbott.

Slate is obtained from Leicestershire, principally from the following workings:—*Switthland Quarry* is not less than 160 ft. deep; the beds dip nearly due east at from 30° to 40°. The cleavage runs N.N.E. by S.S.W., and is nearly perpendicular. As the pit has been deepened, the quality of the slate has been found to improve, the cleavage is more perfect, and much lighter roofing slates can be obtained. The *Midland Railway Hotel* at St. Pancras is roofed on one side with Switthland slate, and it has also been used in St. Mark's Church, Leicester, &c.† In *Grobby Quarries*, the grain of the slate is not quite so fine as in the Switthland, but it nevertheless yields excellent slabs, which are sawn up by steam power. It is generally of purplish or grey tint, and has been found to improve as the workings get deeper. The Gas Offices at Sheffield, channel of St. Paul's Church, Leicester, and one side of the St. Pancras Hotel are roofed with the grey slate. There is also a quarry at *Moorley Hill*, where the slate is coarse, gritty, and of a grey colour.

The principal quarries in Lancashire are the *Burlington*, near Ulverstone, producing pale blue slates and slabs; and *Coniston*, green rough slate and flags. There are also numerous small workings in the vicinity.

The slates of the Lake District are mostly of a pale blue or green colour, and those from near Kendal are of good quality; whilst beautiful green slates are quarried in Skiddaw and shipped at Maryport.

Comparatively speaking, the slate quarries of England, as a whole, are insignificant in many respects to those of Wales. The importance of this industry is manifest to every visitor to

North Wales who cares to traverse the country around Bangor and Carnarvon. On ascending Snowdon from Llanberis, for instance, some large quarries may be seen on the opposite side of the lake, and the warning to the workmen to stand clear as a shot is about to be fired may be frequently heard. Often when the day is fine and the shot is an open-air one a puff of smoke may be seen, followed by a loud report, and then a noise resembling a great smash of crockeryware, as huge pieces of slate are observed falling down the side of the workings.

The *Penrhyn Quarries*, to the south of Bangor, afford employment to a large number of men. The general colours of the slates and slabs are blue or purple, but they are sometimes green. One is immediately struck on going into a quarry of this class with the tremendous heaps of waste material on every side. This is principally caused by much of the slate being imperfectly cleaved, owing to the difference in grain of the original argillaceous deposit. Of course, it can hardly be expected that such a great mass of clay as the hill in which these quarries are situated, is perfectly homogeneous in structure, that is, that no seams of sand or coarser material are present. It is these arenaceous beds or sheets of impure clay that, as a rule, have not taken on the true slaty cleavage.

The great hole forming the principal quarry is the largest artificial excavation we have ever seen, and the amount of slate removed is prodigious. The slate is raised by means of a lift to the desired position, where it is split and shaped. There are two platforms in this lift, in separate guides or frames, the one moving down as the other comes up. The motive power is water, which is let into a tank at the bottom of that platform which happens to be at the upper level. Thus weighted, it can be let down at any time, and by so doing the other platform is drawn up. When the weighted platform arrives at the bottom it is fixed, and the water is run off. Locomotives run along on the top of the mounds of rubbish, thus facilitating the removal of the material from place to place.

There are many other large slate quarries, known as the *Bangor*, *Dinorwic*, *Gilgwyn*, *Dorthea*, *Llanfair*, *Rhwyfachno*, &c., in Carnarvonshire. There are also numerous workings in Merionethshire, amongst which we may mention the *Cumorthen*, *Diphwys*, *Cussen*, *Eftiniog*, *Maenoffern*, and *Oakeley* quarries, which produce blue and grey roofing slates and slabs. Other quarries are situated in Montgomeryshire, Denbighshire, and Caermarthenshire.

Scotland is not without slates. They are principally quarried in Perthshire, Argyleshire, and Invernesshire. At *Balachulish*, in the last-mentioned county, Gwilt says* that from five to seven millions of slates are annually extracted, the weight of which may be estimated at 10,000 tons. The refuse, amounting to upwards of five or six times this quantity, is thrown into the sea,—a ready method of getting rid of it at a small expense. The slate is of a dark blue colour, containing pyrites, which, however, do not weather out, but stand up like small cubes of brass.

Many Scotch slates occur with these pyrites, but as we have previously observed,† they do not under certain conditions detract from their value in the slightest degree. Amongst the slate quarries in Perthshire, we may mention the *Bentley*, *Burnan*, *Glenalmond*, *Glenaeche*, and *Turin*; in Argyleshire, the *Bardale*; in Banff, the *Tantemore*, near Ruthven; and in Aberdeenshire, the *Fouldland* quarry, near Aboyne.

Irish slates are worked at *Killaloe*, near Tipperary, in Lower Silurian rocks. Prof. Hull says that these quarries lay open a vertical section of over 350 ft., and produce slates from 10 ft. square downwards, of a dull bluish-grey colour, and of good quality, though somewhat rough. The *Valencia* quarries are well known, from the fact that large slabs and flags are exported for making cisterns, baths, &c., to England. As a general rule, the cleavage is not very fine, but large slabs are raised of light bluish-grey or greenish tints. The *Valencia* slates are in the Devonian formation. At *Clonakilty*, near Cork, the material is quarried in lower carboniferous beds of very good quality, being both light and durable. The same may be said with regard to those from the *Old Head of Kinsale*, whilst the

* Guide to Museum of Practical Geology (1877), p. 36.
† Geology of Leicestershire and Rutland, by Harrison (1877), p. 9.

* Encyclopedia of Architecture, p. 623.
† Builder, vol. 1, p. 728.

Ashford quarries in Wicklow produce slate like that of North Wales, near Bangor. Slates are also obtained from Kockroe and Mealoughmore, near Carrick-on-Suir, in Kilkenny.

VARIORUM.

THE sixth edition of the "The Watch and Clock-makers' Handbook, Dictionary, and Guide," by F. J. Britten (London: W. Kent & Co.), has recently appeared. It is an exceedingly useful and well-arranged compendium of the subjects of which it treats, and the French and German equivalents of the technical terms and processes dealt with are given. Short biographies of eminent horologists, and descriptions of lathes and other tools, go to make up what is a very useful reference-book. It is very fully illustrated. A list of date-marks on gold and silver plate and watch-cases marked at Goldsmiths' Hall, London, going back to the year 1697 and forward to 1896, is not the least useful part of this excellent handbook.—From *Church Bells* Office (12, Southampton-street, Strand), we lately received "Church Bells' Album of Notable Ancient Yorkshire Churches," which, for sixpence, gives views of twenty-eight fine churches and ministers, accompanied by brief letter-press descriptions to each plate. While not vouching for the correctness of the historical and architectural notes (the author's name does not appear on the title-page) we nevertheless welcome this effort to popularise a knowledge of the main facts regarding so many of the principal churches in the large county of York.—Amongst recent trade-books received is the Coalbrookdale Company's Priced Catalogue of Iron Casements and Window Frames, which merits perusal on account of the practical information it gives. The London office and show-rooms of the Company are now at the corner of New Bridge-street and the Victoria Embankment.—Another useful trade book is Messrs. Charles Winn & Co.'s (Birmingham) illustrated catalogue of closet-flushing cisterns and general waterworks fittings, which is very complete and conveniently arranged, so that it will be handy for reference.—Belonging to somewhat the same category is "The Annual Export Catalogue of Machinery and Hardwares by the Principal Makers of Great Britain" (published at 147, Queen Victoria-street), which is now in the third year of its existence. It is likely to be very useful, and to facilitate business in all kinds and classes of machinery.—Messrs. Cassell & Company send us a parcel of their excellent magazines for January. The *Quiver* is a good number. One article in it, "Charles Wesley in Marylebone," by the Rev. John Telford, B.A., recalls to mind that Marylebone was quite a rural suburb at the date in question, circa 1740. *Cassell's Family Magazine* is varied and interesting in its contents. One of its articles is entitled "A Rural Paradise for London," the locus in quo being Parliament Hill and Fields, Hampstead. The author, F. M. Holmes, rightly urges that if this property be acquired as a metropolitan open space, the Metropolitan Board had better not attempt to convert it into a prim park. *Little Folks*, the ever-popular magazine for juveniles, commences a new volume with well-sustained variety and vigour.—From the Religious Tract Society we have received another parcel of magazines. Two of them, the *Child's Companion*, and a new venture, *Our Little Dots*, are admirable of their kind. For boys and girls who have passed the period of infancy, there are the *Girl's Own Paper* and the *Boy's Own Paper*, both of them established favourites. From the same publishers come the *Leisure Hour* and the *Sunday at Home*. The contents of the former include an interesting article by Professor Leone Levi, entitled "Fifty Years of Economic Progress."—Messrs. Crosby Lockwood & Co. will shortly issue a new edition of "Every Man's Own Lawyer," by a Barrister.

New Club Buildings at Kilburn.—New premises for the Kilburn and West Hampstead Constitutional Club are about to be erected at Kilburn, and the foundation stone of the buildings was laid last week. The structure will be faced with red brick, relieved with moulded brick and red Mansfield stone dressings. The building will consist of three floors,—basement, ground, and first floor. Mr. W. J. Middleton, of West Hampstead, is the architect, and Messrs. John Allen & Son, of the Palmerston Works, Kilburn, are the contractors.

ALMANACKS AND DIARIES FOR 1887.

"WHITAKER'S ALMANACK" for 1887 (published at 12, Warwick-lane, London) has this year been considerably improved and enlarged, so that it is not likely to lose the hold on the public favour which it has hitherto so deservedly maintained.

"Calvert's Mechanics' Almanack and Workshop Companion" for 1887 (London and Manchester: John Heywood) has now reached its fourteenth year of publication. It is very varied in its contents, and contains a mass of memoranda and formulae likely to be of use in the workshop.

"Cassell's Illustrated Almanack" (London: Cassell & Co., Limited) is an attractive and useful one, and it is well illustrated.

Messrs. Hudson & Kearns, of Southwark-street, send us a parcel of their admirable Diaries, specially designed for the use of architects, builders, surveyors, and engineers. We find it difficult to add to our former commendations of these excellent publications; this only we need say, that the standard of excellence and completeness is fully maintained this year,—excellence as to get-up, quality of paper, &c., and completeness as to the mass of valuable tabular and other information which is bound up with each diary. We can strongly recommend "The Architect's Diary," Nos. 12 and 13, and "The Builder's Diary," No. 11. With the diaries we had submitted to us some excellent date-indicating writing-pads, very useful for office-desk or library table.

Messrs. T. J. Smith, Son, & Downes, of Queen Victoria-street, have sent us an assortment of T. J. & J. Smith's well-known scribbling, tablet, and pocket diaries. Messrs. Smith's diaries have now been before the public for more than forty years, so that they need no recommendation. Suffice it to say that they show no falling off in get-up, quality, or arrangement.

We have also received a small selection of Letts's Diaries, which, in the hands of their new publishers (Messrs. Cassell & Co., of La Belle Sauvage-yard), appear to fully maintain their character for excellence.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,730, Blocks for Fireproof Ceilings. J. D. Denny.

These blocks are for the construction of fireproof and ventilating ceilings, and lock one in the other, being self-supporting and not requiring any girders or pillars to be used. The bottom of the blocks form the ceiling, and the top of the blocks form floors, and openings or flues are left as may be required. A pattern is generally indented at the top of the blocks to prevent slippiness. They are fixed with plaster of Paris and cement mixed.

502, Open Fire-grates. J. Jex Long.

According to this invention the upper part of the front plate above the front bars and the fire-plate or box is dome-shaped, or, as the inventor describes it, of a "hollow spheroidal arch shape." Within this enclosed space is fitted a sheet of metal, and the whole is hung so that it may be tilted forward or backward. A blower is also used of a special design. The object is to provide better ventilation and greater economy in fuel by management of the combustion of fuel.

616, Kilns, &c. J. Howie.

The floors of kilns constructed in accordance with this invention are formed from hollow bricks or blocks glazed inside, and so fitted together as to form a series of parallel flues for conveying steam or hot gases which serve to heat the chambers. They are by preference rectangular in cross section, and are formed so as to fit into each other, so that they may be jointed together with cement or luting. The shelves or stands on which the clay ware or other goods are placed are formed of the slabs in the same way as the floor and sides of the kiln.

770, Flooring Tiles, &c. W. Benson and Lehi Gunning.

This invention consists in preventing the adhesion of the clay surfaces while in a plastic condition by treatment with oil or water or suitable liquid. A hollow roller is used to spread or deliver the liquid as soon as the substance issues from the compressing chamber.

829, Flushing Pans, &c. J. G. Stidder.

According to this invention, at the back of the W.C. pan, or in any other position for suitably flushing the same, a flushing-fan with three or more lips is placed. These lips project into the pan at different angles, the central lip projecting at a greater angle than the other lips, which are more

vertical so as to force away all matter from the sides of the pan and out into the traps at the first flush of water.

12,597, Lock-up Ventilators. J. Treasure.

The ventilator which is the subject of this invention is formed with a sliding plate, which being moved backward or forward opens or closes the apertures for the admission of air. The plate is actuated by a square-headed spindle, which is turned with a key fitting the square head. When the key is removed the ventilator cannot be altered.

NEW APPLICATIONS FOR PATENTS.

Dec. 10.—16,171, S. Hazeland, Planing Wood.—16,185, M. Bibbero, Gasfittings.—16,213, W. Murray, Window Sashes and Frames.

Dec. 11.—16,225, A. Edmondson and Others, Hinges.—16,272, A. Ramsden, Pipe Joints.

Dec. 13.—16,324, H. Bassett, Window-sash Fastener.—16,312, W. Illingworth, Joiners' Adjustable Bench Stop.—16,330, R. Schouler, Drain-pipes, &c.

Dec. 14.—16,357, R. Warwick, Parquetry.—16,360, C. Ewing, Sash Fastener.—16,390, L. Oppenheimer, Wood Block Flooring.

Dec. 15.—16,422, F. Hayward, Varnish.—16,451, C. Challis, Mechanism and Attachments for Bolls.—16,452, F. Crittall, Stoves or Fireplaces for Warming and Ventilating.—16,471, G. Redfern, Hearths or Fireplaces.—16,480, W. Joy, Portland Cement.

Dec. 16.—16,496, J. Myatt, Drain Chains or Rods.—16,498, E. Court, Jack and Spoke Shaves.—16,514, C. Wendenby and J. Dodd, Chisels, Screwdrivers, &c.—16,520, T. Lowcock, Door-springs.—16,527, J. Havard, Window-sash Fastener.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,782, A. Barratt, Screw-drivers.—13,632, H. Walker, Wood-boring Tool.—13,959, J. Howie and T. Groves, Open Kilns.—14,206, R. Lee, Fastenings for Windows.—14,545, J. Bridger, Glass Tile, Panel, or Light.—14,916, A. Edmondson and Others, Bolts or Bars for Doors, &c.—14,954, J. and G. Turner, Combination Latches and Handles for Doors, &c.—15,113, J. Tucker, Lock.—14,674, N. Scott and Others, Portland Cement, &c.—15,719, W. Wieg-horst, Bakers' Ovens.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

13,945, J. Hill, Opening and Closing Fanlights and Casements.—2,070, J. Watson, Cowls or Caps for Ventilating Shafts, Flues, &c.—2,310, D. Swan, Pigments.—4,224, A. Ryles, Ornamenting Panels, Tiles, &c.—6,934, S. Rogers, Saw-sharpening Machines.—2,199, W. Tylor, and W. Drayson, Closet-basin and other Joints.—2,337, R. Lacey, Latches.—2,398, H. Falja, Apparatus for Mixing Concrete.—14,580, H. Lake, Metallic Lathing and Fixing same.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

DECEMBER 13.

By WOOD & SPINK.
Windsor—The Victoria Livery Stable, freehold.....£1,985

By MURRELL & SCOBELL.
Limehouse—Nos. 37, 39, and 41, Aston-street, copyhold..... 455

Nos. 27 and 29, Cayley-street, copyhold..... 345

By GRAVES & SON.
Tooting—1 to 13, Abhol-terrace, and 1 to 6, Melrose-terrace, ground-rent 89l. 10s. 6d..... 6,550

Paddington—7 and 9, Marlborough-street, 62 years, ground-rent 11l. 6s..... 705

DECEMBER 14.

By RYNDOLLS & EASON.
Houndsditch—26 to 30, Hutchinson-avenue, freehold..... 1,120

By ROBINSON & RUDKIN.
Hendon—30 and 32, Ash-grove, 93 years, ground-rent 11l. 12s..... 450

By W. J. McALIS.
Notting-hill—Nos. 250, 252, 254, and 258, Lancaster-road, 76 years, ground-rent 29l..... 1,930

By FULLER & FULLER.
Mile End—Nos. 3, 5, and 7, Clinton-road, freehold Deptford—Freehold ground-rent of 8l. per annum, reversion in 19 years..... 210

Blackfriars—No. 56, Stamford-street, freehold..... 1,500

By FRANK JOLLY & CO.
St. Luke's, Errol-street—Business premises, 79 years, ground-rent 35l..... 400

DECEMBER 15.

By HOBSON, RICHARDS, & CO.
Old Kent-road—Nos. 805 to 814, and 814 to 818 (even), Hope Cottage; two plots of freehold land, and ground-rent of 26l., reversion in 37 years..... 5,800

Camberwell—Nos. 47 and 49, Paulton-road, 81 years, ground-rent 13l..... 795

By LUTY & HOWITT.
St. Pancras—An improved ground-rent of 11l., term 69 years..... 165

Hampstead-road—An improved ground-rent of 12l. 12s., term 40 years..... 165

An improved ground-rent of 12l., term 54 years..... 265

Baywater—No. 2, Courtwell-street, 60 years, ground-rent 8l..... 620

Edgware-road—An improved rent of 90l., term 35 years..... 1,220

By H. RUTLEY.
Kensal-green—No. 2, Church-place, freehold..... 670

By R. J. COLLIER.
Upper Clapton—No. 263, Evering-road, 88 years, ground-rent 8l..... 700

Brunswick-square—Nos. 20, Hunter-street, 23 years, ground-rent 24s. 6s.	2330
DECEMBER 16.	
Prince's Gate—Ground-rent of 50l. a year, term 65 years	1,098
Muswell-hill—A plot of freehold land	180
Islington—No. 12, South-street, 22 years, ground-rent 2s.	160
Shortlands, Bromley-road—Four plots of freehold land	818
Finbury—Ground-rent of 8l. reversion in 22 years	1,070
Holloway—Ground-rent of 6l. 6s., reversion in 63 years	165
Paddington—Nos. 16, 16, and 17, North Wharf-road, 34 years, ground-rent 10s.	410
150l. Stock in the Gas Light and Coke Company	405
Barnsbury—Nos. 13, 17, and 19, Denmark-street, 32 years, ground-rent 18s.	895
Stoke Newington—Nos. 23 and 24, Newington-green, freehold	1,310
Islington—Nos. 6 and 61/2, Liverpool-road, freehold	960
Blackfriars—Nos. 6 to 11 (odd), Burrell-street, 25 years, ground-rent 2s.	596
Borough—Nos. 20, 22, and 24, Brockham-street, 40 and 51, Swan-street, 83 years, ground-rent 36s. 4s.	300
Hinton—No. 34, Loughborough Park, 38 years, ground-rent 8s.	535
High Holborn—No. 190, freehold	1,560
By E. ROBINSON & HENR.	
Horsely—No. 129, Lothair-road, 91 years, ground-rent, 6l. 6s.	285
Orford street—The lease of No. 61, term 4 years	105
DECEMBER 17.	
Hackney—Ground-rent of 18l. 10s., term 75 years	280
By A. WALTON.	
City—The lease of No. 89, Worship-street, term 10 years	270
Edmonton—Ground-rent of 18l. 10s., reversion in 75 years	730
By GIBBY & TURNER.	
Hendon—Ground-rent of 100l., reversion in 78 years	2,070

Miscellaneous.

Underpinning at Bolton.—We are informed that Messrs. J. Kershaw & Co. have recently undertaken a somewhat novel piece of work at their Derby-street Mills, — a work which is almost American in its boldness. They have for some time been in want of extra accommodation in connexion with this mill, and as the site is limited, the firm conceived the idea of underpinning the whole of the present building, and constructing beneath it an entirely new story. With this idea they consulted Messrs. Cunliffe & Pilling, architects, of Bolton, as to the advisability of undertaking such an extension, and the possibility of executing it without stopping a mill,—that being a sine qua non. The architects, having advised favourably as to the scheme, undertook the work of preparing plans and designing the necessary shoring, &c., and the work was entrusted to Messrs. W. Dobie & Sons, contractors, of Nelson-street, Bolton, who successfully carried out the work, which has been executed under the direct supervision of Mr. W. S. Dobie, one of the firm. The present building is three stories high, and the machinery and shafting in each story has been running truly during the whole time of the alterations. The new basement is fireproof, constructed with small span brick arches, on wrought-iron girders, concreted on the top, and flagged. The old pillar foundations have been taken away, and new iron pillars substituted in their place. The main walls of the new story have been formed by cutting out the foundations and footings of the present building, and underpinning the old walls, which are supported in short lengths, whilst the new walls are built up solid from the lower level. The contractors have had to cut out and remove about 200 tons of stone from the old wall and pillar foundations, and have carted away between 2,000 and 3,000 cubic yards of solid earth.

Corrugated Iron Buildings.—Messrs. North & Son, of London-road, Southwark, call our attention to their system of erecting corrugated iron buildings with iron dowels and T and angle-irons, whereby they claim that every part comes together interchangeably for erecting or removal without damage, besides adding greatly to strength, economy, and facility of erection.

Competition: Slough Public Hall.—Mr. T. R. Richards, who has been employed as assessor in the competition for this building, recommended the design signed, "Be Strong," subject to verification of estimates. The committee have adopted his recommendation. The author of the design is Mr. F. W. Albury, of Reading.

The Distribution of Electricity.—We have lately had an opportunity of examining the Callender and Webber system for the laying down of ways for underground cables, which secure the protection and provide for the maintenance of the cables. The first working example is now on exhibition at the Borough-road works of the Anglo-American Brush Electric Light Corporation, Ltd. It is what is known as a "drawing-in" system; its speciality consisting in the provision of a separate "way" for every cable, each way being a closed passage impervious to water or gas, completely separate from all other ways and earth by a wall of material in itself a fair insulator. The danger of "earths" or "contacts" is thus reduced to a minimum, as it would be necessary to penetrate both the wall of the case and the dielectric of the cable before the insulation could be destroyed. The cases or "ways" are constructed of a bitumen concrete, possessing great strength, impervious to water, and unaffected by the gases or acids found in the soil. It does not expand or contract. The cases are preferably rectangular in form, pierced with holes or ways of a diameter suitable for the cables to be drawn in, a separate way being made for each cable, and the cases being made to carry the number required. They are generally 6 ft. in length, but can be supplied in from 3 ft. to 12 ft. pieces. Their ends are true, so that each butt exactly on to its neighbour; the joints are formed by saddles closing round the cases cemented together by molten material, similar in composition to that of which the cases are made, the whole then forming one homogeneous mass. Light shields are fitted in the ways and kept in position by mandrills to ensure that no bitumen shall penetrate during the process of jointing, and that no rough edges present themselves at the joints which might interfere with the drawing of the cable or injure it in its passage. Drawing-in boxes or manholes, of the usual type, are provided wherever necessary, to give access to the cables for repairs, or for providing additional leads. The bitumen concrete in question is made under the patent of J. W. Butler, and the system of laying is that patented by T. O. Callender, 101, Leadenhall-street, and Major-General Webber, C.B., R.E.

House Fires without Smoke.—At a meeting of the National Smoke Abatement Institution, held on the 13th inst., Mr. Ernest Hart in the chair, Professor Frankland, F.R.S., gave an interesting description of the smokeless fires which had been burned in his house during the last five years, none of the chimneys having been swept during that time. The grates are the ordinary open ones that were in the house when he took it, no alteration having been made beyond a slight addition involving a cost of about 2s. The fires are lighted with wood, in the ordinary way, without difficulty, and the servants appreciate them for their cleanliness. Professor Frankland, at the request of the Council, promised to give a lecture on the subject shortly. It was reported that the Council had been in correspondence with the Home Secretary on the subject of the insufficiency of the fines inflicted in cases of smoke nuisance, and that subsequently, at a meeting of the metropolitan magistrates, presided over by Sir James Ingham, it had been resolved to increase the fines in all cases. A report on the work of the Institution was read, which described a considerable number of new smoke-prevention appliances which had been brought to the notice of the Council, especially some new smokeless stoves, which showed, by the reports of the testing engineer, Mr. D. K. Clark, M. Inst. C.E., greatly increased duty for the amount of fuel consumed.

It was resolved that the Home Secretary be requested to receive a deputation to lay before him the inefficiency of the existing Smoke Abatement Acts in the metropolis, and the mal-administration of those Acts in the provinces, and also information upon the subject of modern heating methods and the means of preventing smoke from furnaces and domestic fires. It was also resolved that the First Commissioner of Works be requested to receive a deputation on the subject with reference particularly to the deterioration of public buildings by smoky atmosphere.

Lincrusta-Walton.—We have received some samples from the Lincrusta-Walton Company of new designs for wall-hangings in their material, which are very artistic in character, and which appear to be produced at very low prices considering the effect obtained.

Local Self-Government.—Mr. Silvanus Trevail, member of the Truro City Council, lectured before the Bodruth Institution in the Druids' Hall, recently, on the subject of local self-government. The complications of our present system, he said, were such as no other civilised country would tolerate, and could only be excused on the ground that as each new want presented itself, our Parliament added another scrap of legislation to meet it, by the creation of a special Board for each special object,—a system at once the most primitive and extravagant. Mr. Trevail would, therefore, start by having one local body, and only one, to transact all the administrative business of a district. This Board he would call the primary body, and it should be similar in its functions and constitution to the Town Council of a municipal borough, excepting that all its members should be elective directly from the ratepayers. This body might be named the "local council," to distinguish it from present Boards, all of which it should supplant, absorbing their several functions to itself. In conclusion, Mr. Trevail summarised his main proposition as being the simplification and unification of the primary area, the creation of one authority for all local business, and only one; the creation of County Boards, the reorganisation of the staff of local government officials, and the consolidation of local finance. He thought if such a scheme were inaugurated in this country it would attract some of our most capable citizens to the duties of local government, a seat in which would be second only to that in the Imperial Parliament, while the relief afforded to the latter body would be its salvation; and that no better training could exist than in the county parliament for qualification for membership in the higher body.

Presentation Dinner.—On Saturday evening last, at the Holborn Restaurant, Mr. Alexander Ritchie, who for the past twenty-seven years has been associated with the Milton Ironworks, Glasgow, was entertained at dinner by the staff of the firm of Steven Bros. & Co., of Upper Thames-street (the London house of the Milton Foundry, of which firm Mr. Ritchie has for the past seventeen years been the manager), and a company of private friends. The principal cause of the gathering was to present Mr. Ritchie with an illuminated address from the staff, a gilt inkstand and candelabra from the warehousemen of the firm, and a silver *épergne* from his private friends, and to congratulate him on his return to business after six months' enforced absence caused through a serious carriage accident in April last, when he sustained a serious compound fracture which was followed by a painful illness. At the dinner referred to, congratulations were expressed by all present, and a very pleasant evening was spent, brightened as it was by a contribution of vocal and instrumental music from the members of the staff. The proceedings throughout were of a very hearty character.

Trade Smoking Concert.—On Saturday last the office staff of the well-known firm of William Brass & Son, builders, Old-street, gave their second annual smoking concert at the Masons' Hall Tavern, Basinghall-street, when about 120 clerks and friends (several gentlemen from other well-known firms being present) spent a very enjoyable evening. After the programme had been carried out, the Chairman proposed the toast of the evening, viz., Messrs. William Brass & Son, which was heartily responded to, after which the singing of "Auld Lang Syne" brought the evening to a close.

PRICES CURRENT OF MATERIALS.

TIMBER.		2 s. d.	2 s. d.
Greenheart, B.G.	ton	6 10 0	7 0 0
Teak, E.I.	load	9 0 0	14 0 0
Sequoia, U.S.	foot cube	0 2 4	0 0 7
Ash, Canada	load	3 0 0	4 10 0
Birch "	"	2 6 0	3 10 0
Elm "	"	3 10 0	4 10 0
Fir, Danstic, &c.	"	1 10 0	2 7 0
Oak "	"	2 10 0	4 10 0
Canada "	"	3 0 0	6 0 0
Pine, Canada red "	"	2 0 0	3 10 0
" yellow "	"	2 5 0	4 0 0
Lath, Danstic "	fathom	3 0 0	5 0 0
St. Petersburg "	"	4 0 0	5 10 0
Wainscot, Riga "	log	2 15 0	4 0 0
" Odessa, crown "	"	3 5 0	4 0 0
Deals, Finland, 2nd and 1st, std. 100 "	"	7 0 0	8 0 0
" 4th and 3rd "	"	6 0 0	6 10 0
Riga "	"	5 10 0	7 0 0
St. Petersburg, 1st yellow "	"	8 10 0	9 0 0
" 2nd "	"	7 0 0	8 0 0
" white "	"	7 0 0	10 0 0
Swedish "	"	8 0 0	15 0 0

TIMBER (continued).			METALS (continued).		
	£. s. d.	£. s. d.		£. s. d.	£. s. d.
Deals, White Sea	7 0 0	17 10 0	COPPER—		
Canada, Pine, 1st	17 0 0	29 0 0	British, cake and ingot	42 10 0	43 0 0
" 2nd	11 0 0	17 0 0	Best selected	43 0 0	43 10 0
" 3rd, &c.	8 0 0	8 0 0	Sheets, strong	51 0 0	52 0 0
" Spruce, 1st	8 0 0	11 0 0	Chili, bars	38 10 0	39 0 0
" 3rd and 2nd	5 0 0	7 10 0	YELLOW METAL	0 0 4	0 0 4½
New Brunswick, &c.	5 0 0	7 0 0	LEAD—		
Battens, all kinds	4 0 0	12 0 0	Eng. Spanish	12 13 0	0 0 0
Flooring Boards, sq. 1 in., Pre-			English, common brands	12 17 6	0 0 0
pared, first	0 8 0	0 13 0	Sheet, English	13 16 3	13 18 9
Second	0 7 6	0 8 6	SPECIAL—		
Other qualities	0 5 0	0 7 0	Sideman, special	14 7 6	14 10 0
Cedar, Cuba	0 0 3	0 0 3½	Ordinary brands	14 5 0	14 7 6
Honduras, &c.	0 0 2½	0 0 3½	TIN—		
Australian	0 0 2	0 0 3	Strait	100 0 0	0 0 0
Mahogany, Cuba	0 0 4	0 0 7	Strait	100 5 0	0 0 0
St. Domingo, cargo average	0 0 4	0 0 7	English ingots	104 10 0	0 0 0
Mexican	0 0 3½	0 0 4½			
Tobacco	0 0 4	0 0 6			
Honduras	0 0 6	0 0 8			
Maple, Bird's-eye	7 0 0	10 0 0			
Rose, Rio	8 0 0	10 0 0			
Bahia	5 0 0	17 0 0			
Box, Turkey	0 0 6	0 10 0			
Batin, St. Domingo	0 0 7	0 1 0			
Porto Rico	0 0 4	0 0 5			
Walnut, Italian					

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Laying-out Pleasure Grounds, &c.	Guildford Town Council	30l., 30l., and 10l.	Feb. 14th	ii.
Asylum Buildings	Borough of Maidstone	Not stated	March 1st	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Cast and Wrought Iron for Bridge	Sheffield Corporation	Robt Davidson	Dec. 31st	i.
Provision Market and Arcade	Rathbone Market Co.	G. Fuller	Jan. 6th	xvii.
Additions and Alteration to Laundry	Kennington Guardians	H. H. Bridgman	Jan. 6th	xvii.
Stores and Materials	Liverpool Corporation	Official	Jan. 7th	ii.
Alterations to Local Board Offices	Tottenham Local Board	De Pape	Jan. 11th	ii.
Making-up Roads, &c.	do.	do.	do.	ii.
Brick Sewer	do.	do.	do.	ii.
Kerbing, Tar-Paving, Metalling, &c.	Lewisham Bd. of Wks	Official	do.	ii.
Sewerage Works	Com. of Sewers, Lincoln	J. Kingston	Jan. 31st	xvii.

TENDERS.

BARNES.—For additions to the Westfield Schools, Barnes, for the Barnes School Board. Mr. Henry Jacques, architect:—

W. H. Parson	2994 0 0
W. Hallett	980 0 0
Geo. Barnes	970 0 0
Charles Wall, Chelsea	932 0 0
F. R. Tozer	919 0 0
W. J. Beale	885 0 0
R. L. Wood	885 0 0
G. Stephenson	871 0 0
G. Lyford	861 0 0
F. H. Dawes	853 0 0
Webb & Rosser	812 0 0
Jas. Tozer	797 0 0
J. H. H.	754 4 0
H. Haynes	775 0 0
A. Sale, Barnes	799 0 0
Newton & Idle	768 0 0
J. Channon	750 0 0
J. H. Goodwin	738 13 6
A. Hunt, Barnes	720 0 0
H. Pickersgill, Fulham	705 0 0
A. & E. Braid	699 0 0

CANNING TOWN.—For rebuilding two shops at Rathbone-street, Canning-town, E. Mr. J. H. Bethell, architect:—

T. Baxter	£898 0 0
W. Parsons	645 0 0
Allerton & Fox	565 0 0
J. W. Wyles (accepted)	548 10 0

CROYDON.—For asphalted works to playgrounds at the Princes-road, Oval-road, and Brighton-road Schools, for the Croydon School Board, under the direction of Mr. Robert Ridge, surveyor to the Board.

H. Lake, Croydon (accepted)

£582 3 4

EARLING.—For the erection of a new wing to the Public Baths, Earling, for the Earling Local Board, under the superintendence of Mr. Charles Jones, C.E., surveyor to the Board.

Jones Bros.	£1,728 0 0
W. A. Road	1,690 0 0
Oldrey & Co.	1,655 0 0
W. J. Beale	1,638 0 0
Friestley & Gurney	1,645 0 0
Wardrop	1,614 0 0
W. H. Waters	1,573 0 0
H. Haynes	1,530 0 0
H. Pickersgill, Fulham	1,530 0 0
Adamson & Sons (accepted)	1,495 0 0

GOOLE.—Accepted tenders for enlarging the Alexandra-street School, Goole, for the School Board of Goole, Mr. William Watson, architect, Wakefield:—

Excavating, Brick, and Stone Work, Plastering, Carpenter and Joiner's Work.

Newboul & Garnet

Slating

George Stewart

Plumbing, Glazing, Gas, and Iron Work.

Webster, Jackson, & Co.

Painting and Staining

M. Baron

Total

[All of Goole. Seventy-eight tenders received.]

LONDON.—For new studio, alterations, and additions, No. 13, Portland-place, W., for Mr. William Quiller Orchardson, R.A. Mr. Charles F. Moron, architect.

Quantities by Mr. Henry Bushell, Finsbury-pavement:—

Church & Co., Coleman-street

T. H. Kinglesley, Oxford

J. K. Tibbatts, Buckingham

S. C. Farmer, Braintree

Clarke & Bracey, Coleman-street

G. H. & A. Bywaters, Regent-street

Lawrence & Sons, City-road

L. C. Roper, New Cross

* Accepted.

LONDON.—For rebuilding No. 18, Cowcross-street, E.C., for Mr. H. Wilson. Mr. J. H. Bethell, architect:—

S. Goodall

John Garrud

George Moore

E. Battershill

J. W. Wiles

J. Studd & Son (accepted)

£410 0 0

Christmas

Whitburn (accepted)

£250 0 0

SHERBORNE.—For Ham stone work for new Ban-

torium, King's School, Sherborne:—

Ham & Son

S. & J. Staple

Jno. Trask & Co. (accepted)

£495 0 0

£465 0 0

£490 0 0

WAKEFIELD.—Accepted tenders for alterations Westgate Schools, Wakefield, for the Wakefield School Board. Mr. William Watson, architect:—

Excavating, Brick, and Stone Work.

George Fawcett

Slating

C. F. Bycroft

Plastering

Charles Abson

Carpenter and Joiner's Work.

Edwin L. Graven

Plumbing, Glazing, Gas, and Iron Work.

Samuel Atkinson

Painting

C. Turner & Sons

Total

£264 6 8

[All of Wakefield. Thirty-four tenders received.]

WAKEFIELD.—Accepted tenders for converting premises into shops, Kirkgate, Wakefield. Mr. William Watson, architect:—

Excavating, Brick, and Stone Work.

George Fawcett

Slating

Pickles Bros.

Plastering

Charles Driver

Carpenter and Joiner's Work.

Charles Squires

Plumbing, Glazing, Gas, and Iron Work.

Samuel Atkinson

Painting

C. Turner & Sons

Total

£160 19 0

* Of Leeds, the rest of Wakefield.

[Thirty-five tenders received.]

TWELVE GOLD AND SILVER MEDALS AWARDED.

IRON CISTERNS.

F. BRABY & CO.

VERY PROMPT SUPPLY.

LARGE STOCK READY.

Particulars on application.

CYLINDERS FOR HOT-WATER CIRCULATION

LONDON:

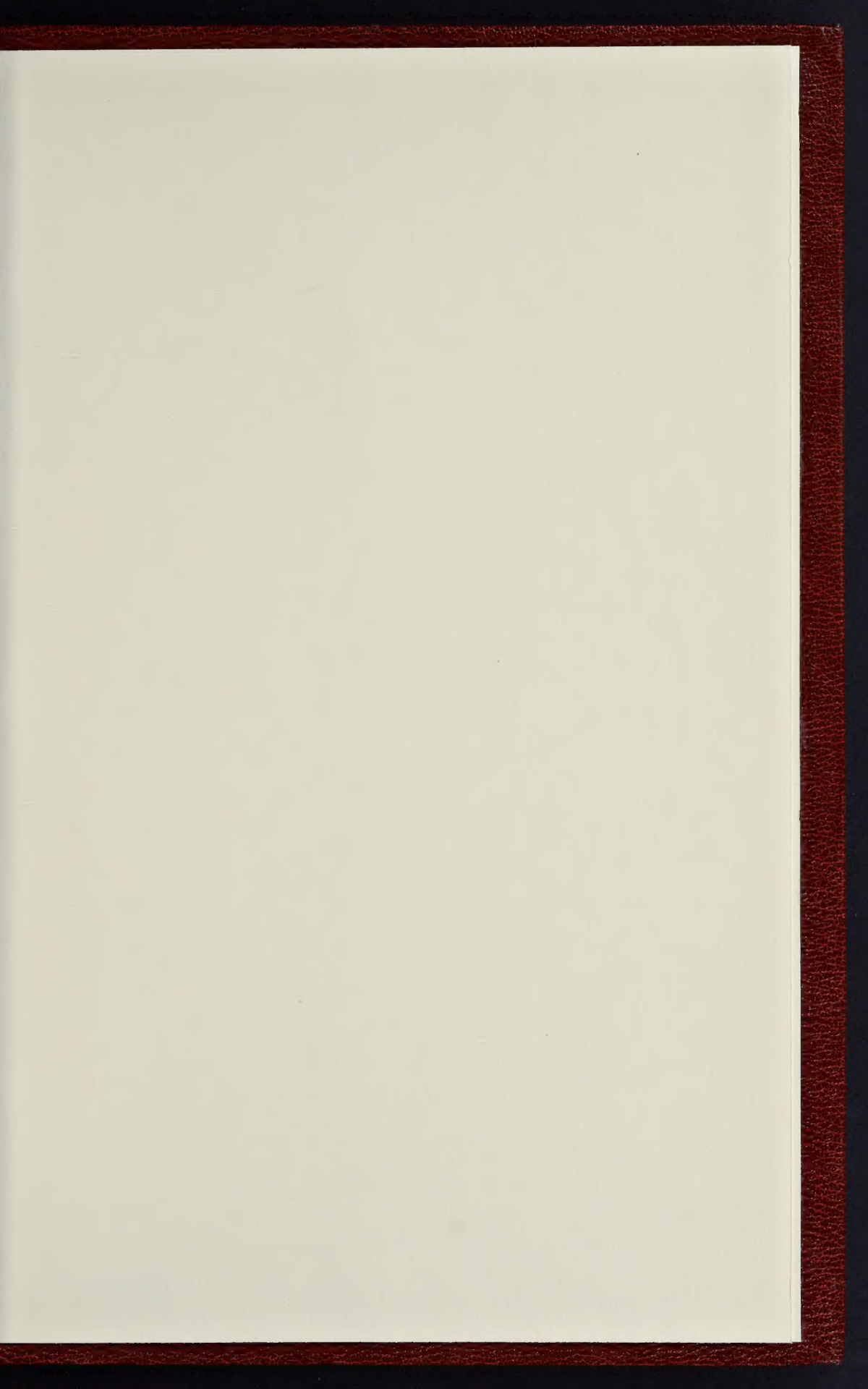
352 to 364, Euston-road.

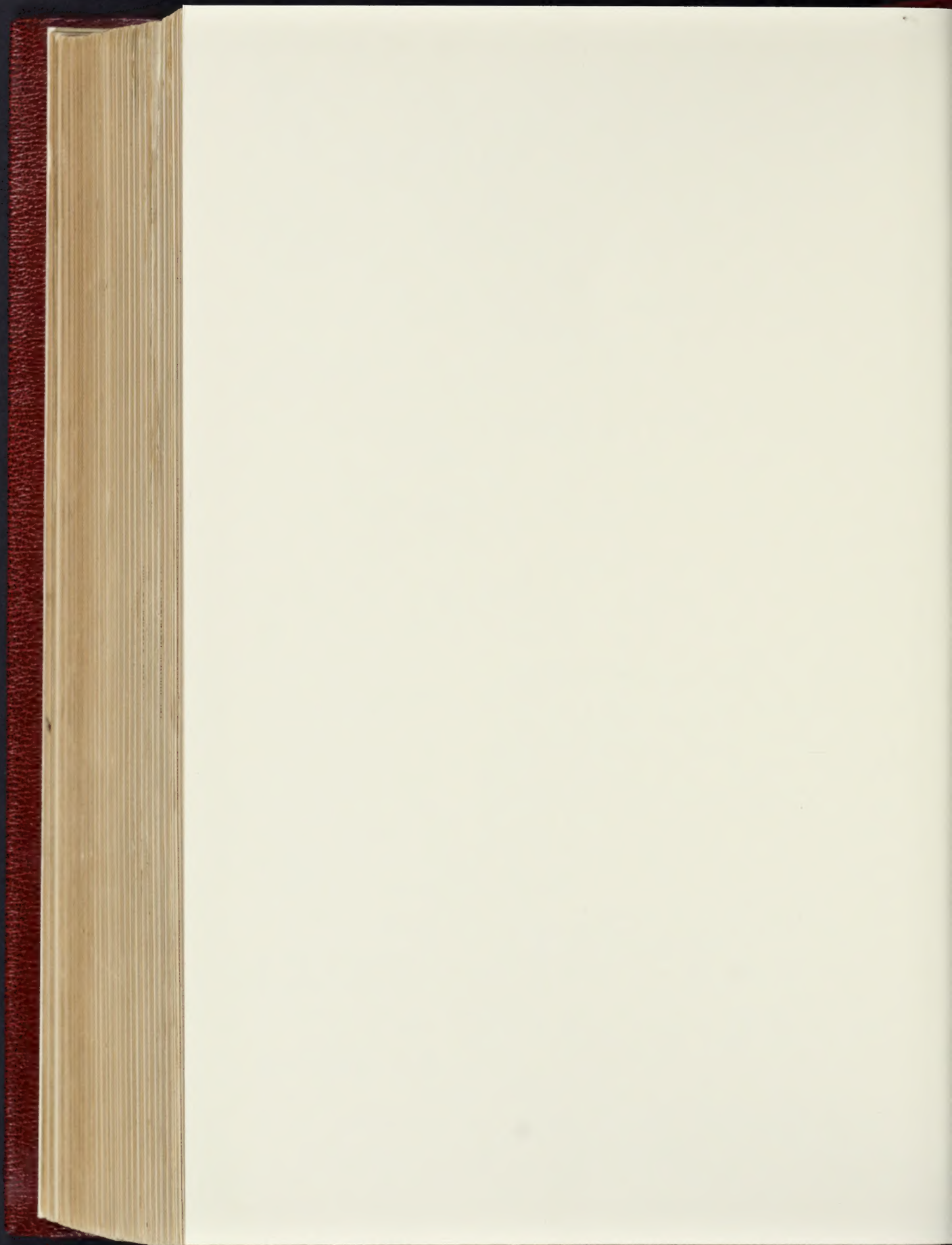
LIVERPOOL:

6 and 8, Hatton Garden.

GLASGOW:

335, Argyle-street





GETTY CENTER LIBRARY



3 3125 00702 3159

